CALIFORNIA
ST Y.
0 2007 1200941 0
California State Library
Accessions No. 117000 Received JUL 1901
Class fc 622.05 M6
1900 81

CALIFORNIA ...STATE... LIBRARY

3574

117000

MINING AND SCIENTIFIC PRESS.
AND PACIFIC ELECTRICAL REVIEW.

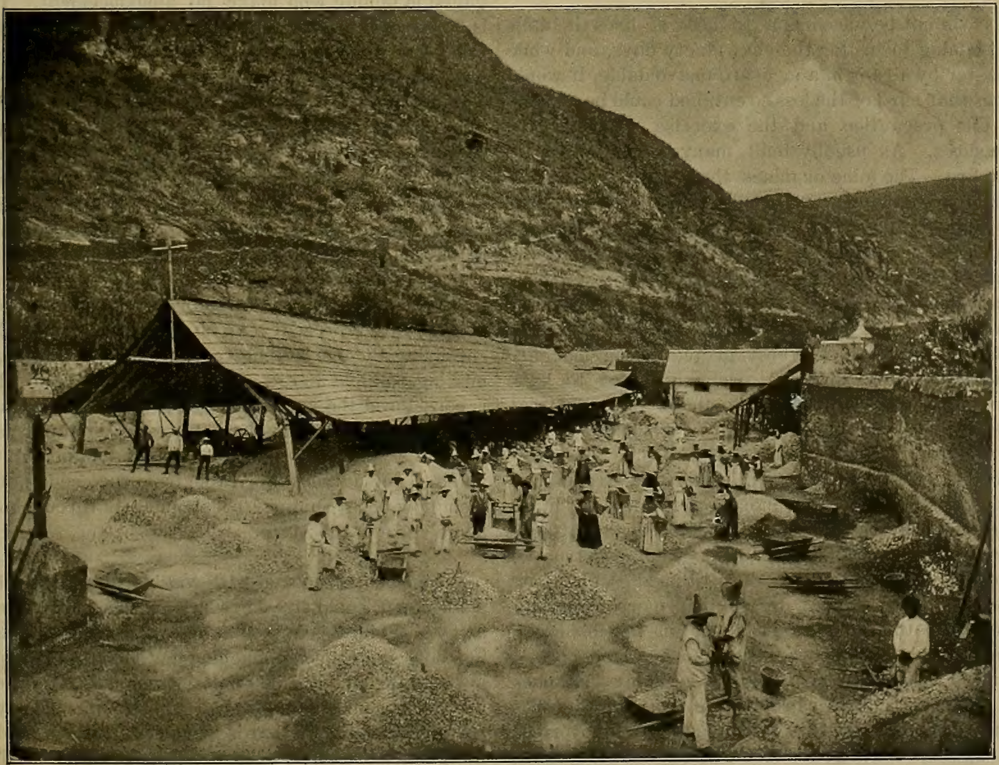
No. 2085.—VOLUME LXXXI. Number 1. SAN FRANCISCO, SATURDAY, JULY 7, 1900. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

Dynamites and Their Manufacture.

In the issues of June 23 and 30 appeared technical account of the manufacture of nitro-glycerine and dynamites. Continuing this subject of explosive compounds comes mention of gelignite, which consists of 65% gelatine and 35% absorbing powder, referred to in the issue of June 30. These three explosives—blasting gelatine, gelatine dynamite and gelignite—are closely related. They all consist of the variety of nitro-cellulose known as collodion-cotton dissolved in nitro-glycerine, where necessary made up with varying proportions of wood pulp, some nitrate or other material of corresponding character.

A later explosive of the combined gun cotton and nitro-glycerine series is cordite. Its proportions are 58% nitro-glycerine, 37% gun cotton, 5% vaseline. In its manufacture the gun cotton is deprived of moisture to 1%; to 28 pounds of gun cotton are added 43 pounds nitro-glycerine. These two ingredients are hand-mixed, then put through an incorporating machine with 16 pounds acetone. When these ingredients have been worked into the form of dough 4 pounds of vaseline are added; the incorporation is continued for seven hours, when the plastic mass is placed in a special press and forced through a hole, issuing from the press in the form of a thread or, in larger sizes, of a cord. The extruded cordite is wound on a drum as it issues from the press and is then taken to a drying house, where it is subjected to a temperature of 100° F. from three to nine days. By this means the solvent is evaporated and the manufacture of the cordite completed. Another class is those derived from the nitrated hydro-carbons, benzine, toluene, naphthalene and phenol. Nitro-benzine enters into the composition of several, including tonite No. 3, roburite, securite and bellite. Tonite consists of finely divided and macerated gun cotton incorporated with finely ground nitrate of barium, recrystallized. It is made by treating carbonate of barium with nitric acid. A given weight of wet, purified gun cotton, after being finely pulped, is intimately mixed under edge runners with the same weight of nitrate until the ingredients have become thoroughly incorporated and formed into a paste, then pressed into cartridges having a recess at one end for the insertion of the detonator, the cartridges being finally wrapped in paraffined paper. Tonite No. 2 is a variety of the foregoing, with the addition of charcoal. Tonite No. 3 consists of 19% of gun cotton, 13% of di-nitro-benzol and 68% of barium nitrate. It has a slower explosive action than some other varieties, and is better adapted for blasting in soft formations.

Ore Yards at Sirena Mine; Cars From Purisima Tunnel Starting Down Tramway to Mill.—(See page 5.)



Men and Women Ore Sorters at Sirena Mine.—(See page 5.)

Roburite is a Sprengel explosive; that is, it consists of two component parts, non-explosive in themselves, but which, when mixed together, form a powerful explosive. Dr. Sprengel's idea was to mix the two ingredients together at the moment of use. This mode of procedure could not, of course, be adopted, as the user—generally a miner or a quarryman—would require to be a practical chemist. Roburite consists of ammonium nitrate and chlorinated di-nitro-benzol; nitrate of ammonia is dried and ground, the melted benzol added and incorporated with it until an intimate admixture is obtained. The compound is then made up into cartridges, which are waterproofed, roburite being deliquescent, due to the nitrate of ammonia. Its explosion can only be effected by a detonator. Securite is another explosive of the Sprengel class, and consists of a mixture of 26 parts meta-di-nitro-benzol and 74 parts ammonium nitrate. A variety of this explosive known as flameless securite consists of a mixture of nitrate and oxalate of ammonia and di-nitro-benzol.

Bellite consists of a mixture of nitrate of ammonia with di-nitro-benzol. It absorbs little moisture from the air after it has been pressed into cartridges while in a heated condition. Like roburite, it is a safe explosive as well as a powerful one. Another explosive of this class is ammonite, which consists of a mixture of ammonium nitrate, paraffine wax, resin and di-nitro-naphthalene. The nitrate is heated and pulverized while hot and mixed with the naphthalene. The mixture is then granulated, sifted and pressed into tubes, which are afterwards filled with the same composition in a granulated condition.

MINING AND SCIENTIFIC PRESS.

ESTABLISHED 1860.

Published Every Saturday at 330 Market St., San Francisco, Cal.

ANNUAL SUBSCRIPTION:
United States, Mexico and Canada........$3 00
All Other Countries in the Postal Union........4 00

Entered at the S. F. Postoffice as second-class mail matter.

J. F. HALLORAN........Publisher.

Special Representatives:
EASTERN.
E. H. HAVEN........150 Nassau St., New York City.
MIDDLE WEST.
CHAS. D. SPALDING........153 La Salle St., Chicago, Ill.
INTER-MOUNTAIN.
W. A. SCOTT........Denver, Colo.
SOUTHERN CALIFORNIA.
W. D. CURTIS........223 W. Second St., Los Angeles, Cal.

San Francisco, July 7, 1900.

TABLE OF CONTENTS.

ILLUSTRATIONS.—Ore Yards at Sirena Mine; Cars from Purisima Tunnel Starting Down Tramway to Mill; Men and Women Ore Sorters at Sirena Mine, 1. Mexican Miner—Cargadores, Tenateros (Ore Packers); Tramway Skirting Sirena Mountain, Connecting Sirena Mine with Mill; Stopes on Second South Drift, Sirena Mine, at a Depth of 1200 Feet from Apex of Vein; View of Stope, Sirena Mine, Showing Structure of Vein, Main Tunnel Level, Depth 1000 Feet; "Driving Ahead" in Sirena Mine, 4. Kia Oro Dredge Dredging Gold in a Butte Co., Cal., Orchard; The Marigold Dredge, Feather River, Cal., Showing Tailings; A New Forest upon a Waste of Rock and Gravel; A Stop for Dinner on the Hillside; The Quiet Pleasures of the Mountain Lake; A Wooded Hilltop Above a Rock Cut, 6. Latest Mining and Metallurgical Patents, 7.
EDITORIAL.—Precaution for Fires in Mining Towns; Must Learn by Experience; Incorporation of Mining Companies; Railroad Restriction; Miscellaneous, 2.
MINING SUMMARY.—10-11-12-13.
LATEST MARKET REPORTS.—14.
MISCELLANEOUS.—Dynamites and Their Manufacture, 1. Concentrates, 3. A Guanajuato, Mexico, Mining Enterprise; Gold Dredging at Oroville, Cal., 5. Summer Outing Scenes, 6. Latest Mining and Metallurgical Patents, 7. The Electrical Precipitation of Gold on Amalgamated Copper Plates; Ozokerite, 8. At the Paris Exposition; The Work Would Apply; Smelter Methods in Colorado, 9. Personal; List of U. S. Patents for Pacific Coast Inventors; Notices of Recent Patents; Books Received; Recently Declared Mining Dividends; Mining School Graduates, 13-14.

THE 79th annual meeting of the American Institute of Mining Engineers will be held at Sydney, Cape Breton, and Halifax, Nova Scotia, August 21st–29th, under the auspices of the Canadian Mining Institute.

◆

THE recent Milwaukee Mining Congress made a mistake in indorsing the Torrens system of legal transfers. That system usually requires a guarantee fund to make good the blunders and mistakes growing out of Torrens titles. Legal titles to mining property are too uncertain and unsettled for any State or county to undertake to insure or guarantee Torrens titles to mining property.

◆

THIS paper is always pleased to receive and publish contributions of interest to its readers, and where deemed desirable illustrations, photos or sketches from which engravings may be made would be acceptable in further embellishment of the subject. Descriptions of appliances and records of experience are always interesting to readers everywhere, and oftentimes of great practical value.

◆

A MINING CLAIM is realty, and a man has a legal right to hold as many claims as he can do annual required work on; yet it is not wise to attempt to grab or hold the whole countryside. That is a habit and a bad one. A locality where one man or a few men hold nearly all the claims is not sought by investors, and wholesale claim holders thus defeat their own purpose. "Just doing assessment work" will keep a camp poor forever. It is development work that makes a camp, and a man who holds his claims to sell at a big profit, just as he would a corner lot in a rapidly growing town, must demonstrate intrinsic value or continue to be "claim poor."

◆

THE event of the week has been the advance in silver and lead, the former indicating withdrawal of deposits for export. In this regard it is of interest to note that New York City reports a greatly decreased number of outstanding silver certificates, thus indicating a cessation of speculation in silver on the Stock Exchange by means of such certificates. They have been so used since their introduction in 1889, but it would now appear that Eastern manipulators consider that the price of silver can be better sustained by control of the supply than by making the metal the subject of certificate speculation on the exchange.

Railroad Restriction.

California mineral development suffers from railroad restriction. In other States the railway companies advertise the resources of the area from which they draw support, rightly reasoning that their own prosperity will be proportionate to that of the country from which they naturally expect to get business. In California the Southern Pacific Company has always acted as though it were afraid that the State's mineral area should be exploited, a vigorous silence, a rigorous reticence being constantly maintained. For aught that great corporation emits no one would know that there was a mineral product in the State. Unlike any other commonwealth, whatever advance is made in the mineral development of the State is not made because of the railway company, but in spite of it.

Wherever it can it comes with a heavy hand on any California mineral producing industry. The latest from San Bernardino county is an example. In that county borate of lime is mined to the amount of about 900 tons per month, loaded at the mine in cars and hauled eleven miles by the borax company over its own road to Daggett, whence it is shipped to the refinery on San Francisco bay. It is considerable of an industry in a small way, one of those things that helps to develop a State, turning into money an inert mass. Formerly the marsh deposits of California and Nevada were the chief sources of borax. Mining and scientific development showed that the stratified rock formation of borate of lime in southern California could be made to yield profitably, by modern processes.

Till recently the freight rate from Daggett to the refinery—about half the length of the State—was $6.50 per ton. The S. P. Co. has raised the rate to $29 per ton. This, of course, is prohibitive, so the Alameda refinery must close. Meanwhile, if the San Bernardino county borax mines continue production the S. P. Co. will get the "long haul;" it will carry the crude borate to Galveston, Texas, over its "Sunset" lines. At Galveston it will be shipped by steamer to New York City—carried over 3000 miles, and at a freight rate cheaper than it would be taken from one California county to another.

This is not an isolated case, nor is the matter exaggerated. It is merely characteristic, and illustrates how mistaken policy retards and restricts the development of a State. Anywhere else such action would be impossible. It was supposed when the Santa Fe got its supplicated favors from San Francisco and the San Joaquin valley that that corporation would and could prevent the creation or continuance of such arbitrary action, but events in the last few weeks show that in California railroad operation combination is preferable to competition, and the cinch is tighter than ever.

◆

IT will not be uncommon to hear of fires in mills and mining towns for the next ninety days, and while disaster by fire is in a measure unavoidable, it would seem that most of the loss so entailed could be avoided by due precaution and the exercise of preventive measures. As usually built, many mining towns invite fire. The mine or mines that are the cause of the town's existence are usually at the head of a narrow canyon that widens down the grade and through which the wind sweeps. Should the fire start at the head of the canyon, it usually burns as long as there is anything left, for the fire protection is generally inadequate, and, despite heroic exertion, the disaster is often complete. The best protection against fire is to recognize its imminent probability and to have every procurable contrivance on hand to check it at the start. Time is worth about $25,000 a second during the first few moments after a fire is discovered—a well directed hand grenade or a stream from a chemical engine will do more to put a fire out in the first few minutes than a whole department after it has got under way. The manner of mill construction and the carelessness born of continued escape from the inevitable, make destruction more complete. There is nothing more likely to entail terrible loss in a mill or mine or mining town than fire, and nothing is more loosely guarded against in many instances. In mill construction, especially, in these days of better transportation, it is well to make all due provision against contingency of fire; it is more expensive to so build, but still more expensive to be burned out. One common mistake is in trying to get everything under one roof; then, if anything goes, it all goes, and the bigger the plant the greater the proportionate danger of such disaster. One thing is to be reckoned on: a fire is sure to start some time or other, and so far as possible the mill should be so arranged that when fire does break out, even if it can not be got under control, it will not consume the entire building.

Must Learn by Experience.

Now that the northern transportation boom has been worked for all it was worth it ought not to be necessary to continue daily statements at so much or so little per published line concerning the return of men with "big bags of gold" in their possession. The truth has been told in these columns about those northern gold fields, but many people want to believe what they themselves imagine. It is occasionally surprising what silly stuff men will believe, men who are ordinarily intelligent enough to discriminate. The following from the Juneau (Alaska) Dispatch of the 23d ult. is illustrative:

> The Alaska Commercial Company's steamship Excelsior arrived this morning from Valdes, Cook's Inlet and the Westward. She carried a number of passengers bound for the south. Among them was Dr. W. D. Northrup of San Diego, Cal., who, with some twenty other residents of that vicinity, says he was induced to go to Yakutat bay by stories of beach and gulf sands that carried 18 ounces of platinum to the ton, besides sufficient gold to pay all working expenses. These stories were told the San Diegans by two prospectors, who wintered last year at Yakutat and who claimed to have lost all their stores in the tidal wave of last autumn. They sold claims to many of the party at various prices, in one instance securing $600 for a one-fourth interest. The buyers will now dispose of these claims at a very low figure. Dr. Northrup says that 360 tons of these sands will produce one ton of concentrates, carrying an ounce of platinum and $4 in gold. There is only one mine at Yakutat and it produces less than $1.50 a day to a man. The party spent two months discovering this sad fact, and they are now returning to San Diego. They are trusting that they may get there before the two prospectors leave.

◆

THE fact that incorporated mining companies in this country paid over $40,000,000 in dividends during the first half of this calendar year will attract considerable attention in the East, where investors will contrast such showing with the unprofitable 150,000 miles of railroad, with over $10,000,000 liabilities. It is a most favorable showing, and will go far toward substantiating the claim that the mining industry, compared with other industries, has paid more dividends than any other. In the $40,000,000 are only announced dividends of incorporated companies. That aggregate falls far short of the total, for there are many companies profitably engaged in mining who make no announcement. This is largely due to the old fear in all competitive industries that some competitor would find out how profitable the business was, and so hurt him who proclaimed his prosperity by cutting into his profits. Such reticence is a survival of former fear in that regard, a fear that should be groundless in the one industry of all others that has least to dread from competition, and that depends for its progress largely upon the increase of the number devoting attention to it.

◆

NEXT in importance to California of the discovery of gold is the present exploitation of its oil wealth, supplying the one lacking requisite of cheap fuel, and making possible an era of manufacturing. And when is considered the variety of bye-products procurable from petroleum, it is manifest that even fuel supply may become secondary in commercial importance to the value of the articles derivable from the crude petroleum now being pumped so abundantly throughout a large area of the State.

◆

IT has been often said with considerable truth that a foreigner could live on what an American threw away. While this is true in many instances the saying does not apply to machine methods, to mining or manufacturing, to industrials in general. American manufacturers and engineers practice an economy in materials and labor that is unequalled abroad, and in no country are more economical methods of production than in the United States.

Concentrates.

THE diameter of a pipe is measured from the inside: that of a tube from the outside.

ALKALI in the water will turn cylinder oil milky if there be 5% or more of animal oil in it.

FOR heat purposes one pound of petroleum is reckoned equal to two pounds of bituminous coal.

UNDER a recent decision of the General Land Office mining and smelting are two distinct industries.

MILL TAILINGS at the Alaska-Treadwell mill, Douglas Island, Alaska, assay from 10 to 15 cents per ton.

SILVER 71.89%, copper 28.11%, gives an alloy that has a lower melting point than any other silver-copper compound.

THE number of miners employed in California in 1897 is officially reported to have been 16,763; in 1898, 19,823; in 1899, 24,991.

LITHIA is used a little in medicine. Lepidolite contains it; plenty of that mineral is available in California, but there is no demand for it.

AN Arizona county recorder's legal charge for recording a notice of location of a mining claim is $1.50; this includes filing, seal and all necessary.

TO FIND quantity of water elevated in one minute running at 100 feet of piston per minute, square the diameter of water cylinder in inches and multiply by 4.

WHIN is the Scotch term for quartzite. Quartzite may be commonly considered as a sandstone in which the crystals have disappeared by becoming indurated.

UNDER Colorado laws it is optional in organizing a mining corporation whether the stock shall be assessable or not. In California mining stock is always assessable.

THE tannic acid from oak wood is not a good boiler scale eradicator. It will attack the scale, but will also attack the boiler, and its use will be likely to honeycomb the tubes.

A MINING location made upon land already patented initiates no right. A patent may be attacked when it is void upon its face, or is prohibited by statute, or is based upon erroneous rulings of law.

ONE THOUSAND GALLONS OF WATER per hour constantly flowing under a 6-inch pressure is equal to 1¼ inches, miner's measurement. The same amount flowing without pressure is equal to 2½ inches.

IN the administration of the public lands the decision of the Land Department upon questions of facts is conclusive, when brought to notice in a collateral proceeding, and it is only questions of law which are reviewable by the courts.

UNDER a rule of the General Land Office a contract for more than $5000 cannot be awarded to a single surveyor, for that is supposed to be as much work as he could do within the time allowed for the completion of the whole survey.

THE Carson, Nevada, mint began coining in 1870; stopped May 22, 1893. Its largest coinage amount was in 1876—gold, $2,850,215; silver, $3,552,000; total, $6,402,215 for that year. Its total coinage was: gold, $23,829,425; silver, $25,445,009.30; total, $49,274,434.30.

PYRITIC SMELTING comprises the smelting of raw pyritic ores direct, in a blast furnace without the use of carbonaceous fuel, utilizing as a source of heat the oxidation of part of the sulphur and iron contents of the ore itself. Pyrrhotite and chalcopyrite may serve instead of pyrites for this purpose.

FOR calculating the capacity of any piston pump, multiply the area of bore of cylinder of pump by the length of stroke, and that result by the number of strokes per minute the pump is working. This gives the quantity of water in cubic inches; dividing this by 231 gives a total capacity of pump per minute in gallons and fractions of a gallon.

WITH care there is little danger of poisoning from cyanide. The chief source of possible trouble in that regard would seem to be that insoluble cyanide salts—cyanide of zinc—for instance, may mix with the slimes, not being well washed out, thus forming hydrocyanic gas when sulphuric acid is poured on. In case of inhalation, a prompt subcutaneous injection of hydrogen peroxide will be effective antidote.

NO PUMP will draft hot liquids any distance, for the reason that the vapor or steam rising from the liquid passes through the suction pipe into the pump and fills it with vapor instead of water. Therefore, for pumping hot liquids the pump should be placed as near as practicable, forcing the liquid upward instead of lifting it by suction. A hot water pump always requires metal valves throughout.

THERE are several simple tests for feed water, any of which can be used by those in charge of steam boilers. The hardness or softness of water is easily determined by dropping a little alcohol that contains soft soap to saturation. If the water is hard it will turn milky white, but will remain clear if it is soft. For carbonate of lime, five to ten drops of oxalate of ammonia should be added to the water in a test tube; if lime be present the water will have a clouded or milky appearance, and after standing a few hours a precipitate will be found at the bottom of the tube. A few drops of nitrate of baryta will reveal the presence of sulphate of lime or sulphuric acid, by forming a white precipitate. When a drop of permanganate of potash is put into the water, it colors it to a bright violet rose color at first, but if decomposed organic matter is present the color changes to a dull yellow. If iron is held in solution, a few drops of a solution of prussiate of potash produces a blue color in the water.

TO make a spark coil for a gasoline engine, to be used either in connection with a battery or a 50-volt direct-current circuit, wind about three pounds of No. 14 wire on a one-inch core of soft iron wire. Use four or five cells of a good sal-ammoniac battery, or a larger number of potash cells. Connect a 50-volt lamp in series when current is taken from a 50-volt lighting circuit; if a 16-candle power lamp does not give a large enough spark, use a 32-candle power.

IN August, 1873, the average London price of silver per ounce standard (0.925) was 59 pence; equivalent value of ounce fine with exchange at par, $4.8665, $1.29334, equivalent value of ounce fine based on average price of exchange, $1.28186; bullion value of a U. S. silver dollar at average price of silver, exchange at par, $1.00031; commercial ratio of silver and gold, 15.98. At current London silver quotations the above figures would be .62196, .62323, .48104 and 33.23, respectively.

METAPHYSICAL and psychical discussion are doubtless fascinating forms of research to some minds, but the only idea in this page is to answer as accurately as possible questions that come up in the daily lives of our readers; questions that are often on the lips or in the minds of many, who see in some answer the very thing they were going to inquire about. It is neither our province nor our purpose to start any argument or discussion on imaginary or fanciful topics, but to try to make practical answer so far as possible to questions of general interest.

THERE is no uniform rule or rate regarding assaying. An "assay" will cost from 50 cents to $5, according to what kind it is. The regular California rate for a common, ordinary assay is $2; in Colorado, $1.50. Yet, were a miner to take a bunch of forty or fifty assays to a Colorado assayer he would probably get the lot done for 75 cents each. The same discount would likely prevail under the same conditions in California or elsewhere. The University of Arizona does assay work and charges for it. Arizona assayers pay taxes to support an institution that enters into direct competition with them.

THE area (a) of the base of a regular vessel, the eighth (h) of the fluid in feet, and the weight (w) of a cubic foot, the fluid being given, required the pressure (p) in pounds on the bottom of the vessel—$a \times h \times w = p$. The height (h) of a column of fluid in feet, and the weight (w) of a cubic foot being given, required the pressure (p) in pounds of the column per square inch—$h \times w \div 144 = p$. The diameter in feet of the base (b) of cylindrical reservoir, and the depth in feet (d) of fresh water contained therein being given, required the pressure (p) in pounds upon the staves—$b \times 3.1416 \times d \times (d \div 2) \times 72.5 = p$.

THE Supreme Court of the United States—102 U. S., 167—in the case of the Ivanhoe M. Co. vs. the Keystone, established the doctrine that Congress in making grants of school lands to the several States did not depart from the policy of reserving mineral lands from sale, and that mineral lands found within a sixteenth or thirty-sixth section, known to be such at the time the grant took effect, did not pass to the State. The Secretary of the Interior and the General Land Office, by a uniform line of decisions, have held that mineral lands do not pass to the State under the school grants from the Federal Government.

IN working a double acting pump, which is equivalent to two single acting pumps of same diameter, double the power would, of course, be required, and double the water would be discharged. It is immaterial whether the water is raised with a large or small pump, as the theory is that it requires a given quantity of power to raise a given quantity of water a given height in a given length of time. Of course, if the pump is large it must be worked slowly, and, if small, it can be worked faster; the power required to work a small pump fast is the same as to work a large pump slow, for the same given height and quantity.

TO FIND the head in feet due to friction in a pipe running full, multiply the length of the pipe in feet by the square of the number of gallons per minute, and divide the product by 1000 times the fifth power of the diameter of the pipe in inches. The quotient, less 10%, is the head in feet necessary to overcome the friction. Example: A pipe 4 inches diameter and 4000 feet long is to deliver 200 gallons per minute; what head of water in feet is equivalent to the friction? $\frac{LG^2}{1000\ D^5} - 10\% = \frac{4000 \times 40{,}000}{1000 \times 1{,}024} - 10\% = 156 - 15 = 141$ feet.

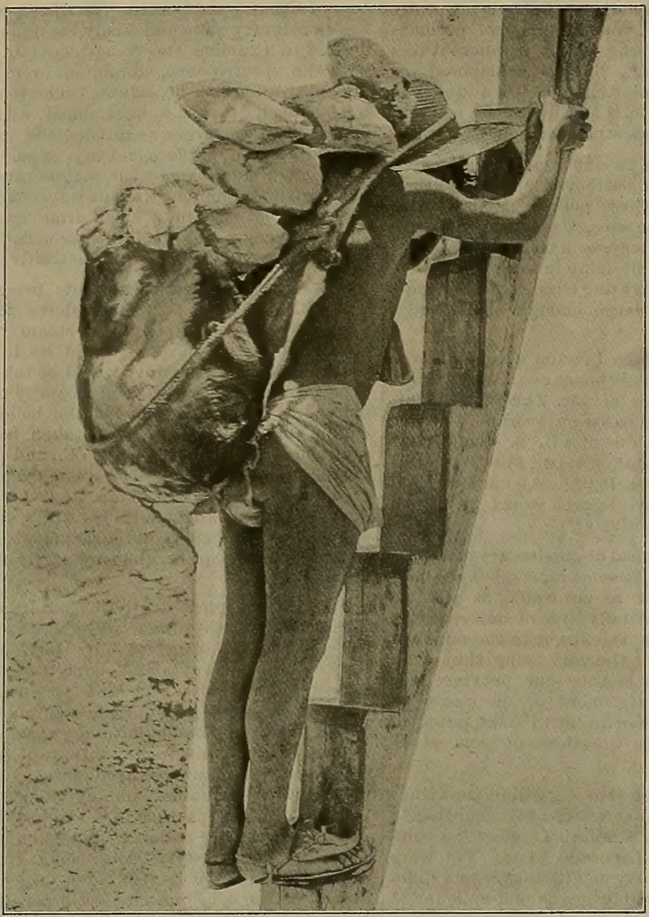
A FINE form of blowpipe reduction may be effected as follows: Flatten out a very small piece of metallic sodium on a fragment of filter paper; in this roll up the substance to be examined and wind with a close spiral of finest iron wire. After the excess of paper is cut off, slowly burn the roll in the interior of a Bunson flame and cool in the stream of gas close to the top of the burner. The product is then treated with a little water in an agate mortar, when the caustic soda formed is quickly dissolved and any metal present is left, generally in quantity large enough for easy examination. Sulphur and other substances are readily detected in the solution. In case of silicates and borates, the silicon or boron is left in the elementary state and easily recognized. In case it is desired to examine the constituents of the substances with the spectroscope, aluminum or magnesium filings are substituted for the sodium. The reaction is violent, but, in small quantities, unattended with danger. If it is desired to use larger quantities, the substance must be diluted with an indifferent body, as salt when sodium is used, magnesium oxide with magnesium and aluminum oxide with aluminum. In this way considerable quantities may be used in a small iron crucible, and thus silicates decomposed in a few seconds. With care the process is even available for quantitative work.

STEAM at 100 pounds absolute pressure has a total heat of 1213 degrees per pound above zero, or 1181 degrees above 32. The weight of steam passing through an engine for this purpose would be $1{,}000{,}000 \div 1181 = 846.7$ pounds, and the duty would be taken for the time it requires for 846.7 pounds of steam to pass through the cylinder. If the test included the boilers as well as the engine, and the feed water was taken from the hot-well at a temperature of 112 degrees F., and passed through a heater supplied with exhaust steam from an auxiliary engine and the boiler feed pump, it would be raised to 212 degrees, thus calling for $1213 - 212 = 1001$ degrees to be supplied by the boiler, and 1000 pounds under these conditions would require almost exactly 1,000,000 British thermal units.

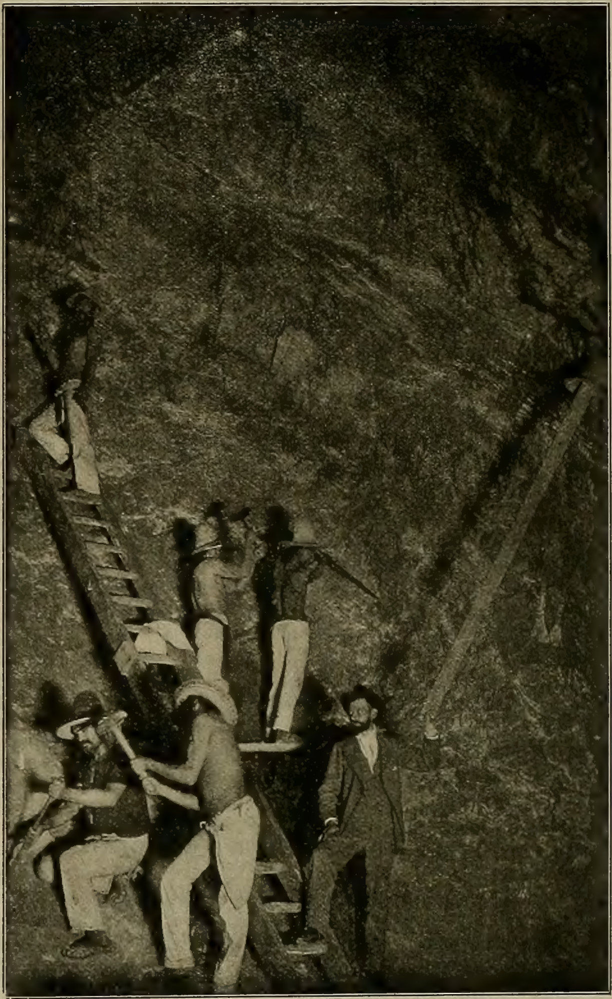
THE Pittsburgh Reduction Co., at its aluminum works, uses about as large rotary converters as any manufacturing concern. They are made by the General Electric Co. A two-phase current is first reduced by transformers to a pressure of 115 volts. At this pressure it is led into the converters, which give out the continuous current at 160 volts; the plant having a total capacity of over 10,000 amperes, equivalent to an output of about 2000 H. P. The G. E. Co. makes a three-phase converter, a 16-pole 600 kilowatt machine running at 188 revolutions per minute. In this machine the pole-breadth is 72% of the pole-pitch, yet the ratio of conversion is 71.8; the voltages at the respective sides being 115 and 160. The armature diameter is 100 inches, the core length 8.25 inches, giving 4.3 square inches of peripheral surface per kilowatt. The temperature rise after 17 hours with a conversion output of 575 kilowatts was 15° C. in the armature, 23° C. in the field magnets. The average flux-density in the gap was 69,000 lines per square inch.

THE power necessary to raise water depends upon the height to be overcome and the quantity to be delivered. A gallon of water weighs about 8½ pounds; consequently, if ten gallons of water are required to be lifted 1 foot per minute, 85 pounds power will be exerted; and the same proportion will remain as the height is increased. The following formula will be found useful in determining the necessary power to work one pump: Having found the number of gallons desired per minute, multiply this number by 8.35 (weight of one gallon of water); then multiply the product by the height in feet to which the water is raised, and it gives the number of foot pounds. Divide the product by 33,000 (1 H. P.), and the result is the horse power, or its fractional part, required to do the work. To this a liberal allowance must be added for friction—say, 15%. A 1 H. P. steam engine will elevate 50% more water than a single horse working on a horse power. It is essential that the inlet or suction pipe to a pump should be air-tight to secure its successful operation. The theory is that water can be raised by suction about 33 feet perpendicular height, but, practically, 20 feet is all it is safe to recommend. The diameter of the suction pipe should not be less than about half the diameter of pump cylinder. When the suction pipe is near the extreme limit of, say, 20 feet vertical height, it should be even larger than this. Suction pipes may be extended almost any distance horizontally; where this occurs a check valve is desirable. Elbows or short turns should be avoided as much as possible in either suction or discharge pipes.

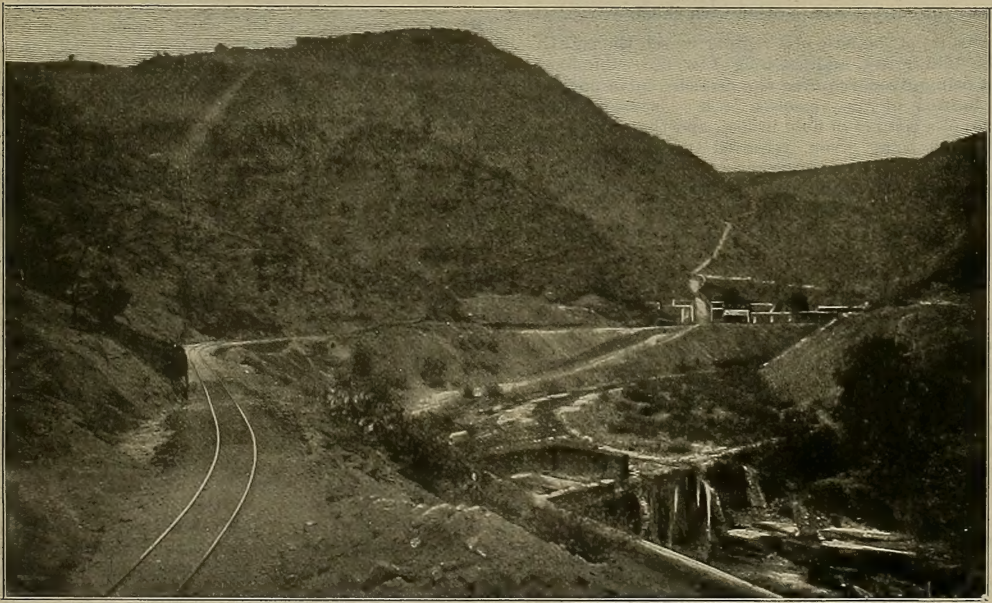
THE high expansion ratios used in compound and mulple-expansion engines, and the high temperature of steam at 160 to 180 pounds pressure unite to cause a greater range of temperature in the cylinders than formerly. These conditions make the internal losses important, and it is to superheating that the steam engineer looks for help to reduce these losses. Many of the old objections to superheating may now be met in a manner formerly not possible. Improved lubricants, capable of resisting the action of high temperatures, are to be had; the best forms of metallic packing require less lubrication than was formerly needed, and the superior workmanship of modern engines assists in rendering smooth operation possible. Excessive superheating is by no means necessary. When the steam is heated 75° to 80° F. above the temperature due to its pressure, an excellent economy is produced without injury to the working parts, the saving usually ranging about 20%. With engines normally requiring 14 to 15 pounds of steam per horse-power hour, the consumption with 75° superheating falls to 11 and 12 pounds respectively; while for engines especially constructed for use with high degrees of superheat, the steam consumption per horse-power per hour has fallen 90 pounds. The principle that steam cannot be superheated until it is removed from the boiler in which it was made, probably holds good for steam that is in a quiet state, but in some upright boilers now in use, as the tubes extend above the water line and are filled with heated gases, the steam as it passes these becomes superheated on its way to the steam pipe, but such steam is in reality removed from the water, although still in the same boiler.



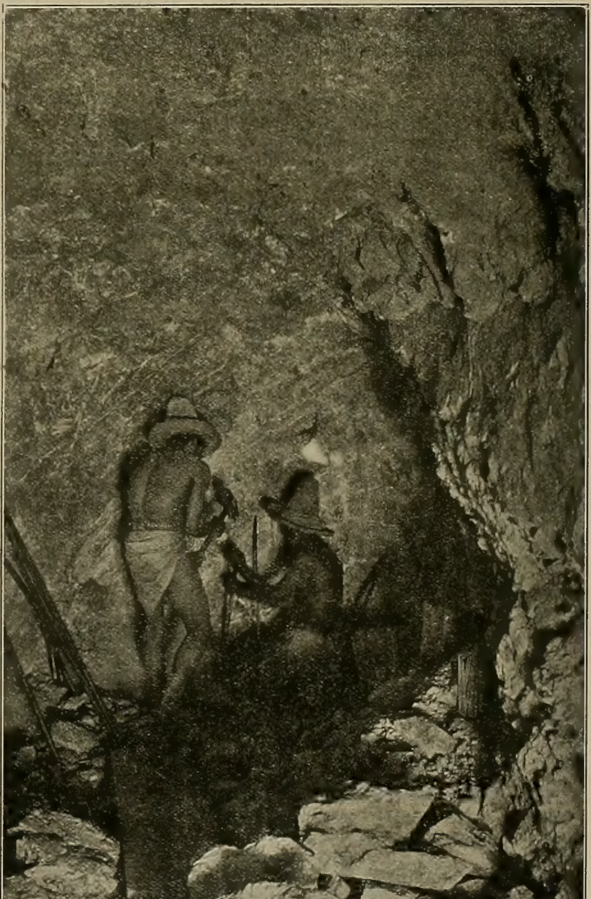
Mexican Miner—Cargadores, Tenateros (Ore Packers), Noted for Their Powers of Endurance and Carrying Capacity; Their Usual Loads Vary From 225 to 350 Pounds, Sometimes Running as High as 450 Pounds.



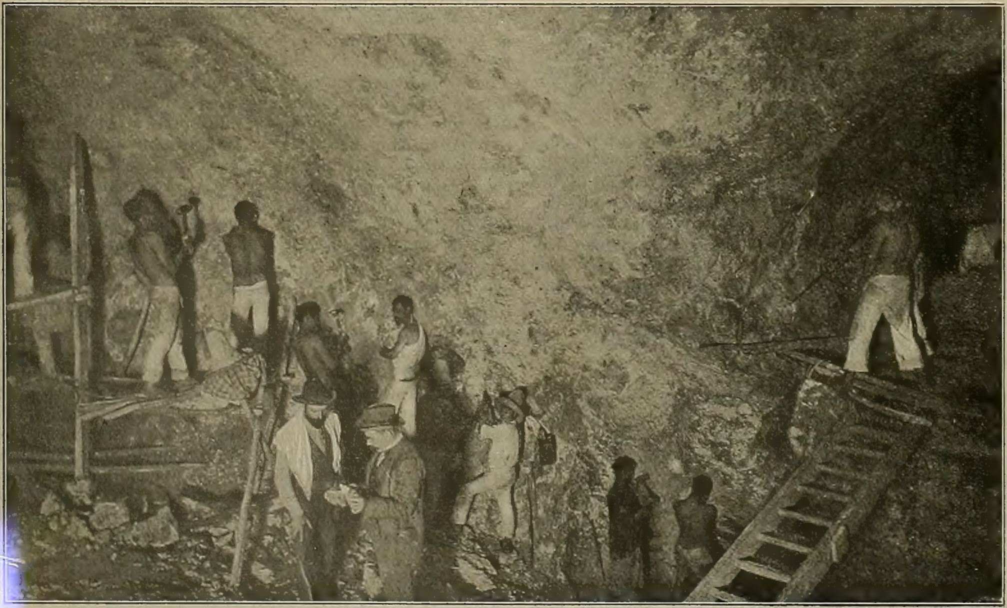
View of Stope, Sirena Mine, Showing Structure of Vein, Main Tunnel Level, Depth 1000 Feet.



Tramway Skirting Sirena Mountain, Connecting Sirena Mine With Mill.



"Driving Ahead" in Sirena Mine.



Stopes on Second South Drift, Sirena Mine, at a Depth of 1200 Feet From Apex of Vein.

In the Sirena Mine, Guanajuato, Mexico.

(See Opposite Page).

A Guanajuato, Mexico, Mining Enterprise.

NUMBER II.—CONCLUDED.

In last week's issue was given some general account of the modern exploitation of ancient mines in the State of Guanajuato, Mexico. On the front page of this issue, and the page opposite this, are further interesting views in and around the Sirena mine, which is one of the properties now being developed in accordance with up-to-date mining methods by the Guanajuato Consolidated Mining & Smelting Co., whose main office is No. 35 Wall street, New York City.

The Sirena mine is located ½ mile from the city of Guanajuato. It has been worked for over 100 years. It was formerly worked through a vertical shaft, which was sunk to a depth of 900 feet. At a depth of 450 feet this shaft cut the ledge, which dips at an angle of about 45° to the west. At this point a level was run and stoping began above this level. In 1856 a crosscut tunnel was run for a distance of 2000 feet and cut this shaft at the above-mentioned 450-foot level, since which time the mine has been worked almost entirely above this level, as the crude hoisting plant made it very difficult to keep the water out of the lower levels. A drift was run on the vein from this shaft 3000 feet. Stoping had been done at intermediate points all the way from one end of this drift to the other, and up to 1897 work was still being done in these drifts above the present level, the lower workings being entirely submerged with water. The richer ore in the upper stopes has been extracted. There is considerable low-grade ore left unstoped, going about 26 to 30 ounces silver and $3.50 to $10 gold. The vein is composed of quartz, which carries lime and feldspar. The gold is present in sulphides of iron, best treated by concentration. The silver is in the form of sulphide of silver.

In 1899 H. P. Sellon made report on the entire property, in which he cited the fact that Mexican mines and their method of management are so entirely different from the general character of mining in the United States that the system has to be explained to understand why large bodies of ore have been left in the mines and not worked by former owners. As was explained in last week's issue, an ore of a value of $20 is not worked at a profit to both the mine and hacienda (custom mill), owing to the cost of treatment at the hacienda and tributary systems adopted at the mines, besides the want of machinery and equipment to save the cost of hauling and handling, though under modern methods there would be a profit to the mine and the mill. The tribute system is in vogue, the miners getting 50% of the value at the hacienda after the charges are paid. Nearly all work is done by man and mule power, which takes much time and makes it difficult to obtain large output. The patio process of treatment is slow and expensive, ore sometimes taking from three to six weeks to treat under this process, which, though good for silver, is bad for gold, only 30% of gold value being saved, all gold in sulphurets being entirely lost. When Mr. Sellon made his report the cost of working on the patio was high, ore grinding alone costing $5 (Mexican), and the working of the ore on the patio, chemicals, sampling, assaying seldom costing less than $5 more, besides cost of general manipulation, making, altogether, cost of treatment $14 to $17 per ton, or nearly twice that of modern milling. A large hacienda with twenty arrastras can only handle about 18 montones, or 28 tons, a day, and the ore, after crushing, must be worked on the patio for two or three weeks, sometimes thirty days, according to the class of ore. With modern machinery the ore ought to be ground up for $1.50 (Mexican) and treatment should not cost more than half as much.

Taking an ore value of $51, for instance, it can be seen how the cost of working cuts down profit. The value of $51 (Mexican) ore would be as follows in the mines under discussion:

Silver	$36
Gold	15
Silver value saved in the patio	$30
Gold value saved in the patio	5
Total	$35
Hacienda charges for treatment	17
Balance	$18
Miner's tribute	9
Balance	$ 9
Hauling ore to hacienda	2
Gross profit to mine	$ 7

After paying superintendents, timbering or stone pillars, supplies, etc., the mine was practically robbed of its profits, while the hacienda made, with its enormous charges, a good profit for treatment.

The scale of wages in Guanajuato at the time was as follows:

	Per day, Mexican.
Assayers	$.50
Machinist	1.50
Miners, first	$0.75 to $0.85
Miners, second	0.60
Day laborers on surface	0.25 to 0.30
Superintendents (Mexican)	5.00
Blacksmith	1.50 to 2.00
Carpenters	1.00 to 1.50

In the patio process the ore is crushed in a Chilian mill, to go through a screen having four meshes to the inch. It is then taken to the arrastras, where it is ground fine with water, mercury there added, and all free silver and gold amalgamated. In those ores little of the gold or silver is free. The remainder is carried on to a paved open courtyard, or patio, where it is mixed with water to the consistency of a thick mud and treated with salt, sulphate of copper and hydro-sulphate of soda. This mass is continually turned, mixed by mules treading it for two or three weeks—sometimes longer, according to the character of the ore. When the ore is adequately desulphurized, and the silver formed into a chloride sufficiently to amalgamate, it is sent through a settler and the amalgam caught and retorted.

The mining laws of Mexico limit the working of a vein to that portion which the boundary lines of the claims cover when extended vertically downward, so that in order to secure a long-lived mine it is necessary to have the locations not only cover the apex of the lode, but also very extensively cover the territory on its dip.

M. E. MacDonald, the company's local manager, reports regarding the Sirena mill and mine:

"In starting up our plant we followed the methods now in use at the different mills at Pachuca, where they treat ores of a similar character to ours. During the month of October, 1899, our expenditures for supplies, labor, etc., were as follows in Mexican money:

569½	Kilos quicksilver	$ 1,400.97
6,138	Kilos sulphate of copper	1,902.78
17,000	Kilos salt	338.94
	Fuel—Coal and wood	3,447,57
	Castings, Oil and supplies	1,420,96
	Total cost supplies	$ 8,511.22
	Total cost Mexican and American labor	1,764.07
	Total cost operation of plant	$10,275.29

"The number of tons of ore treated during October was 1345, dry weight, and calculating from this amount shows the following statistics on the proportional cost per ton of ore treated:

		Cost.
0.42	Kilo quicksilver	$1.04
4.57	Kilos sulphate of copper	1.41
12.64	Kilos salt	.25
	Fuel—Coal and wood	2.56
	Castings, oil, etc	1.05
	Labor—Mexican and American	1.30
	Total cost per ton of ore treated	$7.61

"Our total output of bullion for this month was twenty-five bars, with a net value of $19,615.07.

"In the month of November we made the following expenditures for supplies, labor, etc.:

648	Kilos quicksilver	$ 1,694.08
8,793	Kilos sulphate of copper	2,725.83
20,756	Kilos salt	456.63
	Fuel—Coal and wood	4,020.00
	Cyanide	88.60
	Castings and supplies	601.79
	Total cost of supplies	$ 9,586.93
	Total cost of labor	1,672.88
	Total cost of operation of plant	$11,259.81

"The bullion produced during this month was twenty-five bars, with a value of $18,908.48. In this month we treated 1430 tons of ore, and calculating with this amount as a basis shows the following items of expense—proportional cost per ton of ore treated:

0.45	Kilo quicksilver	$1.18½
6.15	Kilos sulphate of copper	1.90
14.50	Kilos Salt	.32
	Cyanide	.06
	Fuel—Coal and wood	2.81
	Castings, oil, etc	.42
	Labor	1.16½
	Total	$7.86

"Our percentage of extraction of the value in the ore for the above month was 74½, or a total extraction in bullion of $18,908.48.

"The extraction book shows the December mill run to have been as follows: Time, thirty days; 1200 tons milled; silver value, $17, Mexican; gold value, $5.20, Mexican; total per ton, $22.20, Mexican (= $11.10 United States coin); tailing assays, Mexican silver, = $3.56; gold = $0.65; percentage of extraction = about 81; total value bullion, Mexican currency, =$22,145.24; net value, $20,049.31; total milling expense, $9461.70, = $7.88, Mexican, per ton, divided as follows:

.561	Kilo quicksilver	$1.59
2.620	Kilos sulphate of copper	.78½
13.000	Kilos salt	.29
.068	Grams cyanide	.09½
	Coal and wood	2.93
	Sundries	.32
	Labor	1.87
	Total proportionate cost per ton	$7.88"

Concerning the first south drift of the Sirena mine, illustrated on the opposite page, showing the Mexican miners at work, Mr. MacDonald says:

"At present the remains of this enormous body of ore are being worked on the "buscone" plan, viz., each crew of Mexican miners is allowed a certain section of stoping ground, where they mine ore at their own expense and sell the same to the company on the following conditions: First, one-half the entire lot of ore is taken by the company outright; second, the balance is liquidated in the following manner: A treating charge, or 'maquila,' of 508 grams silver, or $20.32, is deducted from the value per ton metric, and then the balance is paid for by the company on the basis of figuring silver at $0.90 per ounce and gold $6.17 per ounce, Mexican currency."

Of the vertical shaft of San Miguel Manager MacDonald says:

"This main working shaft was sunk by the ancient miners in the year 1802, and has a total depth variously stated to be from 825 feet to 1050 feet, and a diameter of 16 feet, octagon shaped, which is walled up with masonry to a depth of 614 feet, and from there down the rock is solid and does not need support. This shaft connects with the deepest workings in the mine, and was for a long time filled with water nearly to the main tunnel level above mentioned. This water has been hoisted and the workings drained to a depth of 325 feet below the main tunnel."

Gold Dredging at Oroville, Cal.

Written for the MINING AND SCIENTIFIC PRESS by H. G. PARSONS.

With Oroville as a focus, gold dredging operations are being extended into contiguous territory and to the auriferous ground of other streams beside the Feather river. The locality below Oroville is exceptional in its formation, and will continue to be the seat of great activity in dredging operations. It is here that the Feather river breaks away from the mountains. The waters have been laying down in ever-changing channels loose, gold-bearing gravels, which underlie the present surface of the country. Some of these channels were discovered in the early fifties; more are now being located by prospectors for the dredger companies, and machines are being built and placed so as to reach these later discovered channels. It is not necessary that the dredgers be upon the river or any small tributary; they can be worked miles away from the stream, provided that a pit be dug of sufficient size to accommodate the machine after construction, that this pit be filled with water and that a sufficient supply of fresh water be added to keep up the operations of the machine. In a country ramified by irrigation or mining ditches, like Butte county, these conditions are easily filled. Most of the new enterprises are away from present water courses, but at points where prospecting operations have demonstrated the existence of good placer ground.

Two types of dredgers are in use, one of these being of the steam shovel or dipper class, the other of the Risdon or Postlethwaite type. These dredgers are provided with a system of buckets fastened to an endless movable chain, which passes over sprocket wheels at the end of an arm, held against the bottom or side of the gravel pit, where the buckets scoop up the gravel and convey it to the center of the boat, where it is dumped into a hopper, the fine gravel separated from the cobbles, the latter dumped outside the boat, the gravel elevated by a centrifugal pump and made to pass over riffles and plates, thence into sluice boxes, where about all the valuable material is saved. Although varying somewhat in detail, the working principle is the same in all the dredgers. The main point is to scoop up the gravel and extract the gold before the gravel is again dumped into the waste pile.

The Feather River Exploration Co. is the most extensive in its operations of any concern now at Oroville. It has three dredgers at work at different points along the west bank of the Feather, all of the Risdon type. One of these—the last constructed—is of greater capacity than its predecessors and requires 100 H. P. for its operation. Capt. Thomas Couch, the president of the company, was one of the first to take up this line of dredging in California, and has had one of the machines in operation since March 1, 1898. John J. Homlyn is secretary and assistant manager; Aug. Berner, superintendent. This company owns over 1000 acres in the heart of the auriferous deposit.

The Marigold Dredging Co., composed of New York men, under the management of Bond Thomas, is operating a dredger of the Risdon type close to the stream, opposite the Feather River Co. Their machine is under the direct superintendence of George Telford, who had experience in dredging operations in New Zealand under Mr. Postlethwaite. The operations of this company have been profitable; they are building another machine double the capacity of the first. They have been working since April, 1899.

The Continental Gold Dredging Co. has successfully started the largest machine yet installed in the State. It is of the Bucyrus type, using the endless chain and bucket, similar to the Risdon machine in its method of scooping up the gravel, but its system of washing the gravel and disposing of tailings is different. The operations of this company are in a pit near the Feather river. No expense seems to have been spared in making the equipment of this machine as perfect as possible. The motive power is entirely electric, and 300 H. P. will be required. This will be developed through four different motors. Frank Griffin is superintendent for this company.

The California Dredging Co. is operating a dredger of the dipper type in the Feather river, two miles below Oroville. This dredger is virtually a large steam shovel, mounted on a hull and fitted with gold-saving apparatus. The dredger Plutus, owned and operated by J. W. Ferris and associates of San Francisco, is of similar type, and until recently was at work in the river near the site of the Feather River Exploration Co.'s plant. The Plutus was probably working in poor ground. It is now being dismantled and will be taken to Rogue river, Oregon.

The Kia Ora Dredging Co. is operating a dredger of the Risdon type in a landlocked pit 1 mile from the river and 4 miles or more below Oroville. This dredger is under the direct management of R. H. Postelthwaite, the designer and builder of this type of dredger. It was one of the first enterprises to start operations so far inland, and after a successful run of several months has demonstrated that these machines can be manipulated with a limited water supply.

The Oroville Dredging Co. is the latest in the field, and is constructing necessary buildings at its seat of operations ½ mile from the river, and will soon begin building one or more of the dredgers it proposes to put in operation. These dredgers will use the Marion steam shovel built at Marion, Ohio, in a machine of special construction for this work. It is estimated that each will handle 1500 cubic yards of gravel in twenty hours' work.

The company owns 360 acres of ground, part of it being along a gravel channel that yielded largely in former years. It has been demonstrated by prospecting that the channel was little more than scratched by the early placer miners. E. Peabody and Henry E. Vail will have direct charge of the dredgers of the above company.

W. P. Hammon is one of the pioneers in dredging operations at Oroville. He has been actively identified with and has efficiently promoted some of the most successful enterprises. He is now stimulating the operations of a company which is about to build a dredge 3 miles from Wheatland, near the bank of Bear river. The project is but an indication of the manner in which dredging enterprises will be spread, all being locally inspired by the success attending this species of mining at Oroville.

Kia Oro Dredger Dredging Gold in a Butte Co., Cal., Orchard.

The Marigold Dredger, Feather River, Cal., Showing Tailings.

Summer Outing Scenes.

Fourth of July week, with thousands of city people out of town, and thousands of country people forsaking scenes of rural activity for the wilds of lake, mountain and forest, affords a proper occasion for turning our pictorial attention away from the lines chiefly pursued. A few camera shots of outing scenes are therefore offered herewith.

It seems to be a general complaint that the more retired avenues of vacation travel and repose are scantly peopled this year. It does not seem to be a good summer boarder and summer travelers' year. There are perhaps several reasons why local resorts should be neglected. In the first place the times are full of action. People are, as a rule, busy about important concerns which promise reward for effort. There is a shortage of labor supply, and many who could steal time for recreation while their affairs proceeded under others' care, have this year to do their utmost to promote their own undertakings. Again, it is a time of unusual interest in distant activity. A large number of those with longer purses are doing Europe and the Paris Exposition; many more are seeking long purses at Alaskan points; there are hundreds of Pacific Coasters in our new Oriental possessions. Last of all, perhaps, it is a general election year and candidates and their friends are very busy pipe-laying and fence-building. All these distractions and others akin to them are reducing the numbers of those who seek recreation for its own sake and decimate the ranks of summer idlers.

And yet the delights of air and water, forest and mountain, are being enjoyed by many, and the charms of changing scenes are not less to those who are now pursuing them. Our pictures are suggestive of some phases of far western summering. The rolling hills, with the mountains beyond, afford a breadth of view which is inspiring and uplifting. The piles of rock refuse thrown up by some hilltop engineering bespeak the power of man to surpass mountain barriers, and the waste of rock and gravel which nature is endeavoring to conceal with forest shows the repairing by which Mother Earth covers her scars wherever such work is possible. Two other pictures relate more directly to outing—the boats upon the lake, the temporary camp upon the hillside—and need no comment to those who are now tasting or have enjoyed these recreations.

A New Forest Upon a Waste of Rock and Gravel.

The Quiet Pleasures of the Mountain Lake.

A Wooded Hilltop Above a Rock Cut.

Doubtless it is well to seek rest and recuperation. One can hardly see a camp of city children, done to a brown by the warm kiss of the sun and hear their happy cries as they pursue unwonted pleasures in the lake or the woods, without feeling that there will be brighter eyes turned upon the books when the schools reopen and bodies better fitted to resist weakness and take on strength during a whole year afterward. What is good for the children is also good for the elders—respite from pressing duties, hunger born of the tonic of the country air and long, sound slumber caused by physical weariness amid conditions which make such weariness a blessing—all these are strong agencies to repair the nerves, sweeten the temper and lessen the gravity of life's burdens. Fortunate are they who can adopt such remedies.

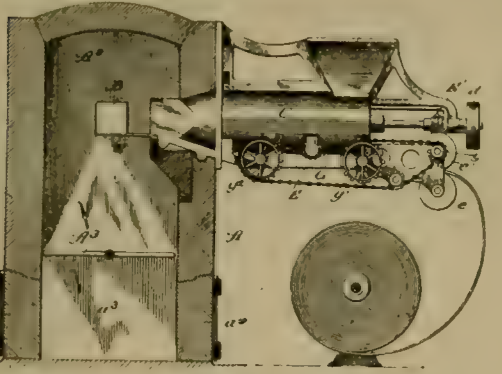
A Stop for Dinner on the Hillside.

Mining and Metallurgical Patents.

Patents Issued June 26, 1900.

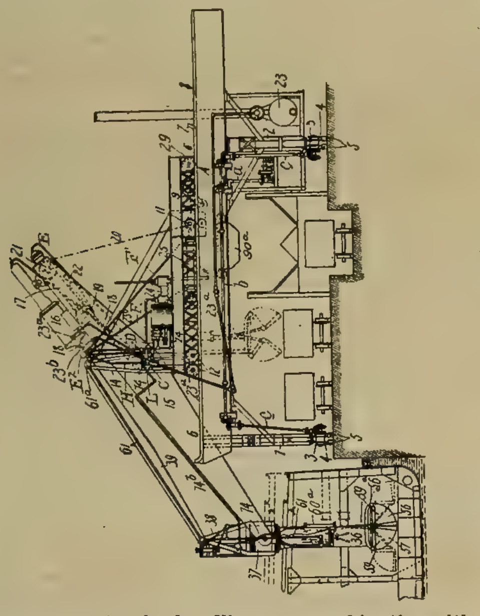
Specially Reported for the MINING AND SCIENTIFIC PRESS.

FURNACE FOR PRODUCING CALCIUM CARBIDE.—No. 651,916; J. Zimmerman and I. S. Prenner, Chicago, Ill.



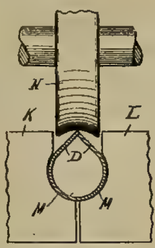
An electric furnace, combination of feed cylinder having discharge or mouth in horizontal plane in line with arcing space of two laterally standing electrodes, means for forcing material from feed cylinder, guide slot or passage in body of feed cylinder leading from exterior to mouth or discharge, strip of flexible material passsing through slot or passage of feed cylinder out at mouth along bottom of mouth forming traveling support carrying material from mouth of feed cylinder to and between electrodes into arcing space, means for advancing strip of flexible material coincident with feed of cylinder to pass beneath feed discharge and electrodes.

APPARATUS FOR HANDLING ORE.—No. 652,313; G. H. Hulett, Akron, Ohio, assignor of one-half to the Webster, Camp & Lane Machine Co., same place.



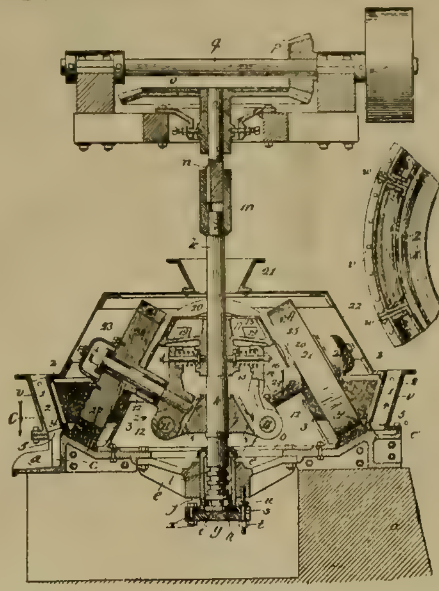
In an apparatus for handling ore, combination with trolley, walking beam thereon, cylindrical seat carried by outer end of walking beam, tower secured to seat and equalizing bar pivoted to upper end of tower and to beam-supporting frame on trolley, of leg mounted to turn in cylindrical seat, scoop carried by lower end of leg, motor for opening and closing scoop, motor for tilting leg and motor for tilting beam, series of actuating rods located within leg, devices connecting rods with valves of several motors and levers for actuating rods.

PROCESS OF MAKING TUBING.—No. 652,658; F. F. Bischoff, Chicago, Ill.



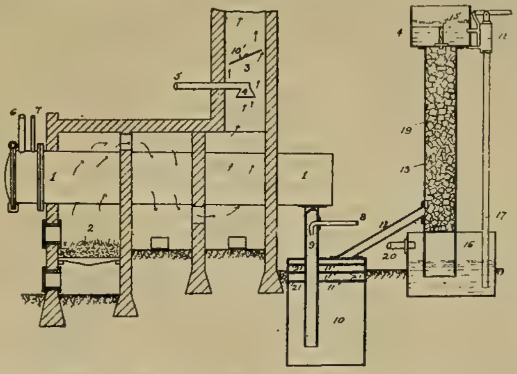
Process of making tubing from sheet metal which consists first in bending strip of sheet metal to form of channel bar having flat web, round corners and flat diverging flanges, subsequently bending web on curve tangential with corners and converging flanges, then forcing flanges together at their edges and simultaneously contracting curvature of web and round corners to radius less than that of finished tube, subsequently bending flanges.

PULVERIZING MACHINE.—No. 652,329; G. Raymond, Chicago, Ill.



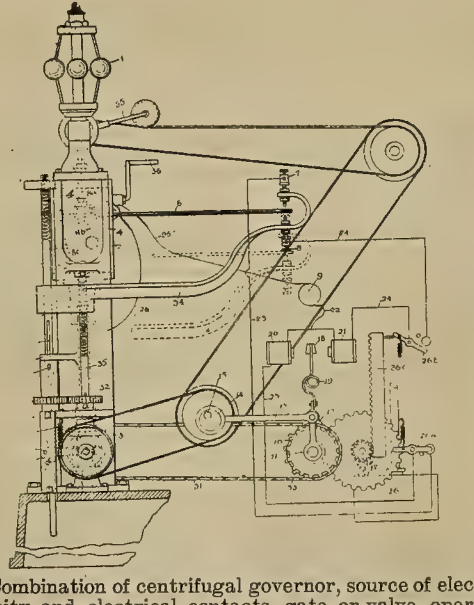
In pulverizing machine, combination with grinding bed, rotary actuating shaft, head on shaft provided with radiating ribs, each terminating in a pair of arms, shafts supported in arms, sleeves on shafts carrying inwardly and downwardly inclined spindle bearings and upwardly projecting lever arms, grinding rolls supported to extend over bed and journaled on spindles inclining downward toward shaft and confined at their inner ends in spindle bearings, hub on shaft, bolts secured to hub, passing through lever arms and secured by nuts, turning of which turns lever arms on their pivotal supports and thereby raises rolls bodily with relation to grinding bed, and springs confined between hub and lever arms.

PROCESS OF EXTRACTING SULPHUR FROM ORES.—No. 652,672; J. S. Fleming and H. Froehling, Richmond, Va.



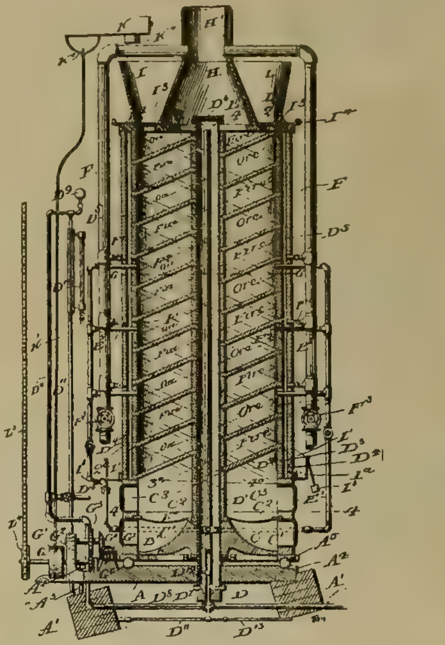
Process of obtaining sulphur from sulphur-bearing ores which consists of subjecting the ore to distillation in an atmosphere consisting of gas or gases which are not supporters of combustion, but with the admixture of a controlled quantity of oxygen.

WATER WHEEL GOVERNOR.—No. 652,389; W. W. Handy, Baltimore, Md.



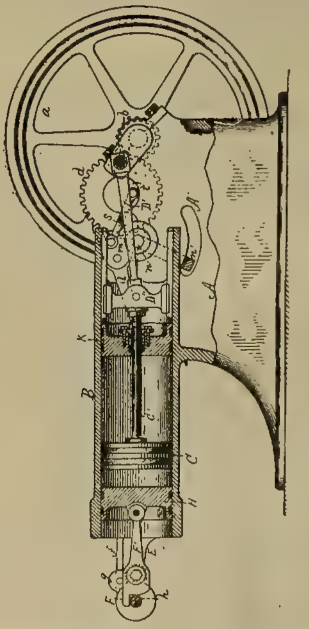
Combination of centrifugal governor, source of electricity and electrical contacts, gate or valve, operating mechanism connected with contacts, and lever operated by governor and normally held in state of balance between contacts, of means for moving lever, screw threaded shaft for operating contacts, pair of gears mounted on shaft, and means for revolving gears in opposite directions in such a manner as to move contacts through same distance as lever.

ORE ROASTING FURNACE.—No. 652,346; A. A. Chainey, Sanford, Me., assignor to H. H. Green, same place, A. D. Ross, Sunshine, Colo., and C. D. Bouton, Ithaca, and W. H. Marland, Binghamton, N. Y.



In an ore roasting furnace, combination of substantially vertical cylinder, driving ring supporting cylinder and provided with peripheral gear teeth, centrally disposed pipe extending upwardly through cylinder, clamping screws carried by hub of ring to engage pipe, driving mechanism engaging peripheral teeth of ring, parallel ore and fire flues within cylinder, feed and discharge means for ore, and heat producing means.

GAS ENGINE.—No. 652,382; J. H. Atterbury, Avon, Mass.



In a gas engine, combination with open ended cylinder B, main piston and piston rod in cylinder, pitmen and crank shaft and supplemental pistons H and K located within cylinder and between main piston and opposite ends of cylinder; of shaft h supported by cylinder, crank F fast on shaft, pitman F′ connecting crank and supplemental piston H, pitman being provided with arm F″ adapted to rest on shaft h when pitman F′ and crank F are in line, crank g on shaft h and mechanism connecting crank g and crank shaft; and mechanism intermediate with crank shaft and pistons H and K communicating movement relative to that of main piston to supplemental pistons alternately.

RETORT FOR TREATING ORES.—No. 652,332; B. Sadtler, Denver, Colo., assignor to A. G. Clark, Cincinnati, Ohio.

A retort for distillation of metallic ores, composed of an admixture of fireclay and infusible basic material in excess, such excess increasing toward inner surface, the whole fritted together.

The Electrical Precipitation of Gold on Amalgamated Copper Plates.*

NUMBER II.—CONCLUDED.

The existence in bath No. 1, containing the common salt, was somewhat lower than in the others, but the decomposition of cyanide was not reduced by the presence of the salt. The density of the current in this and all the other experiments was measured by a mirror galvanometer, with the aid of a resistance box and the fall of potential by a direct reading voltmeter. Both instruments were carefully tested.

When the current was turned on, a black film which proved to consist entirely of gold appeared almost instantaneously on the surface of the cathodes. The addition of sodium amalgam to the mercury baths caused the rapid absorption of the films of gold, but it appeared again almost instantaneously on the surface of the cathodes, and continued to grow thicker and thicker until it formed a black powdery layer which could not be amalgamated without the addition of sodium amalgam. It was easy to remove the whole of the film from the surface of the mercury and of the copper plate by means of a feather. About half the gold had been precipitated in this way when the experiment was stopped.

No. 2.—With the same baths and electrodes, but with the solutions kept at about 0.3% KCy and 10 ounces gold per ton, a current of 0.30 ampere per square foot of cathode was passed for 150 hours. The fall of potential in the baths was 0.75 volt. The black film on the cathodes appeared and thickened in the same way as in the previous experiment, but at the end of the week it was found that the deposited gold was distributed as follows, in grams:

	Bath No 1.	Bath No. 2.	Bath No. 3.
	Mercury cathode. Carbon anode.	Mercury cathode. Iron anode.	Amalgamated copper cathode. Carbon anode.
	Gram.	Gram.	Gram.
Black film on surface	0.681	0.472	0.686
In the mercury	0.583	0.451	.....
In form of amalgam adhering to the surface of the copper plate	0.180	0.324	0.603
Totals	1.444	1.247	1.289

The amalgam on the plates was somewhat hard and dry, but adhered well. It appears that under the conditions about half the deposited gold is amalgamated, and that part of this passes or is driven by the current through the mercury and adheres to the surface of the plate.

No. 3.—A current of 0.15 ampere per square foot was passed for ninety-two hours through solutions containing 0.2% KCy, using the same vessels and electrodes as before. Quantities of black non-adherent gold was precipitated as before, but the proportion between the amounts in this form and that amalgamated was not estimated.

No. 4.—In this experiment an amalgamated copper plate, forming the cathode, was suspended in a vertical position in 1700 c.c. of a solution containing 0.04% KCy and seven ounces gold per ton. A current of 0.04 amperes per square foot of cathode was passed for twelve hours. A black powder formed slowly on the cathode, and at the end of the experiment was swept off and yielded 4.5 m.m.g. of gold. The amalgam scraped from the plate yielded 144 m.m.g., and 201 m.m.g. of gold remained in solution. About 3% of the precipitated gold was, therefore, deposited as a non-adherent powder.

No. 5.—Continuing in the same direction, 1500 c.c. of a solution of 0.05% KCy and 9.25 ounces gold per ton was subjected to the action of a current of 0.02 ampere per square foot of cathode for nineteen hours under conditions similar to those maintained in No. 4. The black powder again appeared on the cathode, was removed by a feather, and proved to contain 2.5 m.m.g. of gold. Owing to an accident, gold in the amalgam was not estimated, though present in considerable quantities.

No. 6.—A similar result was obtained, using a round bath of mercury $11\frac{3}{4}$ inches in diameter as cathode. The current used was 0.027 ampere per square foot, and the fall of potential 0.75 volt, the anode being a small plate of pure gold. The weight of black scum collected after forty-eight hours' run was here only 1.6 m.m.g., and the amount deposited and amalgamated 718.6 m.m.g., or 99.78% of the total weight thrown down by the current. The solution contained 0.14% KCy and 3% of common salt.

No. 7.—Finally a current of 0.01 ampere per square foot was tried with arrangements similar to those in experiments Nos. 4 and 5. The fall of potential was about 0.7 volt. The solution contained 0.082% KCy and twenty ounces of gold per ton. After a run of twenty-four hours no change could be detected in the appearance of the cathode plate, no black film having made its appearance, but 93 m.m.g. of gold were recovered from the amalgam formed on the plate, an amount equal to 70% of the theoretical quantity which the current was capable of depositing. In some further experiments with 0.004 and 0.005 ampere per square foot and very dilute solutions of cyanide and gold, the cathode in every case remained clean and unchanged in appearance.

It is clear from the results given above that, when mercury or amalgamated copper plates are used as cathodes in the electrolysis of gold cyanide solutions, satisfactory precipitation can only be obtained when a low current density is employed. With 0.01 ampere or less per square foot of cathode gold is precipitated and amalgamated simultaneously, the plates keeping in good condition during twenty-four hours' use, while $\frac{1}{2}$ ounce of gold per square yard of plate was deposited on them. With currents of greater density, part of the gold is deposited as a non-adherent black powder, easily rubbed off, but not easily detachable by a jet of water, and not easily amalgamated. As the density of the current is increased, the percentage of non-amalgamable gold thrown down rises, until at 0.30 ampere per square foot about half the precipitated gold is not amalgamated. It, therefore, appears that one essential condition in the use of amalgamated plates as cathodes has never been clearly laid down.

In all the above experiments the condition of the precipitated gold was alone in question, no attempt being made to recover all the gold from the solutions. Moreover, any gold driven into the interior of the plates by the current was allowed to escape observation, but the experiments show that most of the deposited gold was recovered, and, therefore, that the amount could not have been so large as to preclude the use of such plates. The question now arose whether precipitation on copper plates could be effected conveniently and completely, and the following experiments were devised to test this:

No. 8—Three baths, each containing 1750 c.c. of solution, were used, the first being fitted with amalgamated copper electrodes; the second having iron anodes and lead cathodes; the third being without current or electrodes. The solution contained 0.0165% KCy and 0.0288 gram of gold per liter, or about $18\frac{1}{2}$ dwts. per ton. The area of the cathodes was 40 square inches, or about 162 square feet per ton of liquid. A current of 0.0012 ampere was used, equivalent to 0.005 ampere per square foot. After passing the current for eighteen hours the condition of the electrodes was as follows: Copper cathode, clean; copper anode, dark colored; lead cathode, coated with gold; iron anode, much oxidized, but showing no Prussian blue. The solutions were examined and found to contain the following quantities of cyanide and gold:

(1) Copper cathode....0.0015% KCy, 0.0100 gram gold per liter (or $6\frac{1}{2}$ dwts. per ton).
(2) Lead cathode......0.0025% KCy, 0.0215 gram gold per liter.
(3) No electrode.......0.0025% KCy, 0.0288 gram gold per liter.

About 60% of the current had been usefully employed in bath No. 1 in depositing gold, and 23% of the current in No. 2. Very little circulation of the liquid was attempted, but the baths were stirred occasionally. There had been no perceptible decomposition of cyanide due to the passage of the current.

No. 9.—Three baths were used, each containing 700 c.c. of a solution of 0.0025% KCy and 0.0360 gram gold per liter, or 1 ounce 3 dwts. per ton. The same electrodes were used, giving 400 square feet of cathode per ton of liquid, and a current of 0.0035 ampere per square foot was passed for $23\frac{1}{2}$ hours, with occasional stirring. After this the appearance of the electrodes was the same as in the last experiment, and the solutions contained—

(1) Copper cathode...No KCy, 0.0075 gram gold per liter (or 5 dwts. per ton.)
(2) Lead cathode.....0.0010% KCy, 0.0090 gram gold per liter (or nearly 6 dwts. per ton.)
(3) No electrodes.....0.0010% KCy, 0.0360 gram gold per liter.

The amount of current usefully employed in precipitating gold was thus about 36% in bath No. 1, and 34% in bath No. 2. The fall of potential in the baths was 0.22 volt at the start, and 0.6 volt at the end of the experiment.

No. 10.—In this experiment the gold was more completely precipitated. The same baths and electrodes were used, the solutions containing 0.03% KCy and 0.100 gram gold per liter, or 3 ounces $4\frac{1}{2}$ dwts. per ton. After passing a current of 0.005 ampere per square foot for 4 days 16 hours, the gold in each bath amounted to about 0.001 gram gold per liter, or 16 grains per ton. The amount of gold left in solution was tried each day by the purple of Cassius' test. No available cyanide was left in either bath at the end of the experiment.

In another experiment in which a current was passed through a rich solution for 14 days, 0.828 gram gold was deposited from solution, and 0.550 gram, or 66.4% of the total amount precipitated, was recovered from the amalgam scraped off the plate. It is clear from these results that the decomposition of cyanide is created when amalgamated copper electrodes are used than if lead and iron plates are substituted for them. On the other hand, more gold appears to be deposited on copper than on lead, especially when rich solutions are being treated. It seemed certain that both these effects were due to the chemical action of copper on the solution, working in conjunction with the current. In order to determine whether the whole of this effect came from the anode, or if part was attributable to the cathode, a small current was passed through a solution of 0.06% KCy, using sheet lead anodes and an amalgamated copper cathode. After 24 hours it was found that copper could be detected in the solution. The weight of the amalgamated copper cathode was—

Before using	149.953 grams.
After using	149.881 grams.
Loss by dissolution	.072 grams.

The current had therefore been unable to protect the cathode from attack by the solutions.

The conclusions to be drawn from the experiments do not appear to lend any countenance to the view that mercury or amalgamated copper plates will ever be satisfactory substances to use as cathodes in the electrolysis of cyanide solutions. A current must be of small density in order to deposit gold on mercury in a form in which it can be easily recovered. Consequently, as Von Gernet said, the high cost of mercury prohibits its use. On the other hand, with amalgamated copper plates, the density of the currents must be apparently even smaller, not exceeding say 0.015 ampere per square foot, in order that the gold may be deposited and retained, and the dimensions of the cathodes must, therefore, be even greater than if mercury is used. Apart from the cost of the plates, however, the cyanide solution suffers loss by dissolving copper from the cathode, and against all these disadvantages there appears to be no real advantage to be gained by using them instead of the customary lead cathodes.

---

*A paper read by T. K. Rose before a recent meeting of the Institution of Mining and Metallurgy.

Ozokerite.

Written for the MINING AND SCIENTIFIC PRESS by DR. J. OHLY.

There are only two ozokerite mines of any magnitude in the world, though claims of recent discoveries in different parts of the United States have been made from time to time. These are the Galician mines, the oldest works of that kind known, which are controlled in greater part by a Russian syndicate and to a smaller extent by French capitalists; and the Utah deposits, which are in the hands of American concerns.

The mineral has also been located in Moldavia, a northern province of Roumania, in the vicinity of coal and rock salt, and at Gresten, near Gaming, in Austria, while it occurs besides at the Urpeth colliery, near Newcastle-on-Tyne, Northumberland, England.

The Galician deposit is found chiefly in the Miocene formation, a term applied to the middle division of the Tertiary strata of the mammalian age. The veins in which it is encountered have been traced on the surface for a distance of 132 to 270 feet, and measure about $3\frac{1}{2}$ feet in diameter. They pass downward through beds of sand, from 26 to 33 feet in depth, containing large siliceous rocks, and enter gradually a blue clay, from which naphtha generally oozes, when they finally disappear in a layer of plastic loam. The center of the basin is richest in ozokerite, and in some cases soft masses of such extent have been tapped that the miners had hardly time to escape before the workings were filled with the plastic material. Such a deposit was encountered in 1893 in the deepest shaft at Boryslaw, Galicia, at a depth of 681 feet. In general, however, the yield of wax varies from 2% to 8% of the mineral extracted.

Originally ozokerite was discovered in Galicia by a prospector searching for petroleum, with which much of the ground is saturated, and was regarded for a long time as an unwelcome associate to the oil, since it frequently caused the timbering of the shafts to collapse. It was only about twenty years after its discovery in Moldavia that ozokerite began to attain commercial importance, as a method was then discovered for producing a substance from it known under the name of "cerasin."

Previous to 1865 this ozokerite deposit had been regarded as a Crown mineral, a term implying that the Austrian government had the exclusive right of mining and disposing of the product. But when it was declared free in that year, a number of shafts were sunk in the district, and much speculation ensued. The land being parcelled out in small plots, numerous shafts of small section, mostly 3x4 feet, were sunk in the immediate neighborhood of one another, so that the mining of the mineral became a difficult and expensive operation, and much of the material was wasted.

The geological formation of the Galician deposit, shortly indicated before, is characterized by the presence of clay, salt and sandstone, which in connection with the occurrence of petroleum, represent the ideal conditions under which the existence of ozokerite becomes probable. Broken rock strata and saddle formations are considered furthermore as indications favorable to the presence of the mineral, judging largely from the character of the two localities in which ozokerite deposits of any magnitude have been found.

One of the main Utah deposits is situated between

Pleasant Valley Junction and Soldiers' Summit, a mile and a half from the Rio Grande Western, while another lies within a distance of about 5 miles west of this, and has been abandoned as a non-paying venture. The vein matter of the first named mine is between 3 and 4 feet wide, contains occasional pockets or kidneys, and shows a network of small veins permeating the fissures. The upper stratum consists of blue limestone of varying thickness, which overtops a sandstone formation of unknown depth, the latter cropping out at the surface in places. The ozokerite veins permeating this sandstone layer have been worked down to about 150 feet, and are expected to reach a depth of at least five times that distance. The mineral products obtained from this deposit are classified as vein matter and shale, respectively, samples of which were analyzed recently in the laboratory of Field & Goody, Denver, Colorado, with the following results:

VEIN MATTER.

Paraffine	47.05	74.94
Paraffine oil	27.89	
Carbonaceous residue	14.22	
Mineral residue	0.79	
Volatile organic matter	9.75	
Water	0.15	
	99.85	

SHALE.

Paraffine	22.17	22.32
Paraffine oil	0.15	
Carbonaceous residue	9.74	
Mineral residue	62.02	
Volatile organic matter	5.34	
Water	0.58	
	100.00	

The mineral residue, which was very small in the vein matter, showed in each case the presence of lime in prevailing quantities, together with iron oxides and alumina.

The method employed in Utah for the extraction of the ozokerite from the gangue consists in treating the pay rock—holding in the special locality referred to up to 20% of values—in cylindrical tanks, 6 feet in diameter and 8 feet high, filled with water and heated by steam through an inside coil of iron pipe. This tank is provided with a water and oil gauge and a number of spigots, by means of which the liquid ozokerite is drawn off into rectangular pans, 10 feet long by 5 feet wide and 18 inches high—also heated by steam. Here the fluid mass is freed from mechanically enclosed water, which operation is accompanied by much rising and frothing of the substance, when it finally subsides and is conducted into circular molds so as to form, on solidifying, round cakes of 16 inches diameter, in which form it is brought on the market.

This treatment is based on the low melting point of ozokerite, which lies between 50° and 68° C., and its specific gravity, varying between 0.85 and 0.90, so that it separates gradually in a fluid condition from the gangue and floats to the top of the heated water. The subsequent operation of driving off the water was omitted in the beginning of the manufacture, toward 1893, so that Utah ozokerite, which, strange to say, was then known as Colorado ozokerite in England, obtained thereby a rather unenviable reputation.

When taken from the mine the mineral is usually of a yellow or light brown color, which gradually darkens, however, on exposure to the atmosphere. Simultaneously the wax hardens and becomes heavier—circumstances which are caused by the evaporation of volatile hydrocarbons always associated with the substance. For these reasons it seems fair to assume that the mineral originated from petroleum by the limited evaporation of the lighter hydrocarbons contained in it, and that the base of its formation was this oil. The latter presumably entered the fissures from below, and, being restrained by its enclosure from coming in contact with the air except at the surface, lost but a part of these volatile bodies, permeated the adjoining sand or lime formations to form bituminous shale, and left the heavy hydrocarbons behind as ozokerite. In other words, nature performed a task similar to the operation carried on in the fractional distillation of petroleum in retorts, but resorted in her punctilious ways to the preservation of all the values present by a tedious and gradual process at low temperatures and peculiar conditions.

It will be seen from the foregoing analyses that ozokerite is especially valuable on account of the paraffine wax and paraffine oil contained in it in considerable quantities. To produce these compounds advantageously the mineral should be subjected to destructive distillation in a retort, when a volatile gas and a burning oil come over first at 360° C., and, on raising the heat to about 500° C., a mixture of paraffine and paraffine oil results, which is readily condensed in the receiver. The heating ought to be done gradually and uniformly at a dull red heat, and no part of the retort should be allowed to become red hot during the operation. If these precautions are observed, the yield is most satisfactory, and the hard, waxy, carbonaceous residue remaining in the bottom of the retort will be found to be in the proper condition to be manufactured into "okonite." It is incorporated for this purpose with indiarubber, the plastic mixture passed through rollers at moderate temperature, and the plates resulting subjected to vulcanization. Having undergone these manipulations, the product represents a very valuable insulating material for electrical purposes and possesses, besides, a degree of toughness and flexibility which make it a very desirable substitute in cases where rubber alone would not answer.

The paraffine obtained in the manner indicated above serves partly, after proper refining described later on, for the manufacture of candles, and is considered a superior article, since candles made from the material are more compact than those prepared from petroleum paraffine, and, consequently, do not bend or gutter when lighted, like the ordinary article. It also finds application in the crude state for the manufacture of the finer grades of vaseline, when the solid and liquid paraffines produced by distillation are mixed in such proportions as to give a material of the required consistency. The common variety of vaseline, however, is prepared from petroleum residues, which are melted and passed through filters of fine, granular and thoroughly dried animal charcoal, when the resulting bleached and refined product represents the article of trade commonly known as vaseline.

In fact, there are hardly found in nature three raw materials more closely related than natural gas, liquid petroleum and ozokerite or mineral wax, and the United States excel in this regard most conspicuously, since all three are found frequently in association within its boundaries. This close relation renders the theory acceptable that ozokerite is to be classed with the olefines of the general formula $C_n H_{2n}$, and that it belongs to this group of simple hydrocarbons, having originated by a "polymeric" change from petroleum. This term comprises the principle according to which a diversity of compounds can exist under a common formula, their percentage composition being the same, while their molecular weights and actual number of atoms differ.

Analyses of the organic elements constituting ozokerite show it to be a compound of carbon and hydrogen in the proportion of 85.5 and 14.5, when pure. The natural product is, however, frequently contaminated with admixtures of asphaltum, earthy matter and water, so that these proportions vary to some extent, as becomes clear from the following analyses:

Ozokerite from—	Boryslaw.	Moldavia.	Urpeth.
Carbon	85.50	85.75	86.80
Hydrogen	14.50	15.15	14.06
	100.00	100.90	100.86

The European mineral has been found to be especially adapted for the manufacture of cerasin, while the American product, when properly treated, does not give any of the compound. This behavior is rather startling, but cannot be doubted, since several experimenters, and the writer himself, did not succeed in producing the substance desired from the Utah specimens, in spite of repeated efforts. This cerasin, which resembles beeswax in appearance and derives its name from the Latin "Cera," meaning wax, is prepared from the refined European ozokerite by judicious treatment with sulphuric acid, preferably fuming or Nordhausen acid, at a steady temperature of 80° C., when, after the addition of all the acid required for refining, the temperature is raised to from 180° to 190° C., so as to eliminate all the resinous admixtures present. After the removal of the latter, the temperature is lowered to 140° C., and the mineral wax remaining bleached by means of animal charcoal or the carbonaceous residue produced during the manufacture of yellow prussiate of potash.

As the American ozokerite cannot be applied at present to the manufacture of cerasin, no method having as yet been devised for that purpose, its utilization has been limited mostly to the production of paraffine, paraffine oil and okonite. Besides these uses it finds, however, application in the manufacture of varnishes, heavy lubricants, and blacking, serving furthermore as a welcome material for caulking ships, so that it commands a steady price in the Eastern market. It is quoted at present in New York at 8 cents per pound for the foreign article, and at 6 cents for the domestic product, transportation from Utah to the seaboard amounting to $27 per ton. Deducting mining and refining expenses, and cost of transportation, there remains sufficient margin to render the working of the deposits remunerative, and to encourage further prospecting for the mineral. These favorable conditions are still enhanced by the imminent exhaustion of the Boryslaw mines, already reported from time to time, so that finally the Utah deposit will represent the only source from which to supply the market, unless new discoveries are made in California, Utah or Colorado, for which indications are favorable.

Smelter Methods in Colorado.

To THE EDITOR:—Among the new wrinkles for 1900 which the smelter trust is working on the miner are; first, paying 2½ cents per unit below their own market quotation on Pb., or 52½ cents per unit instead of 55 cents on a $4 New York basis, as has been the rule for years; second, two-tenths of one per cent increase in the calculated difference between wet and dry assay on copper; third, a reduction of 3% on free limit on zinc; fourth, a reduction of 2% on free limit on sulphur. Let us take a class of ore not uncommon in Colorado and usually produced in small lots by shippers who must sell at the open market price: Pb. 20%, Cu. 8%, Zn. 15%, S. 20%; loss on Pb. per ton, 50c; loss on Cu. per ton, 40c; loss on Zn. per ton, additional to smelting charge, 90c; loss on S. per ton, additional to smelting charge, 50c. Total, $2.30.

Aspen, Colo., June 30.

At the Paris Exposition.

From Paris A. Van der Naillen of San Francisco writes that the mineral exhibit of the United States is finished and open to the public and greatly appreciated by the crowds before the cases filled with specimens from mining States.

He mentions, particularly, a large piece of crystallized gold of delicate leafy structure 12x8 inches, which crowns the pyramid, loaned by J. D. Fricot of San Andreas, Cal.

Mr. Van der Naillen says many of the leading mines of the mineral States have contributed beautiful specimens to the exhibition. Special exhibits of quicksilver ores, bitumen rock, asphaltum, mineral oils, borax and copper are also noticeable.

"A fine model of a 5-stamp mill in full operation, built by the Union Iron Works, attracts great attention at all times by the hammering of the stamps." A. Ekman of Oroville is in charge of the California collection.

In the metallurgical department the exhibit marked "From Quartz to Bullion" attracts attention. This interesting exhibit was donated by H. P. Stow of the Gold Bank mine of Butte Co., Cal.

"Next to the United States comes the mineral exhibit of Russia. In native gold it is far from being equal to ours; but in all other minerals it is on a parallel with ours. Its territory being so immense from which to gather specimens, in its great variety of riches of its iron ores it is superior to ours. They have mines of pure magnetite cropping in large ledges through the eternal snow of Lapland, and from there to Persia and India they have mineral deposits of all kinds.

"Italy has also an interesting mineral exhibit, the ores mostly coming from the foot of the Alps. The marbles are of course exceptionally beautiful.

"France and Germany are in the first ranks after the United States and Russia. Their exhibits of ores of the precious metals are ordinary, but those of coal, iron, zinc, antimony and manganese are wonderful.

"The great Exposition waxes more beautiful daily and in measure as the general sights have been realized and appreciated; in the same measure do we pay more attention to its details, and only then, when haste is over and we take due notice of every special exhibit, do we realize the beauty of the design, the finish of details, the genius developed in each structure—genius harmoniously blended with art."

The Work Would Apply.

To THE EDITOR.—Can work done running tunnel in patented ground toward and to develop a location made in 1899 apply on assessment work on such location if owned by same company? The development work would not be of any value to the location if done in any other way. L. W. M.

San Francisco, June 28.

Where work performed or improvements made manifestly tend to the development of a mining claim and made in good faith, it would be difficult to successfully combat the case by any adverse claimant.

In the specific case mentioned the answer is "Yes." Work done outside of a claim, if for the purpose of developing that particular claim, and if such fact can be clearly shown, is as available for holding the claim as though it had been done within the boundaries of the claim so developed.

An Act of Congress passed February 24, 1875, amends section 2324 of the United States Revised Statutes as follows: "So that where a person or company has, or may run, a tunnel for the purpose of developing a lode or lodes owned by said person or company, the money so expended in said tunnel shall be taken and considered as expended on said lode or lodes," etc.

A TRAVELER in El Paso, Tex., might be occasioned some trouble if he should desire to set his watch there. Mountain time is used locally and by the Santa Fe; central time by the Southern Pacific's Atlantic system and the Texas Pacific. Pacific time is used by the Southern Pacific's Pacific system, and the Mexican Central Mexican time, which is twenty-four minutes later than Mountain time. The Southern Pacific makes a jump of two hours, the only point where a change of more than one hour occurs. If one travels via the Sunset route from San Francisco to Jacksonville or Savannah on the Atlantic he will only have to change his watch once, at El Paso, where Pacific time is advanced two hours to Central time. There is only a difference of two hours between San Francisco and Savannah.

MINING SUMMARY.

ALASKA.

The steamship San Blas, which left Cape Nome June 21, reports that there were forty-two vessels in Nome harbor that day. The beach was piled high for several miles with freight of all descriptions. The sea was covered continually with myriads of barges and lighters transferring freight from the vessels to the shore. Hundreds of row boats and launches were continually passing from the boats to the beach.

Nome beach gold is worth more than Dawson gold. It assays $18.25 per ounce.

Purser Hayward says the beach claims have been worked over three or four times. He is of the opinion that the creeks near Nome are rich. He thinks the population of Nome may reach 50,000 before the rush subsides.

Under date of June 3, J. B. Zimdars writes to the Dispatch from Cape Nome: "Unless you can afford to blot out a year of your existence and lose the cost of living for a like period, or you can afford to drop a thousand or more for the sake of experience, stay at home. Under no circumstances come if you must stake your all. It is true there is an extensive gold belt here, reaching from Norton bay to the Arctic. But the creeks in that belt which contain pay are comparatively few and far between. The beach, which is the hope of thousands who, we are informed, are coming, has been more than three-fifths exhausted by last summer's work, as far as individual mining is concerned. Some few rich spots may yet be found, but the average beach miner will be paid with results which will represent only average wages. To him who cherishes the idea of finding new creeks and becoming the owner of yet undiscovered claims, I can but say that virtually all that most of the people here have so far done is to stake and locate claims; and if there be any creek, or gulch or bench yet left unstaked it is a pure accident, for which the stampeder would blush for shame should it ever be brought to his knowledge. For men to find claims at this late day they must be prepared to lend themselves to a year of hard tramping and more wearing work than most of them have been accustomed to, with the chances ten to one against them. And to augment all those difficulties there are still others to be considered—the cost of getting here, for passage and freight; the almost entire absence of food and shelter; the shortness of the working season, virtually only four months. During the eight months of winter none but deep diggings and tundra claims can be worked to any advantage, and as far as other mining is concerned, this period can only be devoted to preparation for the next season's run."

The Alaska Commercial Co.'s steamer Portland from Cape Nome brought passengers and gold. The captain reports a general and continuous row along the beach at Cape Nome between conflicting claim owners and their agents. There is the usual report of considerable gold being taken out at Topkuk, and the papers have alluring pictures of men with their pants tucked in their boots, carrying big bags, presumably full of gold. It is estimated that there are 30,000 people at Cape Nome. The lawyers are all busy.

The exodus to Cape Nome from Dawson, which has been comparatively steady, had been superseded by the rush to the Kyuoquot country.

The Cape Nome Gold Digger of June 13th says: "There is not a man on the beach line but knows he should be pitched incontinently, neck and heels, from his roosting place. Each and all of the men there have been expecting to be thrown off and are wondering why they are not. The value of tens of thousands of dollars worth of property is involved, and the highways and landings are obstructed. There should be no temporizing with the question."

ARIZONA.

GILA COUNTY.

Silver Belt: Mgr. Cutting of the Troy mine is going to push work, commencing soon. The company is said to have $20,000 on deposit in Globe for development work.

The Ray mill, at Kelvin, will be in operation Sept. 1. The ore train is making regular trips from the mine; there is now on the dump at the mill a pile of ore 500 feet in length, 30 feet wide and 17 feet high. The dump is on the upper side of the mill and above the crushing floor. The train runs up onto the dump and discharges its cargo in a few minutes, the cars being self-dumpers. From this dump the ore is dropped through trapdoors to the self-feeders over the Cornish rolls, which are arranged in series, so that the product from the first, or coarse-crushing rolls, passes, automatically, to the next set of rolls, which reduce the product to a [illegible] greater degree of fineness and passes it on the next set of rolls; thus the commutation continues until the last set or finishing rolls have been reached. Here the product is caught by elevators and carried to the top of the building, where it is discharged, automatically, into revolving screens, of which there are three sets, running in mesh from ½-inch down to ¼-inch. These classify the pulp into uniform sizes, and each size is discharged, automatically, through a chute to a double-compartment, iron plunger jig, of which there are twelve in the mill. These jigs take out the coarse metal and also the finer particles which have been freed from the gangue in passing through the rolls, and make clean concentrates both above and under the screen beds. The tailings from the jigs pass to two Chilean mills of 80-ton capacity each, where they are recrushed to pass through about a 40-mesh screen and discharged onto sixteen Hallet concentrating tables. The middlings from these tables are pumped into an iron cylinder, the dimensions of which are 4x12 feet. The interior of this tube is partially filled with Norway round flint pebbles, ranging in size from 1 inch to 3 inches in diameter. The cylinder revolves and the middlings are reduced by attrition till the pulp will pass a 60-mesh screen, through which it is discharged and returned to the tables, where it receives final treatment. The plant will handle 250 tons of ore in twenty-four hours; seven tons will be concentrated into one; the output of concentrates every twenty-four hours will be about thirty-five tons. The average grade of the ore being a little over 4%, the concentrates will carry about 30% copper, beside iron and other values. At 16 cents for copper, the concentrates will be worth $96 per ton for their copper contents. The mill will require the services of eleven men to operate it. The company intend to increase the capacity of the mill to 800 tons per mill day of twenty-four hours, if the present plant handles the ore successfully. The first improvement made will be a railroad from Kelvin to the S. P. or to a connection with the Santa Fe at Phœnix.

GRAHAM COUNTY.

On June 29 the reduction works of the Detroit Copper Co., at Morenci, caught fire and the entire plant was consumed. The fire was caused by the bursting of a slag pot. There were no water facilities. The works consisted of a 150-ton concentrator, smelter furnaces and converters. The company has a 600-ton concentrator mill one mile distant from the old plant.

MOJAVE COUNTY.

Mineral Wealth considers the strike on the Juno at a depth of 400 feet important for the district. The property was a rich producer until the development reached a break in the vein that contained mineral country rock, mud, etc., when it became too low grade to ship. The present owners have been sinking to get through this mixed zone and have succeeded. Breaks occur in nearly all the mines of the county and usually work has stopped at the break line. The Juno is the first mine in the county to get below the break line and the renewal of the ore is important.

North of Chloride J. C. Stewart has located what he considers to be a turquoise mine, worked in former days by the Aztecs.

Near Chloride, Mgr. Wulstein is sinking on the Silver Age mine 3 feet a day.

The Juno mine shaft is down 400 feet, and at the Blue Pea, Mgr. Rochford will put in a steam hoist.

The Lucky Boy has "mahogany" ore, it being of a dark brown color, closely resembling mahogany wood.

YAVAPAI COUNTY.

The officers of the Crowned King M. Co. are: N. C. Shekels, president and general manager; R. Wilkinson, vice-president; J. M. Taylor, secretary; B. A. Turner, assistant secretary; G. P. Harrington, treasurer; P. A. Jones, Supt.; R. H. Hetherington, residing agent at Prescott.

J. H. Wilkerson has bought the Sun Dance mine, near the head of the Hassayampa, at trustee's sale, and will work it.

Contracts have been let for 200 feet of drifts and an upraise of 165 in the Mammoth mine, Big Bug.

A cyanide plant for the working of gold ore that does not smelt well will be built by the Copper Chief Co. at their mine, 7 miles south of Jerome.

YUMA COUNTY.

F. M. Barnes of Poncho Springs, Colo., and F. B. Cassiter, at Needles, have acquired 4240 acres of dredge and hydraulic placer ground above The Needles.

CALIFORNIA.

AMADOR COUNTY.

Ledger: In the Centennial, at Drytown, Supt. Gross has samples of ore from the 630 level that, he says, will assay $107 per ton, and other levels that will go $60.——Supt. Stewart of the Butte Basin Gravel Co. has gravel in the long tunnel that will average $4 per ton.——At Amador work is under contemplation at the Fremont and Gover mines. The new shaft at the Fremont is down over 300 feet. The old Gover shaft will be unwatered and retimbered, and equidistant from the two shafts, which are 1200 feet apart, a 60-stamp mill will be built.——In the Amador Queen No. 1, at Jackson, Supt. Dye is fitting up additional stamps and concentrators and at the 500 level is making preparations for stoping. The ore yields 6% in sulphurets.

CALAVERAS COUNTY.

Near San Andreas the Commodore has men repairing and straightening the shaft preparatory to further sinking.

The Del Monte M. & M. Co., a new incorporation, will work in Railroad Flat mining district the Del Monte, or Old Prussian Hill mine, the Monte Del, Hazard, Calaveras View, Pina Vita and the west extension of the Del Monte.

At the Oriole mine, near Angels, crosscutting is being done at the 400-foot level. The Citizen says the ore body is nearly 20 feet thick, and all good milling rock.

The Ford will be unwatered to the 400 level.

Supt. Carver of the Table Mountain cement gravel mine, between El Dorado and Sheep Ranch, has a 5-stamp mill crushing thirty tons daily; five stamps more will probably be added.

The Riter mine, near El Dorado, has incorporated in San Andreas; capital stock, $100,000; M. C. Rigney, C. D. Fontana, S. E. Redmond, E. Casey, F. J. Solinsky.

At Angels a mining company has been formed to dredge the Mokelumne river near Jackson bridge. The company is the Angels Submarine M. Co.; W. A. Clark and T. Colepan are managers.

EL DORADO COUNTY.

(Special Correspondence).—The South-Sliger mine, 3 miles north of Greenwood, is being developed by a San Francisco company. The main incline is 300 feet deep. At 260 feet a crosscut was made to the hanging wall a distance of 100 feet—all in vein matter. In the crosscut, 50 feet east of the incline, a streak of ore 1 foot wide was found showing ore rated at $40 per ton. In bottom of the incline the pay ore is 10 feet wide. Sinking is progressing. C. W. Keeney is Supt.

The Union mine and 20-stamp mill is sold to the Schoolgirl M. Co. T. H. Williams, Jr., D. M. Burns and D. Bixler paid $12,500, or a quarter interest in the Union mine for 25,000 shares of the Schoolgirl; the U. G. M. Co. receives 75,000 shares in the Schoolgirl as a compensation for an undivided three-fourths interest in its mining ground and mill, Mud Springs district.

At the Big Canyon mine work has suspended. Some of the machinery will be moved to Tuolumne county. The Vandalia mine continues.

J. H. L. Tuck is opening the Expansion mine, west of Placerville, and grading for a mill.

Placerville Nugget: The mill at the Omo mine has started up.——Two shifts are employed in the Mt. Hope mine, near Grizzly Flat.——At the Larkin mine, Diamond district, ore is being stoped from the 600-foot level sufficient to run the 10-stamp mill.——The Mt. Pleasant mine, near Grizzly Flat, is unwatered to the 500-foot level.——At the Grand Victory mine thirty men are employed.

Nugget: The tunnel at the Electric mine is in 680 feet.——At the Alpine mine crews are working night and day sinking a shaft.——At the Big Canyon mine work stops July 15.——At the Little Gem mine near Volcanoville ten men are crosscutting.——At the Expansion mine, 8 miles south of Placerville, a mill site is being graded.——Davis Brothers have bonded a quartz mine, 1 mile southwest of El Dorado, and will put in a steam hoist and pump.

HUMBOLDT COUNTY.

W. McCracken of San Francisco will develop the copper claims at the head of Mad river, 60 miles southwest of Weaverville.

INYO COUNTY.

At Darwin the Defiance mine suspended operations for the present, Supt. McDonald being unable to get miners enough to work the mine with a full crew.

A payment of $10,000 has been made on the recent purchases in Inyo county by the California & Inyo M. Co. of Salt Lake City, Utah. F. Mathews, the manager, has gone to the property with H. E. Simmons. The vein is reported to be 5 feet in width and assays 30% lead and 40 ounces silver per ton.

KERN COUNTY.

The S. P. Co. will build a 35,000-barrel tank at the track in the Kern river fields, to be used as a reservoir for locomotive fuel.

At Bakersfield the Hercules Oil Co. will build an oil refinery, capacity 1000 barrels daily.

The Californian hears that the security of those whose titles rest on mineral locations may be only fancied. The "scrippers" have been maintaining a regular bureau of information at Washington and have left no work undone which would strengthen their side of the case, while the mineral locators, regardless of warnings, have done practically nothing. The fate of the lands depends upon the attitude of the Land Department, of which the Secretary of the Interior is the head, and his position is thought to be indicated by the stand he took in relation to the petroleum miners' bill, which failed of passage because of his opposition.

The Kern Oil Co. has sold to Collins & Waterman the west half of the southwest quarter of section 4, 29–28, for $120,000, or $1500 an acre. The Aztec Oil Co. has eighty acres in the same section, paying $108,000.

MADERA COUNTY.

(Special Correspondence).—The Magnet Co. is grading for a new stamp mill, 850-pound stamps, quick drop. The mill is at the foot of Crystal Falls, will be run by water power; steam will be used until the dam is completed at the head of the falls, and the winter rains fill the reservoir. The Lily mill has completed a run on ore which is said to have yielded very satisfactorily.

Gold, June 29.

MARIPOSA COUNTY.

(Special Correspondence).—In the Merced G. M. Co.'s operations the recent find of quartz cutting diagonally across the mother lode continues strong, besides considerable trenching on the surface. A shaft being sunk on this vein is now down 60 feet. At the Mary Harrison mine the main vertical shaft is down to the 800 level, a crosscut has been made to the vein and an inclined shaft (to conform to the dip of it) is being sunk some 40 feet back in the footwall slates. The winze from the 700 level is down to the 900, and a drift is being run north to connect with the shaft.

Coulterville, June 27.

At Mariposa, Supt. J. L. Madden of the Francis mine will put a 10-stamp mill and 40-ton cyanide plant in operation by November 1. The ore averages 8% in sulphurets. The shaft is down 300 feet.

A contract has been let by the Mariposa C. & M. Co. to Corbett & Koglund to run the east and west drifts in the Mariposa mine at the 475-foot level. The contract calls for each drift to be run 200 feet, the contractors being required to break the ground, the company furnishing everything and removing the dirt.

MENDOCINO COUNTY.

C. R. Schumacher of Colorado has a bond on the manganese mine near Ukiah.

MONO COUNTY.

At Lundy R. T. Pierce is digging a ditch for the pipe line to convey power to drive the 300 H. P. electric motor on Mill creek.

W. C. Travis is daily treating 100 tons of tailings at the Jackson & Lakeview cyanide plant, Lake canyon.

NEVADA COUNTY.

The machinery transferred from the Daisy Hill to the Jeffersonian mine, near Grass Valley, is running.

H. L. Body will build a 20-stamp mill at the Cadmus mine, near Nevada City.

PLACER COUNTY.

Colfax Sentinel: Supt. Felix Chappellet Jr. of the Eureka mine is extending the main tunnel.——The tunnel of the Azalea mine, Blue canyon, is in 2640 feet.

The Gold Run Gravel Co., also the Inskip Co., have closed down; failure of water supply. The Inskip Co. has shown that the bedrock is pitching into the hill. The company will extend the main tunnel 300 feet to reach gravel at the bottom of the channel.

PLUMAS COUNTY.

To the Arcadian property, near Greenville, a 10-stamp quartz mill will be removed from the Gullic mine.

At Rich Bar the Moore property will resume next week in charge of T. R. Andrews.

Carter & Deal, at Crescent, have twenty pounds of gold taken from their placer claim, the Cadimus, worked by the ground-sluice method.

Morgan & Mott have bonded the Hughes property at Meadow valley.

SAN BERNARDINO COUNTY.

The new mill on Capt. DeLamar's gold mine at Gold mountain will start up August 1st.

The Alameda Borax Works are closed because of a raise in freight charges on the crude borax from Death valley to the works, the Southern Pacific Co. raising the rate from $6.50 to $29 a ton. The refining will be done in New York, the rate from the mines to that point being cheaper than it is to San Francisco. The borax works have been receiving about 900 tons of crude borax from Death valley each month. A raise of $22.50 a ton in freight from one California point to another is prohibitive.

SAN DIEGO COUNTY.

I. Trumbo's report as receiver of the Golden Cross mines at Hedges shows that a total of $18,888.02 has been received from the mines since March 31, and $21,443.43 expended.

SHASTA COUNTY.

The Black Spider mine, near Keswick, has closed down.

The Searchlight says that by November 1st smoke will be issuing from the stacks of the Bully Hill smelter. The stack of the roasters will be 125 feet high, of the smelter 100 feet and of the converter 90 feet. Seventy men are employed at mine and smelter site.

Shasta Democrat: Machinery is to be put on at the Mt. Shasta mine; sinking the main working shaft, now down 350 feet, is being pushed.

The Pioneer G., S. & C. Co. has incorporated at Redding; H. C. McClure, O. E. Nash, T. Greene, J. R. Hall, A. Bell; capital stock, $200,000; to develop the Recorder and Town Creek mines at Copper City.

The National mine in Rich gulch has temporarily closed down. S. P. Poland & Co. will continue cyaniding the tailings.

SISKIYOU COUNTY.

Spanglor Bros. have closed their mine at the mouth of Humbug, water being too light.

The Preston Peak copper district, in the Siskiyou mountains, is being developed by Schoonoven & Young of New York, represented by H. Phillips, who is locally credited with having spent $100,000. The work is a 200-foot drift right on the ledge and a 70-foot winze. They have ore which assays 22% copper and $4 in gold. Another property there is owned by E. M. Drexler and J. W. Pierson of San Francisco, represented by J. T. DeBoy. They have spent considerable money in development work. Their vein is 4 feet, runs parallel with the other property and assays the same.

TUOLUMNE COUNTY.

Supt. R. L. Long at the Tri-Color mine, Tuttletown, is sinking a three-compartment shaft. A new gallows frame has been completed.

The Rosedale gravel mine, east side of Table mountain, is leased to D. L. Quirolo & Co., Rawhide.

"Sinking in the shaft and doing prospect work" is the report of Supt. A. L. Moore of the Green mine, above Sugar Pine, to the Magnet. Twenty men are employed.

The Yosemite G. M. Co. have their pipe line completed on the line of Big Oak Flat ditch.

The incline shaft at the Jumper mine is down 1300 feet.

The Dutch M. & M. Co. has levied an assessment of 15 cents per share.

Concerning Santa Ysabel reorganization, Treasurer Belches says that holders of 125,000 shares have thus far assented to the plan, leaving a margin of 5000 shares unassented.

Supt. Pease of the Mazeppa mine reports the shaft 515 feet deep. In drifting, crosscutting and upraising 1134 feet of excavations have been made. At the 300-foot level the vein will mill an average of 12 feet wide. The 100-foot level is extended south 66 feet. On the 200-foot level a drift has been run south 285 feet on the vein. A crosscut was made west on this level, showing the ledge 20 feet wide; 215 feet south of the shaft an upraise is being made to connect with No. 1 level; 250 feet from the shaft a crosscut west shows the vein to be 20 feet wide. From the 200 station a drift has been run south 225 feet. At the 225-foot level an upraise is being made for ventilation and stoping. A station has been cut at the 400-foot level and a crosscut run east 202 feet, cutting two veins lying east of the one now worked. On the 500-foot level a drift is now in 107 feet.

The Mount Jefferson mine, Groveland, is to have a vertical three-compartment shaft to tap the vein at a depth below 600 feet. The Magnet says the mill is turning out about $7000 a month with ten stamps.

At Big Oak Flat ten stamps are to be added to the Nonpareil mill; a hoist is to be put in at the Nonpareil shaft of the Longfellow mine.

YUBA COUNTY.

The crushing plant in the Blue Point mine at Smartsville is a revolving screen cylinder, 6 feet diameter, 8 feet long, propelled by a turbine wheel, with an average speed of fourteen revolutions per minute. The bearings are hollow and 18 inches in diameter, through one of which the feeding is done; coarse matter passes through the other. Streams of water are conducted into and about the cylinder, which, with the fine or pay gravel, drops through the screen upon the table below and thence over a series of riffles.

COLORADO.

BOULDER COUNTY.

The Silver Lake mine, 8 miles west of Sunset, is to be worked. The ore is sulphide and carries gold, silver and copper. A prospectus places the average value of the ore at $32 per ton, and the cost of mining, shipping, milling, etc., at $14.50. The managers say: "We intend to make our money out of the mine, not by manipulating stock on the Denver exchange."

CHAFFEE COUNTY.

Granite mining district is the extreme northern end of the county, from the Arkansas river east to the Park county line; altitude, 8500 feet; geological structure the granite-gneiss complex common to that section of the State, the whole district traversed by porphyritic dykes varying from 100 to 600 feet in width. The ve[illegible]s of the district are of true fissure type, though small; principal value gold.

The Belle of Granite, at a depth of 250 feet, is still in the oxide, having passed through small bodies of sulphide of as great, or greater, value than the oxide.

The Magenta has a depth of 500 feet.

CLEAR CREEK COUNTY.

Idaho Springs Gazette: The management of the Lamartine mine will shut down the compressor to change the plant to electricity. Although they have a tunnel connecting the lower workings, they hoist all the mineral through the shaft where the machinery is located. In changing from steam to electricity there will be a saving of one-half the present cost of operation, not including the labor, the mine giving employment to 100 men.

The McKinnie–Davie Investment Co. has secured control of the Freeland mine and other contiguous property. A payment has been made and the deal involves the payment of $250,000.

CUSTER COUNTY.

The Grand Rapids G. M. Co. has organized to work a group 2 miles from the Bassick mine, comprising the Woodhull, Bobtail, Lily, Wellington, G. W. and Antrim claims.

DOLORES COUNTY.

Near Rico the Weaver–Burke lease on the Swansea G. & S. M. Co. employs fourteen miners; three carloads of gold-silver ore were shipped during June.

On June 24 the first shipment of zinc was made to Denver from the Atlantic Cable group of mines near Rico, operated by the New Jersey Zinc Co., for a crucial test.

FREMONT COUNTY.

At Canyon City the Lucky Day G. M. & M. Co., capital stock $1,000,000, has incorporated; C. Myers, W. L. Huffman, E. Colwell, W. J. Wilson.

GILPIN COUNTY.

Central City Register-Call: The Gettysburg M. & D. Co., operating the Gettysburg, Gilpin camp, have a 16-inch streak of peacock ore, which runs $50 per ton, with 10% copper.——Bertha G. M. & M. Co. are operating the head of Elkhorn gulch, M. W. Tanner, manager.——The Arizona property, bought by Boston parties for $60,000, lies part in Gilpin and part in Clear Creek counties, near the head of Gilson gulch. The main shaft workings are on the Gilpin county side. The new owners will sink the shaft to a depth of 500 feet.——The Specie Payment, on Bellevue mountain, is shipping enough milling ore to keep ten stamps dropping at the Black Hawk mills.——The Colorado & California S. M. & M. Co. have the 25-stamp mill at Idaho Springs and intend to make it a concentrator, with a daily capacity of fifty tons.

GUNNISON COUNTY.

The Times says there will be over 600 men on Redstone's pay roll next month.

A. E. Reynolds of Denver is locally credited with buying and locating properties in the lime belt near Pitkin, in Chicago Park, to the amount of 2000 acres.

HINSDALE COUNTY.

The Hidden Treasure at Lake City has been sold to New York men for $200,000. The property has been in litigation for several years.

A Lake City dispatch says: A. G. Morrison and J. Hockett were blown up beyond recognition this morning at the Hidden Treasure mine. They were alone and no one knows just how it happened. They stayed behind their companions, who went off duty at 2 o'clock, to fire their shots. They were not discovered until 7 o'clock this morning.

At Lake City Manager Gardner has the Ocean Wave concentrating mill completed. The Cammet table is to be used.

LA PLATA COUNTY.

The Bulldozer group of eleven claims in California mining district, Lewis gulch, La Plata mountains, is reported sold to E. K. Austin of New Yook and associates for $90,000.

LAKE COUNTY.

(Special Correspondence.)—The downtown mine of the Bohn M. Co., whose shaft is now about 500 feet deep, will sink 100 feet deeper to get under the carbonate and iron ore body known to exist at that level. The mine is now shipping about forty tons per day, but expects to increase this to 100 tons when prepared to hoist from the 600-foot level. This property and the California Gulch mine are under the management of J. W. Newell.

According to smelter receipts the tonnage of the district has slightly fallen off within the past week. This is accounted for by the lower lead prices, which had the effect of cutting off lead ores of low grade. The present advance in lead, however, is likely to result in restoring the former tonnage of low grades.

Leadville, July 1.

(Special Correspondence).—The California Gulch M. Co., of which J. W. Newell is manager, has just put in a new hoist over its 400-foot shaft and cut a pumping station at the bottom of the shaft. The station is 8x9x30 feet.

Leadville, July 1.

MONTEZUMA COUNTY.

At East Mancos, Supt. Haines of the Timberline Co. is milling thirteen tons ore per day. Supt. W. Rossler has the North Star mill running twelve hours a day.

OURAY COUNTY.

W. H. Hammond Jr. is pushing the Treasury tunnel, which is now in 1400 feet and progressing 8 feet per day.

In the Bobtail mine, Red Mountain district, owned by the Barstow M. & M. Co., twenty men, including top men and ore sorters. are taking out a ton a day per man. There is a streak of bismuth silver ore about 8 feet wide running through the vein.

SAGUACHE COUNTY.

Trouble is reported from Baca land grant No. 4, San Luis valley, near Duncan, where dynamite was used to blow up a mining settlement. Miners in the hills are arming themselves and propose to contest the rights of the company to evict them from their claims which the company claims comes to it by its purchase of the Baca land grant. A suit to evict miners and others from the grant is now pending in the United States court in Denver.

SAN JUAN COUNTY.

At Gladstone the South Dakota is shipping by car from the divide on the Ouray slope, at the head of Grey Copper gulch. The ore has a copper pyrite base, strong silver values and some gold.

The Queen Anne is spipping from Gladstone a lead base ore.

In Bear Creek district C. Weisbecker, lessee of the Gold Bug and Repeal mines, and C. P. Martin will put in a 100-ton cyanide plant.

G. H. Burrows has started a 6000-foot tunnel to tap the Broadway lode near the Hinsdale county line.

SUMMIT COUNTY.

(Special Correspondence).—Ault & Wiborg of Cincinnati, O., have very complete equipment at the Excelsior mine, including electric power plant and concentrating mill. The mine, which yields a sulphide ore, is opened through a system of tunnels. The electric generator is driven by water power.

Frisco, June 27.

(Special Correspondence).—The Summit M. & S. Co., in charge of Supt. E. E. Byron, is producing from 35 to 40 tons of ore per day, the most of which is concentrated at the company's mill. The ores are composed of an iron and copper sulphide, carrying small values in gold, silver, lead and copper. This production is the result of systematic development work in progress.

F. M. Linsley, manager of the Free American mine, reports the putting in of new hoisting machinery and that the property will doubtless begin shipping ore as soon as the machinery is ready to operate. He reports the vein 12 feet between walls so far as work has gone, and thinks the ore will stand shipment direct to the smelter.

The Snowbank mine, which shipped about twelve tons of ore per day from February 1 to May 20, found it necessary to cease producing a few weeks on account of the surfeit of water. The mine, having been unwatered, will resume work again July 1. The shaft sinks 100 feet to the blanket vein of sulphide ore, which carries lead, a high excess of iron, with fair gold and silver values. Supt. W. G. Martin thinks shipments will run about twenty tons per day from now on. The Snowbank belongs to James Stettauer of Denver.

The Sellers group, belonging to the Eagle M. Co. and managed by Peter Breen, ships steadily over 100 tons per day.

The Queen of the West, under lease to Turner & Farnham, is expected to begin shipments next month. The former lessees made a shipment of four carloads of ore which ran unusually high in gold and silver values.

The Iron Mask, now in control of Mrs. Marshall of Leadville, will be unwatered and mining work therein will be resumed.

The Eldora, near Robinson, under lease to Mr. Wright of Aspen, is reported making good shipments. Last winter an ore shoot heretofore undiscovered was opened, which has been yielding a rich grade of ore.

WASCOTT.

Kokomo, June 28.

R. J. A. Widmar and R. G. Dill, newspaper men of Breckenridge, have got out a folder containing a fine description of the Blue River gold fields, supplemented by colored maps of that section by F. C. Cramer.

The double Evans hydraulic plant of the North American G. D. Co., opening a pit to bedrock in the Swan valley, is within a few feet of the bedrock. The pit is about 40 feet deep.

TELLER COUNTY.

The Gould M. & M. Co. has made final payment of $20,800 on the purchase price of the two Sitting Bull claims recently bought for $67,500.

For the week ending June 21 Stratton's Independence shipped 1435 tons of ore; gross value, $104,700.

The Cripple Creek gold yield for June is figured at 49,350 tons; gross value $2,125,000. The mills treated 34,350 tons, saving $1,050,000; the smelters received 15,000 tons, average value $70.

The Standard M. & L. Co. has sold the Door Key G. M. Co. its interest in the McCumber, Morning Star and Door Key lode claims, on Tenderfoot hill, and the Malta claim for $50,000.

On June 30 the shafthouse of the New England G. M. Co., on the top of Straub mountain, was destroyed by fire.

The Cripple Creek sampler is to be enlarged 200 tons a day, the enlargement to be a duplicate of the present works. The new sampler to be erected by the same firm will be in the vicinity of Goldfield. The Cripple Creek sampler of the Rio Grande Sampling Co. is to be closed temporarily.

By a reorganization of the El Reno company through C. N. Miller, the new company takes over the El Reno, Comstock and the World's Fair lodes by payment of $50,000 cash and an interest in the new company by the old stockholders.

The Denver Post is authority for the statement that C. M. McNeill, S. Penrose and C. L. Tutt "are preparing to build a new and probably the largest sampler in the State on the railway track somewhere on the east slope of Bull hill. It will have a capacity of 600 tons every ten hours and will cost about $750,000."——The output from Stratton's Independence for June was about 6000 tons, worth about $525,000.

IDAHO.

ADA COUNTY.

From Boise F. T. Daly states that the Atlanta Mountain mines are sold, and that "it is the intention of the purchasers to put a 250-stamp mill on the mountain, which they buy in its entirety."

BOISE COUNTY.

Around Idaho City mining operations have mostly closed for the season. The dredgers at Warm springs continue through the summer. Pres. Souther and Mgr. Gardner are there now. The new dredger has a capacity of 2000 yards a day. It is a scoop dredger, 65 feet long, 54 feet wide. On it are a pair of hoisting engines, 12x18-inch cylinders, swinging engine, spud engine and compound engine that operates the stacker, grizzlies and pumps. In addition, there is an electric light dynamo and two large boilers. Two shifts of eight men each are employed. There are two grizzlies into which the scoop dumps alternately.

The War Eagle Con. Co. on the Plowman placers for the past three months have had eight giants cutting on the bank, 120 feet high. Operations have ceased for the summer. The gross output is given at $25,000 for the season's run.

The War Eagle Co. has closed down on the Illinois; the Lucky Boy has also been closed down, likewise the Buffalo, with its 10-stamp mill.

The Snake River G. M. Co. of Idaho Falls is putting in a 1000-ton concentrator and a Hallidie wire rope tramway 1000 feet in length, the plant to be in operation Sept. 1st. The gold is very fine and runs from 15 cents upward, the intention being to run the concentrates over plates. W. P. Cantland is manager.

World: The War Eagle Co. is to put up the 20-stamp mill now at the Iowa mine, at Quartzburg, and will put in a new chlorination process in which electricity is used. The company contemplates a 100-

stamp mill in addition to the twenty stamps now on the ground. The tunnel on the Iowa is 500 feet deep; it will be extended to the Yellow Jacket, 3000 feet. The War Eagle Co. has men at work on the Mountain Chief, west of Quartzburg.

CUSTER COUNTY.

The White Knob Copper M. Co. at Cliff, about 7 miles from Houston, has a shaft down 750 feet, and going down at an average of 50 feet per month.

IDAHO COUNTY.

At Grangeville the Deer Lick-Idaho G. M. & S. Co. is organized; E. W. Goodner, secretary; T. F. Parks, general manager. About sixty men are employed.

OWYHEE COUNTY.

Sonnemann & Branscombe at South Mountain, 20 miles southwest of Silver City, have fifteen miners employed on development work, and report a 5-foot ledge averaging 15% lead and 100 ounces in silver.

At Silver City Sorensen & Hogan are reported by the Avalanche to have struck ore in the Great Republic claim "which would go $20 to the pound."

Supt. F. M. Langford of the Melcher M. Co.'s properties, 50 miles north of Elko, Nev., says the tunnel has been driven in 1000 feet and will be extended 1000 feet farther to tap the vein. He has been authorized to increase the force.

Work is to be resumed on the Lexington, 3 miles from Kellogg. The headquarters of the company are in Walla Walla, Wash.

Near Wallace it is estimated that the values lost in tailings when all the mills are running full time is $5000 per day. One plant for treating tailings is in operation, one more is in course of construction and arrangements are completed for the erection of two others.

Green, Robbins & Nelson are preparing to put in a similar plant at Gem.

SHOSHONE COUNTY.

At Wallace the Springfield has a 12-foot vein, carrying 4% copper, about 340 feet from the portal.

At Wallace, the Flagstaff M. Co. has incorporated; capital stock, $100,000; J. B. Thomas, F. T. Millichamp, W. C. Miller, A. E. Carlson, D. E. Mackinnon, directors. The Alameda M. & M. Co. has also incorporated there; capital stock, $75,000. Directors: W. L. James, F. H. Fox, J. B. Taylor, W. R. Russell, I. M. Cornthwait.

MICHIGAN.

HOUGHTON COUNTY.

Houghton reports that mining has been resumed in the Red Jacket shaft of the Calumet & Hecla, and but 50 feet of water remain in the bottom. Shafts Nos. 2 and 3, Hecla, are being ventilated. No access can yet be had to No. 2, the burned shaft.

MONTANA.

DEER LODGE COUNTY.

F. Deckerts, representing Salt Lake and New York men and his own interests, is developing his property, the Copper Camp, above Lincoln, on the Big Blackfoot.

Smeltermen of Anaconda and Great Falls want the same pay received by the employes of smelters of Butte. Butte wages in smelters are 20% higher than those of Anaconda or Great Falls.

FLATHEAD COUNTY.

Near Libby the American Kootenai M. Co., through its resident agent, W. Beager, has bought three claims on the West Fisher from F. G. Horner for $30,000.

GRANITE COUNTY.

Harper & Hamilton, in the Rock Creek district, report placer diggings in Flat gulch.

LEWIS AND CLARKE COUNTY.

Fredericks & James of Hancock, Mich., have a mill site and water right on York gulch at York. They paid for some property $40,000; will buy a stamp mill and will build a cyanide plant in connection with the mill. They say that ore in the Moss Rose runs upwards $20 a ton in gold, and cyaniding tests have saved 95% of the assay value.

The Independent says the Horseshoe M. Co. is developing a group of twenty claims across the Missouri river, 18 miles from Helena. A vein in slate carries copper, silver and gold.

J. A. Widmer, managing the dredge company on the Missouri river below Canyon ferry, will repair the boat and machinery and start again.

Resumption of work on the Humboldt, adjoining the townsite of Helena, is noted by the Independent. The Humboldt has produced $70,000 in silver-lead ore from the pipe in the lime since its discovery. The pipe came to the surface in the lime and previous operations had followed down on it at an angle of 45 degrees until a depth of 400 feet was reached.

Independent: The Helena & Livingston Co. has taken over the bond and lease held by Davis, Buskett & Hudnall on the Justice mine at Rimini. It is the intention to treat the ore in the Peck concentrator at East Helena.——Work has started on the Bullion on the main divide above Rimini.——In the Eureka are forty men at work, superintended by J. H. Steward. The mine is shipping twenty cars of ore a week.——The Bald Butte has good ore in the 600-foot level, the deepest level in the mine. The mine has paid $800,000 in dividends; all its dividends are received by Helena owners. The mine is perhaps the heaviest dividend paying gold mine in the Northwest; it has a continuous dividend record for nearly ten years. The management is opposed to publicity and no dividend notices are published.

MADISON COUNTY.

At Red Bluff the Water Lode is producing ore; the Red Chief is in splendid shape for stoping; the Comstock has ore suitable for cyanide treatment; G. D. B. Turner is operating the property.

A strike is reported in the Navajo mine by the Alder Gulch Times.

J. Whitaker, at work on the Bamboo Chief, has leased the Largey mill.

B. J. Fine proposes to work the Gravel range, 3000 acres of ground, 14 miles south of Virginia City.

E. Smith at Sheridan has charge of the hydraulic and steam derrick of the Ruby Placer Co. on Upper Wisconsin creek. Five hundred inches of water is conveyed by ditches to a high bluff opposite the works and conducted by pipe to a 5-inch monitor. To remove the boulders and large rocks a steam derrick is used.

SILVER BOW COUNTY.

The Parrot S. & C. M. Co., a branch of the Amalgamated Co., has brought an action against Heinze Bros. and the Montana Ore Purchasing Co. to have the defendants perpetually enjoined from alleged encroachment on the ore bodies of the Adventure lode mining claim, of which property the plaintiff says it is the owner. In the complaint the Parrot Co. alleges that the defendants have entered the alleged vein of the Adventure from the 1100-foot level of the Nipper claim and are engaged in extracting ore from it.

The Butte correspondent of the Spokesman-Review says: The eight-hour proposition continues to be the absorbing topic. So far no word has been received from the Amalgamated Copper Co. It remains to be seen what Daniel McDonald, president of the Western Labor Union, will do. The Butte Miners' Union adopted resolutions to continue the struggle until every mine in Silver Bow county is worked on that basis. It was reported that C. S. Batterman and F. Klepetko, general manager Amalgamated Co., consulted Foreman Williams and Shift Boss Dunshee of the Pennsylvania as to the eight-hour movement. They were asked by the officials if they thought they could get as much work out of the men in eight hours as in ten. Both shift boss and foreman were willing to guarantee that they could. Mr. Klepetko was of the same opinion, but Mr. Batterman thought that a change was unnecessary, as ten hours was a working day anywhere. It was rumored last week that Supt. J. O'Neill of the Anaconda properties had notified the committee from the union that his mines could not grant their request for an eight-hour day. It was thought that a refusal of the Amalgamated Co. would result in a clash, and in the end it is believed the union will win, for Butte is essentially a union town. The agitation will extend to all the important mining towns of the State. Wages are 20% higher in Butte than in other places. If a strike is ordered, the union will not be bucking Marcus Daly alone, but the Standard Oil Co.

The Parrot S. & C. Co. wants F. August Heinze enjoined from trespassing or carrying on mining operations on the 1100-foot level of the Nipper. The Parrot Co. claims title to the ore bodies on that level because they are alleged to apex in the surface boundaries of the Adventurer claim, belonging to the plaintiff. It is alleged that Heinze has unlawfully entered it and is mining and extracting ore.

TETON COUNTY.

A. M. Esler, at Altyn, is building a 300-ton concentrator at the Cracker mine. Four hundred thousand tons are designed to be treated during the next three years. He has thirty men.

NEVADA.

CHURCHILL COUNTY.

A $6000 copper smelter is to be put in at the Gardner mine, Cottonwood district.

ELKO COUNTY.

F. A. Sizer, for W. A. Clark, has bonded the Keystone, Commonwealth and Grand Central copper mines, in Dolly Varden district, for $10,000.

ESMERALDA COUNTY.

J. W. Mackay is said to have bought the Silver Peak mines.

General Manager Siegel of the Vulcan C. Co., at Siegelville, has put in a 25 H. P. gas engine hoist at his mine. The first and second levels are being extended. There is some pay ore blocked out.

LANDER COUNTY.

The Nevada company, operating at Galena, has three cars galena ore ready for shipment. The ore carries considerable silver values.

LINCOLN COUNTY.

J. McFarlane, Mgr. Homestake at Deer Lodge, says he will have a mill in operation this month to handle 150 tons of ore daily. He expects to show an average of $20 per ton.

E. H. Hackett will manage the Midnight and Reliance group near the Horsehoe at Deer Lodge for the Newport-Nevada M. Co., organized under the laws of West Virginia.

The De Lamar Co. is again crushing 300 tons daily.——In the southwestern part of the county is Yellow Pine district, 25 by 12 miles, dotted with claims under present conditions almost valueless, owing to isolation, low grade, owned by poor men; still with the limited resources copper and lead ores have been sent to Colorado and New Mexico, giving them a margin for development.——The A. G. Campbell group consists of 24 claims, 20 patented.——The Green Monster, being worked by the Hearst Estate, is a copper mine of merit. ——The Keystone has a record of $800,000 in gold.——Northwest of Yellow Pine is Montgomery district with mines of good values were a railroad near at hand; and east near the Colorado river, and south a distance of 90 miles, are Eldorado, Crescent and Searchlight districts.

STOREY COUNTY.

In the Confidence, Challenge Con. and Con. Imperial mines at Gold Hill the west crosscut from the surface tunnel is out 2466 feet. It advanced 14 feet during the week. The face is in porphyry.

In the Belcher mine, on the 100-foot level, the north drift from the east crosscut has a length of 149 feet. The face shows porphyry and quartz, the latter giving low assays. On the 1100-foot level the Belcher, Crown Point and Yellow Jacket joint drift is being repaired.

WASHOE COUNTY.

Near Olinghouse, W. C. Williams has the Ora mill running on high grade ore. The Ora mine at the 150 level shows 20 inches ore.

WHITE PINE COUNTY.

A new shaft is to be sunk on the Robust mine at Ely.

The Bay State property, under lease and bond by W. F. Snyder, will start work. A 20-stamp mill will be repaired and put in commission. The shaft is down 400 feet.

NEW MEXICO.

BERNALILLO COUNTY.

(Special Correspondence).—The mill of the Cochiti Reduction & Improvement Co. at Woodbury, 6 miles east of Bland, was destroyed by fire to-day. The stockholders of the company are Denver, Colo., men, principally.

Woodbury, June 29.

The Cochiti G. M. Co. in June treated 5000 tons of ore.

COLFAX COUNTY.

The Paragon mine, near Elizabethtown, runs three ounces on the plates.

The Montezuma mine, Elizabethtown district, is to be leased. It has been idle for ten years owing to the impossibility of showing the values—carbonates of lead carrying gold—without concentration, the ore not averaging enough to stand expense of shipment to Pueblo or Denver.

The Ohio G. M. Co. in its main workings at the head of Humbug gulch, Elizabethtown, is in 740 feet, and expect to go 150 feet more to cut the vein.

Baron von Zuylen of the Black Horse mine, near Elizabethtown, belonging to the Four Creeks M. Co., will start his mill with improvements in concentrators and close amalgamators.

The Montezuma G. M. & P. Co. is working three shifts on its Blue Bandana, crosscutting for the Red Bandana lead at the 425-foot level.

The Smithfield G. M. & M. Co. has appointed F. Spurr its New Mexico agent, with headquarters at Elizabethtown. The company is a West Virginia corporation.

GRANT COUNTY.

Rutherford, Smith & Rutherford have incorporated the Wilson M. & M. Co., capital $30,000, offices at Stein's Pass.

The Texas mine at Central has just begun a three-compartment shaft to be sunk to a depth of 1200 feet, when stoping will commence and a new concentrator erected. About fifty men are employed.

SANTA FE COUNTY.

Supt. Wells is running the Cerrillos smelter, with a reduction capacity of eighty tons.

OREGON.

BAKER COUNTY.

The Copper Queen mine, 20 miles northeast of Baker City, owned by Gilkson Bros., is sending ore to Sumpter.

The Baisley-Elkhorn mine shaft is in readiness to be extended 300 feet deeper, making a total depth of 700 feet.

LANE COUNTY.

The Music mine is 35 miles from Cottage Grove, in the Callapooya mountains. It is being constantly operated and has a 10-stamp mill. The Helena mine is operating a 5-stamp mill. The Noonday has a 20-stamp mill; at present it is closed on account of litigation. The Champion, which has a 10-stamp mill, is also closed down. The Grizzly mine is sold to an English company.

UNION COUNTY.

The Cougar, near Granite, is worked through a tunnel. The ore is cyanided.

At Sparta, Mgr. Perkins, in the old Gem mine, is arranging for a 10-stamp mill.

On the Mazama Company's claims, near Sparta, five ledges carry gold.

At Cornucopia the 20-stamp mill of the Cornucopia mine has resumed. The mine is employing 100 men. Alliene Case is resident manager.

SOUTH DAKOTA.

LAWRENCE COUNTY.

The Deadwood Independent has discovered "a stratum of gold a mile long, 500 feet wide and 12 feet thick, that can be mined and treated for $1 per ton." "Millions of tons" are available, and "will yield $8 per ton on an average." Further information is vouchsafed to the effect that "the ore is an altered limestone."

UTAH.

Utah dividend-paying mines in the current year have paid $2,370,026, as compared with $1,782,264 for the same period last year.

The complete list of dividend-paying mines of the State, as determined by the Board of Equalization, with net proceeds or assessable value, is as follows:

Horn Silver M. Co., $31,124. Utah Sulphur Co., $2200. Whittemore Bros. & Ballinger, $300. Centennial-Eureka M. Co., $102,431. Jesse Knight, $50,000. Ajax M. Co., $2015. South Swansea M. Co., $30,764. Swansea M. Co., $100,064. Mammoth M. Co., $248,720. Gemini M. Co., $59,204. Godiva M. Co., $27,313. Bullion-Beck & Champion M. Co., $68,165. Grand Central M. Co., $141,261. W. J. Stickney, $81. Ivanhoe M. Co., $23. Petro M. Co., $15,062. R. C. Chambers et al., $636. Highland Boy G. M. Co., $256,350. Daly West M. Co., $195,000. Silver King M. Co., $675,000. Ontario S. M. Co., $110,174. De Lamar Mercur M. Co., $27,650. Mercur G. M. & M. Co., $165,186. Honerine M. Co., $76. Estate I. S. Waterman, $89. Sacramento G. M. Co., $40,000. The Gilson Asphaltum Co., $7084. Jesse Knight, Provo, $10,000. Dixie M. & S. Co., $1483. St. George Copper Co., $2571. Total, $2,370,026.

DAVIS COUNTY.

At Farmington a mill of twenty-five tons daily capacity is to be built by J. Bogan, lessee of Rhymney mine.

EMERY COUNTY.

President St. V. Le Sieur of the Copper Globe Co. tells the Tribune the copper formation there is due to a geyser. The ore assays 50% copper; silver 250 ounces. The copper-laden water deposits incrustations 4 miles down the wash.

JUAB COUNTY.

At Eureka the Eureka Hill mill is operating forty-five stamps. The number is to be increased to sixty.

Miner: D. B. Gillies has completed the survey for the aerial tramway which within two months will be in active operation between the Mammoth mine and mill. It will be similar to the one in use at the Centennial-Eureka, but with a carrying capacity of 800 pounds to each bucket, and 250 tons per day. The distance from the mine to the mill is 4800 feet, the difference in elevation being 350 feet. The structural part will be of iron and work will begin at once on the surface. The estimated cost of the work is $15,000; but it will affect a great saving to the company, as it will enable them to handle the entire output of the mine at a cost of 6 cents per ton. The present cost is 30 cents over the railway. The tram will also carry everything up to the mine, excepting timbers. An iron chute will be built from the mill to the railroad track below and the shipping ores dumped directly into the cars.

PIUTE COUNTY.

Mgr. W. G. Filer, at Gold Mountain, has begun construction of a mill.

SALT LAKE COUNTY.

Tribune, July 1: From the Highland Boy smelter there was yesterday forwarded to the Eastern refineries lot No. 111, consisting of 60,134 pounds of copper, gold and silver bullion, this swelling the total output since June 13, 1899, to nearly 7,000,000 pounds. The month at the smelter recorded the production of 451,938 pounds, and closed with the plant receiving and putting through an average of nearly 300 tons a day.

Upon the arrival of S. Newhouse from the East, arrangements for the construction of the proposed mill on the Boston Con. Co.'s properties at Bingham will be announced.

TOOELE COUNTY.

Tribune: In the Con. Golden Gate & Mercur mines H. A. Cohen will be president and Gen. Mgr.; John Dern, vice-president; Geo. Dern, treasurer; W. H. Cunningham, secretary; G. Z. Edwards, Supt.

UINTAH COUNTY.

Mgr. Sawyer is about to start the smelter erected by the Dyer M. Co. near Vernal.

WASHINGTON.

FERRY COUNTY.

At Republic, Supt. Crumner of the San Poil and Black Tail mines will put in a 12-drill capacity air compressor on Eureka creek.

KING COUNTY.

The value of the gold received at the Seattle assay office in June aggregates more than $1,000,000.

OKANOGAN COUNTY.

Jno. I. Booge writes the Spokane Review from Loomis that at the Puritan mines the force at the mine will be largely increased. Mgr. Chilson has orders to increase the force at the Utica and Oro Fino. At the Bull Frog the work is confined to the raise to connect with the Phantom shaft. Good ore comes from the Black Bear.

PIERCE COUNTY.

The Co-operative is building a smelter at Fairfax to reduce ores, coke being plentiful there.

SNOHOMISH COUNTY.

At Index the Index-Independent, at a depth of 125 feet, a vein of copper glance 10 inches thick is reported.

SPOKANE COUNTY.

New York men propose to buy the old smelter property in Spokane, complete, and operate it. They ask that Spokane take one-seventh of the stock. It was built in 1890 on the Spokane river, 5 miles northwest of the city. It was never operated, and the buildings were finally sold at receiver's sale.

WYOMING.

CARBON COUNTY.

(Special Correspondence).—Battle Lake copper district is about 50 miles south of Rawlins: formation quartzite, schist, diorite and red granite. No systematic mining was done until 1898, when a plant was obtained and several cars of copper ore averaging 40% copper were shipped. The mine was closed during the winter of 1898 and 1899. During the summer of 1899 work was resumed for two months, during which time about 150 tons of high grade copper were taken out. There are large bodies of low grade that, owing to the cost of transportation, cannot be worked to advantage. The ore is in shoots in the quartzite, though with depth it may go to the contact between the quartzite and diorite on the south side of the claim. This group is on the north side of Battle Lake and is owned by the Battle Lake C. Co., controlled by George F. Doane, Congressman Sibley of Pennsylvania and associates. It has not been pushed. The developments consist of a shaft 265 feet, a tunnel and good plant.

On the Hercules claim, one mile east of Battle Lake, the owners have sunk a shaft in a belt of diorite, the south contact of which is red granite, the north quartzite. At 150 feet a crosscut was run to the granite, but only decomposed and oxidized iron found. A crosscut run to the quartzite found three stringers of ore aggregating 9 feet, and running about 20% copper and some gold, and new plant of machinery has been ordered, and this property is to be thoroughly developed.

The Battle C. Co., to the west of the Hercules, has the same formation and a shaft down 125 feet. This property is known as the Ledbetter property, the present manager and original locator being W. C. Ledbetter.

The Ferris-Haggarty mine, 4 miles northwest of Battle Lake, on the north fork of Battle Creek, was opened in September, 1898, since which time it has shipped over 4000 tons of copper ore, 30% copper. The ore lies in shoots on a contact between the quartzite and schist. The development consists of a shaft 3½x7 feet, 80 feet from which 1100 tons of ore was taken that averaged better than 30%; a shaft 4½x9 feet, 185 feet deep, which is now being sunk deeper, a good 6x8 hoister, a 40 and 60 H. P. boiler, pumps and air compressor, etc. The mine is owned by the Ferris-Haggarty Co., and has been poorly managed. The ore is hauled 60 miles to the U. P. Ry. and loaded at Walcott station, most of it going to the Chicago Copper Refining Co., the Argo, Denver, and other places.

Battle.

FOREIGN.

BRITISH COLUMBIA.

The B. C. mine, Summit camp, has increased its force to eighty-five men.

From January 1 to June 5 the Le Roi shipped 28,659 tons copper ore, the War Eagle 10,603 tons, the Center Star 7071, the Van Anda 2958, the Iron Mask 1434 and the Lenora, Mt. Sicker, Vancouver Island, 1200 tons.

The Trail smelter management has a contract with the Enterprise Co. to treat the output of the mine. The Ymir mine will ship to Trail; from the Queen Bess 1000 tons are to be sent via Alamo.

R. C. Pollett at Ymir has bought the El Dorado group, on the north fork of Porcupine creek.

Of the Poorman mine E. R. Woakes says within a short time it will be producing monthly ore to the value of $22,500. He estimates that the required machinery would cost about $50,000. It would be advisable to renew a good deal of the old machinery. "From the Poorman mine I believe we can expect a minimum extraction by amalgamation of $10 per ton, with a further $5 per ton should the cyanide treatment prove satisfactory. The cost per ton should not exceed—mining $4, milling and hauling $1.20, cyanide $2, total $7.20."

Under date of June 30, Rossland reports that shipments for the past week were 4165 tons, all of which came from the Le Roi. The shipments for the six months of 1900 were 72,080 tons.

Men are grading the railroad to the ore bins of the Josie and No. 1 mines, now called Le Roi No. 2.

At Kaslo the Ruth mines have bonded the Mascot claim in the Slocan for $30,000.

The Payne and Slocan Star are exporters to the U. S. smelters. The total shipments from January to June 25 were 5118 tons of ore.

The City of Paris at Boundary has sent a car of galena to be treated in the lead stack at Trail, one of the first shipments of such ore out of the district.

At Ymir, the Ymir mine is running sixty of the eighty stamps. The tunnel is being run to tap the vein at the 1000-foot level.

KOREA.

The Asahi of Japan says that L. S. J. Hunt, formerly of Seattle, Wash., has been awarded a perpetual lease of the Uvson gold mines in Korea. He paid the Korean Government 300,000 yen for the concession.

MEXICO.

The Santa Theresa mine, Sahuayacan district, Chihuahua, is to resume operations. A 20-stamp mill will be put on the property. Enrique C. Creel of Chihuahua has an interest.

Arizona men will work a free milling gold property in the Moctezuma district, Sonora. M. Wellington is Supt.

Throughout Mexico in January there were registered 1318 new mines, with an area of claims of 16,398 hectares of ground. Of these 74 were gold mines, 313 gold and silver, 112 gold, silver and lead, and 120 gold, silver and copper. There were 116 silver mines, 314 silver and lead, 61 silver and copper and 76 copper. The State of Chihuahua registered the largest number, 305; Sonora followed with 205 and Guerrero third with 75.

The Torres & Prietas Railway of Mexico has contracted to deliver to the Grand Central M. Co. 24,000 tons of coal during the next two years, 1000 tons monthly, and delivery began on June 1, 300 tons having gone forward since that date. The coal comes from Gallup, New Mexico, via Albuquerque, Deming, Benson and Nogales.

Two Republics: The output of the three producing mines of El Oro, the Esperanza (120 stamps), the American mine (100 stamps) and the El Carmen (20 stamps), will average 500 tons of metal daily, yielding gold bullion worth $600,000 per month, or over $7,000,000 per annum.

THE KLONDIKE.

The Alaska Exploration Co.'s steamer Gustin, from Dawson and Yukon way ports, was at St. Michael June 15. She brought 300 passengers, partly for Nome and partly for San Francisco, and $2,000,000 in gold dust.

Obituary.

Hamilton Smith, the well-known mining engineer, died at Durham, N. H., on the 4th inst. He was in California a few weeks ago and then seemed in good health. He came first to California in 1868 and since then has been prominent in the mining world. For several years he had been consulting engineer of the London Exploration Co.

Personal.

Chas. Butters is at Berkeley, Cal.

Max Boehmer of Leadville, Colo., is in Butte, Mont.

Capt. DeLamar is expected to be in California from Europe, July 25th.

W. H. Radford has returned to Oakland, Cal., from Trinity county, Cal.

The address of Wm. Chadbourne, formerly of Leadville, Colo., is asked for.

President Goodale of the Taylor Park M. Co., Aspen, Colo., is in Boston.

Deputy Mine Inspector P. H. Clifford is visiting San Miguel county, Colo.

C. W. Davis is to be manager of all the Pinnacle Co. property, Cripple Creek, Colo.

Edw. J. Fowler of the Campo Seco Copper Co., Calaveras county, Cal., is in San Francisco.

J. E. Potter, manager Clio mine, Jacksonville, Cal., arrived at the mine from Boston on the 1st inst.

D. Murphy, of Monaghan & Murphy of Needles, San Bernardino Co., Cal., was in San Francisco last week.

G. A. & G. H. Roberts and B. Ford of Phœnix, Ariz., are examining mining property at Placerville, Cal.

M. Guggenheim's Sons deny that they contemplate consolidation with the American Smelting & Refining Co.

A. L. Waters is now smelter superintendent of the Newton Copper Co. of Ranlett, Amador county, Cal.

J. P. Hutchinson is at Guerrero, Mexico, superintending the erection of a new smelter for the Trinidad M. Co.

R. C. Gemmel of Salt Lake City, Utah, is examining California mining property in Shasta and San Bernardino counties.

A. Raht, former Supt. Arkansas Valley smelter, is at Salt Lake, Utah, to begin work on the new million-dollar smelting plant there.

H. W. Hinckley, for several years a lessee on the Humboldt mine, Leadville, contemplates taking a lease on a property near Ouray, Colo.

F. D. Baker, mechanical engineer, Denver, Colo., is drafting plans for new work at the Pueblo plant of the American Smelting & Refining Co.

T. W. Hickey has resigned as foreman at the Santa Ysabel, Tuolumne Co., Cal., to take a similar position with the Boston Q. M. Co., Napa county, Cal.

J. I. Long, manager of the Hidalgo M. Co. at Parral, Mexico, has arranged for the opening of the railroad recently completed to connect the company's smelters with the Mexican Central Railway.

Mrs. E. C. Atwood of Empire, Colo., was among the principal speakers before the International Mining Congress at Milwaukee, Wis. She talked on "Why Women Should Become Interested in Mining."

C. A. Gehrman and James Bowden have resigned from the management of the Stanley mine, Idaho Springs, Colo. Their places are filled by Mr. Bell, the mining engineer of the company, who will assume the management and Mr. Cyphers the superintendency.

D. F. Brown of Salt Lake City, Utah, has returned via Wrangel on the mail steamer Baranoff from inspection of copper properties, Prince of Wales island. He is employed by Congressman Sulzer of New York and Senator Stewart of Nevada. He thinks the region is rich in copper; but when he was there the snow was deep.

Mining School Graduates.

The following are graduates for 1900 in the mining department of the A. Van der Naillen School of Engineering of San Francisco:

Mining Engineers.—I. C. L. Thomas, Stent, Cal.; G. E. Colbert, San Francisco, Cal.; J. W. Woodford, Martina, Mont.; L. Everett, San Francisco, Cal.; J. D. Helm, Wickenburg, Arizona; E. Schmidt, Congress, Arizona; J. F. McDonald, Bisbee, Arizona; F. Watt, Congress, Arizona; G. F. Rhodes, Berkeley, Cal.; F. C. Davis, Forest, Cal.; E. E. Petty, Nelson, Wash.; A. Muir, Vancouver, B. C.; A. R. McDonald, Vancouver, B. C.; J. E. Gardner, Napa, Cal.; E. Wheeler, Ukiah, Cal.; F. A. Gawthorne, Oroville, Cal.; C. J. Pringle, Half Moon Bay, Cal.; H. C. Glass, San Ramon, Cal.; H. H. Cardwell, Roseville, Cal.; H. B. Tiedeman, Alameda, Cal.; E. B. Olney, Chico, Cal.; H. A. Kuns, Ingomar, Cal.

Assayers.—H. G. Siskom, Shasta, Cal.; J. C. Riggs, Wilcox, Arizona; E. E. McWayne, Drytown, Cal.; P. L. Shelford, Healdsburg, Cal.; C. Farrell, Moyie, B.C.; F. Lucas, San Francisco, Cal.; D. Haberbosch, Selma, Kan.; A. Wrightson, Santa Rosa, Cal.; H. F. Lyon, San Francisco, Cal.; A. E. Foster, San Francisco, Cal.; F. C. Schilke, Dawson; H. Norman, Keswick, Cal.; E. B. James, Groveland, Cal.; H. T. Coffin, Portland, Or.; W. D. Davidson, Bodie, Cal.; N. Wrinkle, Keeler, Cal.; R. Wrightson, Keswick, Cal.

List of U. S. Patents for Pacific Coast Inventors.

REPORTED BY DEWEY, STRONG & CO.,
PIONEER PATENT SOLICITORS
FOR PACIFIC COAST.

FOR THE WEEK ENDING JUNE 26, 1900

652,587.—Pack Saddle—E. F. Bliss, Providence, Ariz.
652,588.—Filter Press—M. P. Boag, Golden Gate, Cal.
652,663.—Sulphuration Tank—E. C. Burr, S. F.
652,662.—Carbonators—E. C. Burr, S. F.
652,664.—Filter Press—E. C. Burr, S. F.
652,665.—Pulp Press—E. C. Burr, S. F.
652,715.—Hydraulic Motor—E. F. Cassel, Juneau, Alaska.
652,253.—Thermostat—T. B. & F. A. Duncan, Newberg, Or.
652,605.—Manhole Cover—E. A. Faller, S. F.
652,513.—Cultivator—G. J. Friend, Kingsley, Or.
652,556.—Snap Hook—J. A. Garitt, Waitsburg, Wash.
652,557.—Stove—W. R. Hampden, Spokane, Wash.
652,264.—Sad-Iron Handle—Hawkins & Snelling, Lakeview, Or.
652,559.—Air Pump—C. M. Hobby, San Diego, Cal.
652,395.—Excavator—I. P. Lambing, Denver, Colo.
652,367.—Pipe Cutter—T. Law, San Jacinto, Cal.
652,370.—Paper Wrapper—W. P. Murphy, San Jose, Cal.
652,546.—Indicator—W. F. Murray, S. F.
652,567.—Desk Attachment—C. F. Nesse, Elko, Nev.
652,546.—Mail-Box Time Indicator—M. S. Norton, S. F.
652,696.—Wire Splicing Tool—C. D. Smith, Corning, Cal.
652,300.—Signature Gatherer—D. M. Smyth, Pasadena, Cal.
652,649.—Key-Hole Guard—Priscilla Stephens, Express, Or.
652,492.—Refrigerator—C. J. Stuart, Puyallup, Wash.
652,411.—Index—A. W. Theirkoff, Redding, Cal.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s Scientific Press U. S. and Foreign Patent Agency, the following are worthy of special mention:

Apparatus for Plastering Columns or the Like.—No. 651,957. June 19, 1900. J. R. Tobin, San Francisco, Cal. This invention relates to a device which is designed for use in plastering columns, pilasters and similar surfaces for the purpose of making the plastered surface of an equal thickness, and to maintain an equal diameter and outline of the cylinder or other column after it has been finished. It consists of a bar which acts as a surfacer for the body of the column and removable and replacable guide rings for the upper and lower ends of the bar, said rings forming a gauge for the plaster, and each formed of a plurality of segments hinged together at one end so that they may be opened and closed to detachably fit the column, and means for detachably uniting the free ends of the segments.

Index for Mechanical Account Apparatus.—No. 652,411. Dated June 26, 1900. A. W. Thierkoff, Redding, Cal. This invention relates to a means for indexing and finding accounts which are carried upon a mechanical drum or like apparatus. It consists in the combination with a rotatable carrier of bills, of tabular surfaces adapted to receive the bills or accounts and expose them for inspection, an index to correspond with said accounts, a lever movable with relation to the index and a stop moved in unison with said lever, a series of projections or bumpers carried by the account drum and arranged out of direct alignment with each other, whereby the stop is caused to arrest the drum and a lever movable with relation to the index and accounts.

Screw Holder and Driver.—No. 651,949. June 19, 1900. T. R. Lillie, Lodi, Cal. The object of this invention is to provide a device for holding and starting screws and afterwards turning them into position. It consists of arms having jaws at one end adapted to clasp the head and shank of a screw, said arms first diverging from the jaws, and afterwards converging, having their opposite ends fulcrumed to a transverse bar having a central hole through which the shank of the screwdriver is freely slidable; a second bar intermediate between the fulcrum bar and the jaws having closed slots in its ends fitting and slidable upon the inclined arms of the holding jaws, a spring interposed between the bars and acting to normally separate the bars and close the jaws together, arms fixed upon the intermediate bar extending beyond the holding jaws so as to contact with the surface into which the screw is being driven, and thus force the slidable arm back so that the jaws are opened to allow the point of the driver to advance through them and complete the seating of the screw.

WINDING DRUM INDICATOR. — No. 652,546. Dated June 26, 1900. W. F. Murray, San Francisco, Cal. This invention relates to a means for applying an indicator to winding drums of that class in which the drum is turnable upon a shaft and to which power is applied from the shaft by means of a friction clutch, so that the operator can know accurately at all times how much rope has been paid out or wound up, in order to know where the cage may be, especially when used in deep mines. It consists of a drum loosely revoluble upon the driving shaft, a frictional device, one member of which is fixed to and revoluble with the shaft and the other member carried by the drum, mechanism for engaging and disengaging the clutch devices, a transmitting gear adapted to engage with the drum or a driven part and to transmit motion to an indicator arm, and a space dial over which the indicator is moved in unison with the movements of the drum.

MAIL BOX TIME INDICATOR. — No. 652,549. Dated June 26, 1900. M. S. Norton, San Francisco, Cal. Assigned to the Postal Device and Improvement Co. of the same place. The object of this invention is to provide a mechanically movable device and means by which information is exposed through the front of the apparatus to indicate the times when mails are collected, the outgoing mail with which such collections will connect, and other matter necessary or useful for the depositor to know. It comprises a centrally pivoted disk carrying the hours of collection, an opening through the case through which the different hours are exposed, means for automatically returning the disk at the end of each week day's collection, and an automatic mechanism whereby the collections of Sundays or other days different from those of the week day are also indicated, together with means whereby the indicator is always returned to the starting point in readiness for the following day's collections.

EXCAVATORS. — No. 652,395. Dated June 26, 1900. I. P. Lambing, Denver, Colo. This apparatus is designed for excavating and moving earth or like material. It consists of revolubly journaled buckets with closed ends and a scroll-shaped periphery, the curvature of which increases outwardly from the periphery of the bucket through the cutting edges carried upon the exterior of the scroll. The buckets are so journaled that when reversed the outward cutting edges are presented downwardly, so that when rotated through the material to be excavated they cut out a sufficient portion to fill the bucket, and as they approach each other these cutting edges are turned upwardly so as to lie side by side in parallel vertical planes without intersecting. By means of circular pulleys and ropes or chains they are rotated to open and fill themselves. The ropes or chains are connected with a vertically slidable piston movable in a cylinder mounted upon a base plate and operated by any medium under pressure by which the piston is reciprocated to actuate the buckets.

Books Received.

"Park's Cyanide Process," revised and enlarged from the third edition, just out; 128 pages. There have been a good many orders received for this book, which could not be filled. It is published by J. B. Lippincott & Co. of Philadelphia, or can be sent direct postpaid; price $2.50. New illustrations and tables have been added, and discussion of treatment of slimes, analyses of solutions, etc., has been brought up to date.

"The Metallurgy of Silver," by H. F. Collins, edited by Sir W. C. Roberts-Austen, 4to, 352 pages, an unusually complete work, principally compilation from standard works and treatises on the same subject, with full credit therefor, and valuable addition of matter concerning treatment of argentiferous mattes, and silver-copper smelting and refining. Published by J. B. Lippincott, Philadelphia.

Latest Market Reports.

SAN FRANCISCO, July 5, 1900.

SILVER—Per oz., Troy: London, 28⅞d (standard ounce, 925 fine); New York, bar silver, 61⅝c (1000 fine); San Francisco, 61⅝c; Mexican dollars, 49¾c.

To Port Arthur silver is now being shipped in quantities that affect the Eastern market. One mine alone in Australia is reported to have a standing order for 50,000 ounces a week.

COPPER.—New York: Lake, 1 to 3 casks, 16.65 cash; carload lots, 16.25; Electrolytic, 1 to 3 casks, 16.50; carload lots, 16.12½; Casting, 1 to 3 casks, 16.37½; carload lots, 16.00. San Francisco: 17. Mill copper plates, 20c; bars, 22@23c.

LEAD.—New York, $4.25; Salt Lake City, 4.10½; St. Louis, $4.20; San Francisco $5.00, carload lots; 5½c 1000 to 4000 lbs.; pipe 7, sheet 8, bar 6c. London, £17 10s = 3.80c per ℔.

The new prices made by the American Smelting & Refining Co., for shipment before August 1, seller's option, 50-ton lots, are as follows:

Delivered.	Desilverized.	Corroding.
St. Louis	$4 20	$4 30
Chicago	4 20	4 30
Cincinnati	4 25	4 35
Pittsburg	4 30	4 40
Philadelphia	4 30	4 40
New York	4 25	4 40
Boston	4 32½	4 42½

On lots of less than 50 tons 5 cents per 100 lbs. higher.

Lead is being exported at $3.75 per 100 pounds.

SPELTER. — New York, $4.25; St. Louis, $4.10; San Francisco, ton lots, 5½c; 100-lb lots, 6c.

ANTIMONY. — New York, 10c; San Francisco, 1000-lb lots, 12c; 300 to 500 lbs., 13@14c; 100-lb lots, 15@18c.

IRON. — Pittsburg, pig, No. 2, foundry, $19.50; gray forge, $18.00; San Francisco, bar, per lb., 3c.

STEEL. — Billets, Pittsburg, $27.50; bars, $30.50; San Francisco, bar, 11c to 18c per lb.

Pittsburg wires that on the 1st inst. the Shenango Furnace Association put Bessemer on a basis of $20 valleys, which carries with it a corresponding relation in the price of all other materials, raw and semi-finish. Foundry irons have experienced a considerable drop in anticipation of the reduction and further decline is imminent.

QUICKSILVER. — New York, $50.00; London, £9 10s; San Francisco, local, $49.50 ⅌ flask of 76½ ℔s.; Export, $47.

MAGNESIUM.—New York, $3.00 ⅌ ℔.; San Francisco, $4.00.

ZINC.—San Francisco, 5½c; slab, 6c; bar, 7¾c.

SOLDER. — Half-and-half, 100-℔. lots, 20¼c; San Francisco, Plumbers', 100-℔. lots, 17c.

BABBITT METAL.— San Francisco, No. 1, 10c.

TIN.—New York, pig, $30.00; San Francisco, ton lots, 31½c; 1000 ℔s., 32c; 500 ℔s., 33c; less, 34c; bar tin, ⅌ ℔, 37c.

ASSAY LITHARGE.—San Francisco, 10c ⅌ ℔.

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 30c to 35c.

BISMUTH.—New York, ⅌ ℔., $1.60 50-℔ lots; San Francisco, $2.50 to $2.75 ℔ lots.

NICKEL.—New York, 50@60c ⅌ ℔.

TUNGSTEN.—New York, ⅌ ℔., $1; San Francisco, $1.25.

FERRO-TUNGSTEN. — New York, 37%, 40c; San Francisco, 75c (60%).

FERRO-MANGANESE. — Pittsburg, 80%, $125.

CHEMICALS.—Cyanide of potassium, 98%-99%, jobbing, 33@35c ⅌ ℔.; carloads, 31@32c; in 10-℔. tins, 40c; sulphuric acid, 66% B, 2c ⅌ ℔.; soda ash, $1.60 ⅌ 100 ℔s. 58%; hyposulphite of soda, 2¾@3c ⅌ ℔.; blue vitriol, 5½@6c ⅌ ℔.; borax, concentrated, 7@8c ⅌ ℔.; chlorate of potash, 12@13c; roll sulphur, 6c; alum, $1.90@2.00; flour sulphur, French, 2¼@2½c; California refined, 1¾ @ 2c; nitric acid, in carboys, 8c ⅌ ℔.; caustic soda, in drums, 3@4c ⅌ ℔.; Cal. s. soda, bbls., $1.00; sks, 95c ⅌ 100 ℔s.; chloride of lime, spot, $2.35@2.50; nitrate of potash, in kegs, 8c; caustic potash, 10c in 40-℔. tins.

POWDER.—F. o. b. San Francisco: No. 1. 70% nitro-glycerine, per ℔., in carload lots, 15¼c; less than one ton, 17¼c. No. 1*, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1** 50%, carload lots, 11¾c; less than one ton, 13¾c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9½c; less than one ton, 11½c. No. 2** 30% carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9.

FUSE.—Triple tape, $4.35 per 1000 feet; double tape, $3.70; single tape, $3.45; Hemp, $2.55; Cement No. 2, $3.70; Cement No. 1, $2.95.

PHOSPHORUS. — F. o. b. New York or Philadelphia, 45@50c ⅌ ℔.

CANDLES.—Granite 6s, 16 oz., 40s., 11¾c ⅌ set; 14 oz., 40s., 10½c.

OILS.—Linseed, pure, boiled, bbl., 75c; cs., 80c; raw, bbl., 73c; cs., 78c. Deodorized Stove Gasoline, bulk, 16c; do., cs., 22c; 86° Gasoline, bulk, 21c; do., cs., 27c; 63° Naphtha or Benzine, deodorized, in bulk, per gal., 15½c; do., in cs., 21½c; Lard Oil, Extra Winter Strained, bbl., 60c; cs., 65c; No. 1 bbl., 49½c; cs., 54½c; Neatsfoot Oil, coopers' bbls., 60c; extra bbls., 55c; cs., 60c; No. 1 bbl., 52½c; cs., 57½c.

Recently Declared Mining Dividends.

Specimen G. M. Co., Colorado, 13¾ cents, $153,346.87	June 25
Keith & Grube M. & L. Co., Colorado, 10%	June 30
Home M. Co., Colorado, 50%	July 1
Bunker Hill & Sullivan M. & C. Co., Idaho, $21,000	July 4
Empire State Idaho Developing Co., 3%	July 16
Amalgamated Copper Co., Montana, 2%	July 30
Parrot S. & C. M. Co., Montana, $1.50 per share	July 30
Old Colony Z. & S. Co., 2½%	July 30

Catalogues Received.

WEBER GAS & GASOLINE ENGINE CO., Kansas City, Mo., 72 pp., orange and black, descriptive, with sectional views and halftones of different makes and sizes of the company's engines; facsimile testimonials from pleased customers form a prominent part of the contents.

FIFTH EDITION of Catalogue No. 2, Fraser & Chalmers, Chicago, Ill., in this firm's uniform style, treats of hoisting engines and appliances, for all classes of mine work. Each type of engine is illustrated and described, with reference to where they may be seen in actual use.

WANTED.
A Rich Placer proposition, adapted to working by Railroad Steam Shovel, or Dry Land Excavator. Description, with price and terms, to receive attention must be accompanied by reliable reports and references.
Address: EDWARD N. BREITUNG,
MARQUETTE, MICH.

Quicksilver
—FOR SALE BY—
The Eureka Company,
OF SAN FRANCISCO.
ROOM 1, - - 320 SANSOME STREET,
SAN FRANCISCO.

Quicksilver
For Sale in Lots to Suit.
REDINGTON & COMPANY, Wholesale Druggists, 23-25-27 Second Street, San Francisco.

HERMANN J. VAN DIEREN,
Assayer and Metallurgist,
1407 Seventeenth St., DENVER, COLO.
Stamp Mill and Reduction Works: 19th St. and Platte River.
Buyer of every description of Ores and Precious Stones. Rights for sale for process of treating refractory gold ores; also process for treating low grade copper ores. Write for particulars.

WE BUY very rich Ores, Dental Scraps, Tellurium Ores, Mill Wastes, Jewelers' Sweeps, Gold Retorts, Old Iron Retorts, Base Amalgam, Quicksilver, Amalgamated Plates, Gold and Silver, Old Slags.
A. M. DONALDSON & CO.,
ASSAYERS AND WASTE PRODUCT SMELTERS,
1661 Larimer St., Denver, Colo.
Write for Donaldson's Assayers' Slag Hammer.

M. S. HAUSER,
Room 38, 12 Front St., San Francisco, Cal
Will act as purchasing agent for mining companies.
Will use the benefit of his wide experience in getting the best articles at the lowest prices, securing low freight rates, and prompt delivery.
Will submit estimates on all kinds of supplies.
Will work for either a small salary or a commission, and show a saving greatly in excess of charges.

BENJAMIN T. LLOYD,
STOCKS, BONDS AND MINES.
Have immediate customers for well-developed Gold and Copper Properties.
P. O. Box 608, SALT LAKE CITY, UTAH.

MILL PLANS.
Cyanide, Concentration, Smelting, Sampling
F. D. BAKER, Mech. Eng., DENVER.

FRED C. MILES,
CISCO, PLACER CO., CAL.
COPPER AND GOLD PROSPECTS.
A GOING GOLD PROPERTY.

SITUATIONS WANTED.

EXPERIENCED METALLURGIST DESIRES position in charge of a gold mill or cyanide plant. Thorough chemist and assayer. Understands handling machinery. Technical graduate. References. Address "Millman," Box A, this office.

WANTED—SITUATION AS MANAGER OF producing or developing property. Twelve years' experience in gold mining and milling, copper mining and smelting. Address C. H., care of Mining and Scientific Press.

MINE SUPERINTENDENT, TEN YEARS' experience in Michigan, Montana and Idaho, desires engagement as Supt. or manager of developing or producing property in this country or abroad. Best of reference. Address D. C., care this office.

POSITION WANTED TO MANAGE A MINE and mill. Years of experience. Thoroughly practical, pushing and energetic. Handle men with skill and economy. First class testimonials as to integrity, etc. Address SKILL, this office.

WANTED.

WANTED,
A man thoroughly skilled in the work of erecting Reverberatory Furnaces and Chlorination Plants. Previous experience essential. Address "Cullum," Bodie, Mono County, California.

REFRACTORY ORES
WANTED.
1000 TONS or more which will assay $75.00 Gold per ton and over, delivered free of charge at San Francisco, Cal. Correspondence solicited.
C. J. TALLON,
308 MARKET STREET, SAN FRANCISCO, CAL.

EUREKA CONSOLIDATED DRIFT MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Placer County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 29th day of May, 1900, an assessment (No. 25) of one cent per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Room 31, No. 214 Pine street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 30th day of June, 1900, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on SATURDAY, the 21st day of July, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

GEO. W. DIXON, Secretary.

Office—Room 31, No. 214 Pine street, San Francisco, California.

POSTPONEMENT.

The date of the delinquency of the foregoing assessment (No. 25) has been postponed to MONDAY, the 16th day of July, 1900, and the day of sale from the 21st day of July, 1900, to TUESDAY, the 7th day of August, 1900.

By order of the Board of Directors.

GEO. W. DIXON, Secretary.

Office—Room 31, No. 214 Pine street, San Francisco, California.

Notice of Application for Dissolution.

In the Superior Court in and for the City and County of San Francisco, State of California.

In the Matter of the Voluntary Dissolution of the South Paloma Gold Mining Company, Limited. (a corporation.)

Notice is hereby given that the South Paloma Gold Mining Company, Limited, a corporation created and existing under the laws of the State of California, has presented to the Superior Court of the City and County of San Francisco, State of California, a petition praying for a judgment and decree declaring the said corporation dissolved according to law; and that said application will be heard on TUESDAY, the 31st day of July, 1900, at 10 o'clock of said day, or as soon thereafter as counsel can be heard, at the court room of said Superior Court, Department No. 3 thereof, at the New City Hall, in the city and county aforesaid.

Witness my hand and the seal of said Court the 25th day of June, A. D. 1900.

{SEAL.}

WM. A. DEANE,
Clerk.
By JOSEPH RIORDAN,
Deputy Clerk.

WRIGHT & LUKENS,
Attorneys for Petitioner,
222 Sansome Street.

Atlin Gold Fields,
British Columbia. Of particular interest to HYDRAULIC OPERATORS and experienced QUARTZ PROSPECTORS. American miners can pre-empt claims. For further particulars write BROWNLEE & LOWRY, Civil and Hydraulic Engineers and Land Surveyors, Atlin, British Columbia.

ALVIN PHILLIPS & CO.,
Chemists, Mining and Metallurgical Engineers,
1761 MARKET STREET,
DENVER, - COLO.
Complete Ore-Testing Works — capacity ten pounds to two tons. Modern Methods of Lixiviation, Cyanide and Chlorination. Concentration on Bartlett Table. Assaying and Bullion Refining. Chemical Analyses of Oils, Coal, Water, and all solutions. WRITE FOR PRICES.

FOR SALE.

INTEREST IN GRAVEL MINE FOR SALE.

On account of business reverses, a part int^rest in a most promising gravel mine in Placer county is offered for sale at a figure that will bring excellent returns. Satisfactory reason for sale given. Address "Mining," care Mining and Scientific Press.

FOR SALE --- Developed Zinc-Lead-Silver Property. Texas.

Two trunk lines. 700 acres. 8100 feet on vein. Splendid concentrating proposition. 1500 feet development. Mine average: Zinc, 17.66%; lead, 9.57%; silver, 7.35 ozs.; gold, .04 ozs. Price, $30,000. Principals only. **H. B. RUNKLE, El Paso, Texas.**

FOR SALE.

A Development Interest in a Large, Low-Grade Quarry Proposition.

Conditions favorable for working cheaply and for water power. Near good road, not far from town. Address L. M., care of Mining and Scientific Press

Second-Hand Mining Machinery and Supplies OF ALL KINDS.

Send for Catalogue.

THE S. H. SUPPLY CO.
22nd and Larimer Sts., DENVER, COLO.

Hydraulic Pipe FOR SALE CHEAP.

1500 feet of 10⅜-inch Casing weighing 27 lbs. to the foot, with Flanges, or Screws and Sockets; in lots to suit. Immediate delivery. Correspondence solicited.

C. J. TALLON,
308 Market Street,........San Francisco, Cal.

For Sale, or Will Bond With a Cash Payment,

A mother lode claim in Calaveras Co., joining Amador Co., 2000 feet long by 500 feet wide, United States mineral patent, title clear. Ledge of quartz from 6 to 8 feet on top of the ground. Mother lode runs through center of claim. Mokelumne Hill and Campo Seco Water Co.'s ditch close by. Can get big water pressure. Lots of good timber growing on the claim and could get plenty of wood for steam pressure. Also can be got the adjoining claim, which would make this one of the biggest and best mother lode propositions in this part of California. For further information, address

JOHN HOLLAND,
SUTTER CREEK,.... ....CALIFORNIA.

INTERESTING TO MINERS!

FOR SALE.

Twelve Silvered Copper Plates, each 4 feet square, slightly used, ready for use, f. o. b. San Francisco.

1600 feet Steel Pipe, double riveted, 22 to 26-inch diameter, 10 to 12 gauge. Will stand pressure up to 300-foot head.

Also, one 3¾-inch Schuttler wagon and one road plow.

(Delivered at Libby, Montana.)

Second hand sawmill, complete with boiler and engine Kalispel, Montana.

A bargain can be had on any part or all of the above. Address S. T. F., Mining and Scientific Press office, 330 Market St., San Francisco, Cal.

THE ERICSSON SWEDISH TELEPHONES HAVE BEEN IN USE OVER 20 YEARS. THEY ALWAYS TALK. GIVE THEM A CHANCE TO TALK TO YOU. CATALOGUES FREE. ERICSSON TELEPHONE CO 20 WARREN ST. NEW YORK, N.Y.

EFFECTING ECONOMY IN

Steam and Power Plants

IS MY BUSINESS.

DOES IT INTEREST YOU?

Howard H. Fielding.
1328 Seventeenth St., DENVER, COLO.

AIR COMPRESSORS,

Rock Drills, Coal Cutters, Lift Pump, Pohle and Stone Channelers.

Catalogues.

The INGERSOLL-SERGEANT Drill Co.,
Havemeyer Building, NEW YORK.
San Francisco Agents, PARKE & LACY CO., 203 Fremont Street.

HARNESS —AND— SADDLES.

CATALOGUE FREE.

L. D. Stone & Co., San Francisco,
417 and 419 Market Street.
A. KEMPKEY & F. M. GILHAM,
Proprietors.

WHITEWASHING —AND— TREE SPRAYING PUMPS.

Prices from $4 to $60. Nozzles from 75 cts. to $1.00. Catalogues. WM. WAINWR'GHT, 1411 Jackson St., San Francisco. Telephone Hyde 2986.

JEFFREY SPECIALTIES.

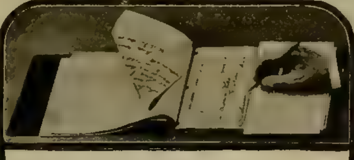
DUMP CARS.

We manufacture: Chains (Standard and Special), Sprocket Wheels, Coal Conveyors, Cable Conveyors, Coal Screens, Ore and Stone Buckets, Dredges, Hoisting Machinery, Sand Handling Machinery, Water Elevators, Spiral Conveyors, Dump Cars, Skip Cars, Clay Screens, Columbian Separator (for Treating Cement, Cement Clinkers, Ores, Marble, Quartz, etc.

Our Prices Will Interest You.

For Catalogue, Address

THE JEFFREY MFG. CO., Columbus, Ohio.
Western Branch, Equitable Bdg., Denver, Colo.



LETTERS COPIED WHILE WRITING.

Keep a copy of all letters; **no press; no water; no brush; no work. Any ink; any pen; any paper.** Our Pen-Carbon never smuts; our clip holds paper firm. Write with no extra pressure, and our **Pen-Carbon Letter Book** produces a *perfect* copy.

Can be used anywhere. If your stationer does not keep it, write for *free* specimen of work. Agents wanted. **PEN-CARBON MANIFOLD CO.,**
Department 6. 145 Centre Street, New York

THE ROESSLER & HASSLACHER CHEMICAL CO.,

100 William Street, New York.

THE ROESSLER & HASSLACHER CHEMICAL COMPANY CHEMISTS NEW YORK

CYANIDE

Peroxide of Sodium

Hyposulphite of Soda

Chloride of Lime

Sulphide of Iron

And Other Chemicals for Mining Purposes.

HEALD'S BUSINESS COLLEGE.

24 Post Street, - - - San Francisco.

MINING AND CIVIL ENGINEERING DEPARTMENT: Mathematics, Draughting, Strength of Material, Chemistry, Assaying, Blow-Pipe Analysis, Geology, Mineralogy, Surveying, etc., under the direction of Prof. O. H. Packer, an engineer of national reputation.

ELECTRICAL DEPARTMENT: Theory and Practice; Construction,

BUSINESS: Bookkeeping, Shorthand, Typing, Modern Languages, etc.

Twenty teachers; individual instruction; can enter at any time; Catalogue and Journal free.

The State Ore Sampling Co.

DENVER, COLO.

We buy Gold, Silver, Lead, Copper, Bismuth, Uranium, Wolframite, Cobalt, Molybdenite and Antimony Ores. We have modern sampling mills, also test ore for the new processes of ore reduction.

Our long experience in the market enables us to obtain the highest prices for all marketable ores. Write for our "Reference Book." Send analysis of your ore for prices and information.

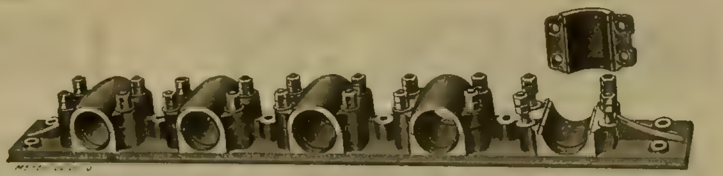
BAILY & MONNIG, Managers.

HENRY E. WOOD, ASSAYER,

1734 Arapahoe St., DENVER, COLO.

Ore Tested in Carload Lots.

Write for Circular.



Globe Battery Stem Guide.

PATENTED AUGUST 24, 1897.

RIGID. SIMPLE. DURABLE. EFFICIENT. ECONOMICAL.

Effect a Saving in Friction Losses. No Trouble to Install. No Alterations of Mill Necessary. No Keys or Wedges to Adjust.

——MANUFACTURED ONLY BY——

GLOBE IRON WORKS, STOCKTON, CAL., U. S. A.

Manufacturers of All Classes of Mining Machinery. Estimates Furnished.

U S

IT'S A CATALOGUE.

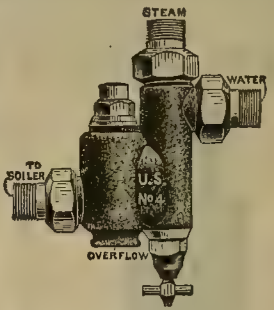
Our little ENGINEER'S RED BOOK is real y our catalogue, though it is also one of the best vest pocket reference books for engineers ever published. It answers over 500 engineering problems and incidentally brings out convincing reasons why the

U. S. Automatic Injector

is better than any other.

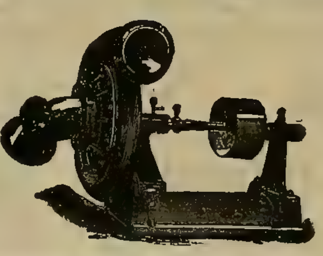
Most engineers know this about the U. S. Injector, but the Red Book will tell them a good many things they don't know.

Can we send you one?



AMERICAN INJECTOR CO.,

DETROIT, MICH., U. S. A.



Jackson's Whirlpool Centrifugal Pumps. Capacities from 50 gallons to 50,000 gallons per minute.

CAPE NOME PUMPING MACHINERY.

BUILT LIGHT AND STRONG.

COMPLETE PLANT IN OPERATION AT OUR WORKS.

Centrifugal Pump and Steam or Oil Engine Direct Connected.
Sand Pumps, Rock and Gravel Pumps, Mining Machinery, etc.

BYRON JACKSON MACHINE WORKS,
625-631 SIXTH STREET, SAN FRANCISCO, CAL.

CAPE NOME MACHINERY.

THE KROGH MFG. CO.

—— BUILDS ——

CEMENT GRAVEL MILLS, THE "DRAKE" AMALGAMATOR, THE "KROGH' 2-STAMP MILL AND MINING MACHINERY OF ALL KINDS.

The Krogh Centrifugal Pumps are the Best for CAPE NOME SANDS.

Capacity from 1 to 100,000 gallons per minute.

Send for Illustrated Catalogue.

KROGH MANUFACTURING CO.,
BRANCH, 134-136 MAIN ST. 9-17 STEVENSON ST., SAN FRANCISCO, CAL.

WEST COAST OF MEXICO.

WÖHLER, BARTNING Suc's, Mazatlan (Sinaloa), Mex.

Bankers, Importers, Exporters and Commission Merchants.

Representatives and Agents of the principal Mining Companies in the State of Sinaloa and the dependencies of the Pacific coast in the States of Durango, Chihuahua, Sonora, Lower California and Jalisco.

ORE BUYERS AND EXPORTERS. - MINING SUPPLIES.

PUT YOUR ADVERTISEMENT

In the Paper Read by the Men Who Buy What You Have to Sell.

RISDON IRON WORKS,

SAN FRANCISCO, CALIFORNIA.

Cable: "Risdon's." Code: A. B. C. & Leiber's.

MANUFACTURERS OF

Gold Dredging Machinery

And COMPLETE EQUIPMENT for Placer Mines

OUR SPECIALTY.

We build GOLD DREDGES COMPLETE IN RUNNING ORDER to handle 2500 cubic yards per day at a cost of 3 cents per cubic yard.

We excavate 50 feet below water, 20 feet above water and handle boulders up to one ton weight.

Send for Dredging Catalogue No. 17.

—WE ALSO BUILD—

All kinds of Mining, Milling, Concentrating, Pumping, Air Compressing, Hydraulic, Water Wheel and Hoisting Machinery.

EVANS HYDRAULIC GRAVEL ELEVATORS.

We publish sixteen catalogues. Write for one in the line you are interested in.

THE RISDON HAMMERED SHOES AND DIES.

Manufactured from the best quality of projectile steel—which is stronger and tougher than any heretofore used—the best shoe and die ever made. Will crush more ore per pound of steel than any other. Will not chip or cup and will outcrush any other made. Wear smooth and true with hardly any perceptible decrease in their size, and those who use them say, "We never had shoes and dies wear so long." Send for circulars and dimension blanks to

RISDON IRON WORKS, San Francisco, Cal.

Here is Your Chance!

A MAGNIFICENT HOISTING ENGINE

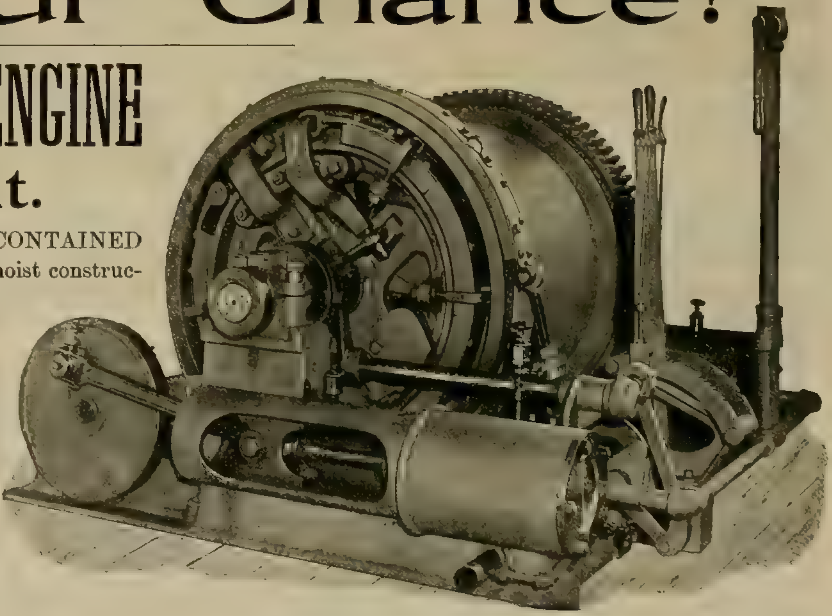
For Immediate Shipment.

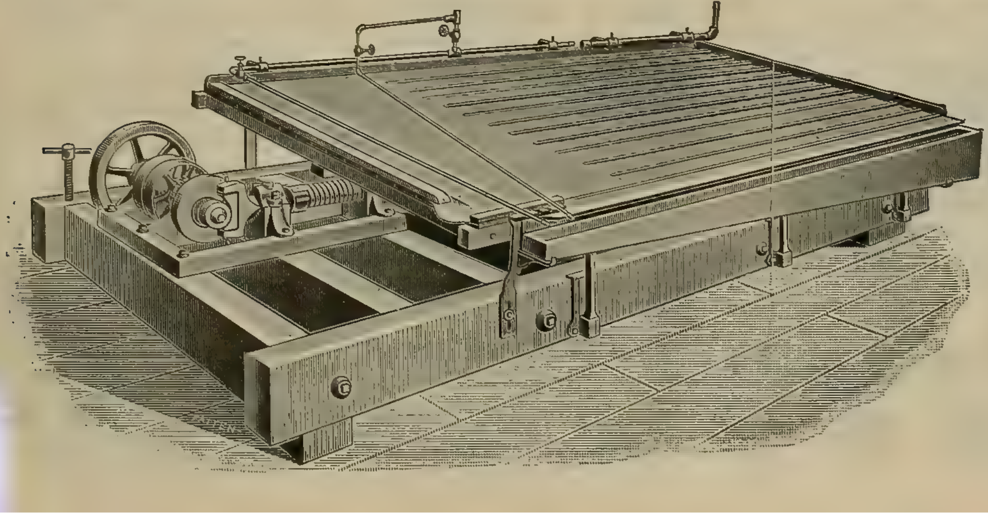
We are prepared to ship from stock this HEAVY DUTY, SELF-CONTAINED ENGINE, in which are combined the most desirable features of modern hoist construction. Read the following specifications:

DOUBLE CYLINDERS, 13″ BORE, 15″ STROKE.
SINGLE DRUM 72″ DIA., 48″ FACE,
CUT GEAR—RAWHIDE PINION,
SHIPPING WEIGHT, 28,000 POUNDS.

THE HENDRIE & BOLTHOFF
M'F'G & SUPPLY CO.,

No. 36. DENVER, COLORADO.





WOODBURY'S IMPERIAL
CONCENTRATING TABLE.

THE Imperial Concentrating and Amalgamating Table is the latest invention of Mr. Geo. E. Woodbury, whose fame as one of the pioneer concentrator builders is world wide, machines of his manufacture being in general use in every country on the globe where the milling of ores is carried on. This Table is, however, built on entirely new lines, differing materially from either the well-known belt or bumping table types of concentrators.

SIMPLE IN ITS CONSTRUCTION.

SAVES FINE SULPHURETS.

WITHOUT LOSS IN TAILINGS.

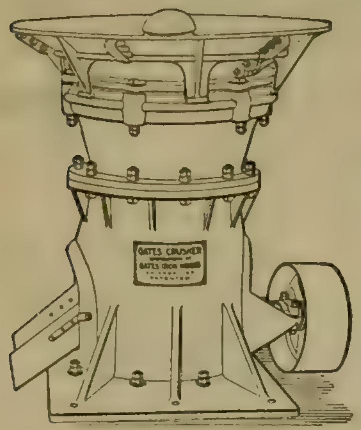
MAKES HIGH PRODUCT.

CAPACITY FROM 5 TO 10 STAMPS.

GEORGE E. WOODBURY,

Send for Catalogue. 'Phone Main 1766. 223 First St., San Francisco, Cal.

CATES IRON WORKS.



The Original GYRATORY BREAKER.

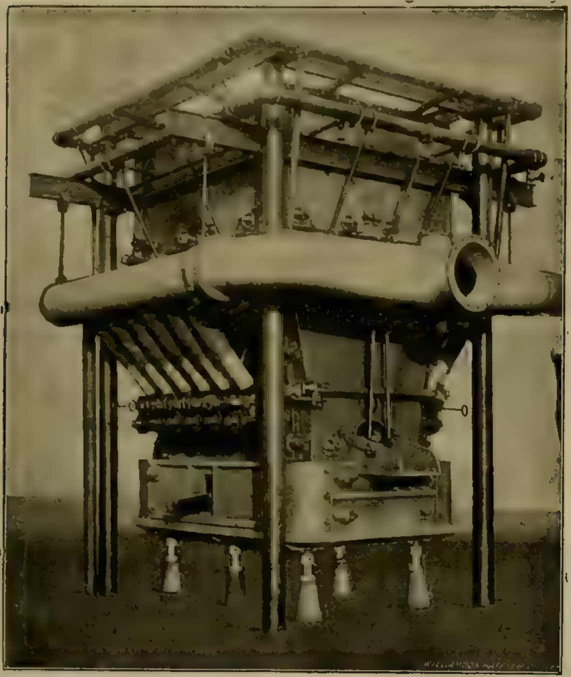
It is ADJUSTABLE, and INDESTRUCTIBLE.

THERE ARE 4,000 OF THEM IN USE.

The South African Mines Have Purchased 200.

. . We build a FINE CRUSHER that is a wonder. . We know how to design this class of machinery. . . . There are others who think they know how to make a Gyratory Crusher; they are simply poor imitators of The Only Great Gates Rock and Ore Breaker. .

Address for Catalogue No. 1, Dept. UU, 650 Elston Ave., CHICAGO.



A MODERN COPPER SMELTER.

THE COLORADO IRON WORKS CO.

ESTABLISHED 1860. DENVER, COLO.

—MANUFACTURERS OF—

Smelting Furnaces and Equipments

: : : FOR THE TREATMENT OF : : :

Gold, Silver, Lead and Copper Ores.

We build furnaces to drawings and specifications, and furnish drawings and full instructions for erecting.

We erect all furnaces at our works and carefully mark every piece before shipping. By this means, trouble in erecting at the smelting plant is entirely avoided.

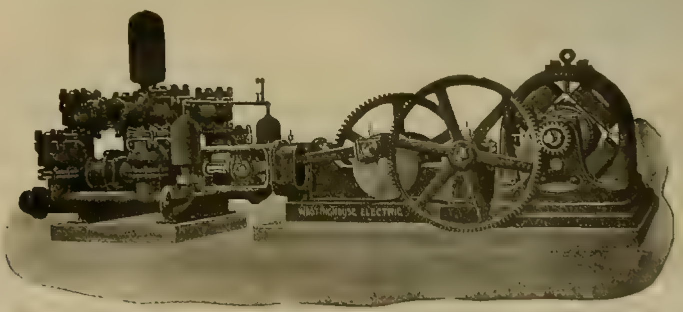
We contract to build and equip smelting plants complete, of any required tonnage capacity above forty tons per day, at any desired location and put them into successful operation under guarantee. We contract to smelt a thousand tons of ore, more or less, before turning the plant over as completed under the guarantee

We have in the past built more Blast Furnaces for smelting the ores of the valuable and the precious metals—gold, silver, lead and copper—than any other manufacturing concern on the American continent, and in the past year of 1899 we built more such furnaces than all others combined.

(SEE PAGE 30.)

Westinghouse Motors

The Ideal Power for operating Mine Pumps, Hoists, Elevators and Locomotives.



WESTINGHOUSE D. C. MOTOR OPERATING PUMP.

WESTINGHOUSE ELECTRIC THE NAME WESTINGHOUSE IS A GUARANTEE

Westinghouse Electric
& Manufacturing Co.,
Pittsburg, Pa.

All Principal Cities
in U. S. and Canada.

65–E

CHAS. C. MOORE & CO.,

...ENGINEERS AND DEALERS IN...

HAMILTON CORLISS ENGINES, N. Y. SAFETY AUTOMATIC ENGINES,
BABCOCK & WILCOX BOILERS, McINTOSH & SEYMOUR ENGINES,
GREEN'S ECONOMIZERS, HOPPES LIVE STEAM PURIFIERS,
WHEELER CONDENSERS, BARNARD-WHEELER COOLING TOWERS,
EDMISTON FEED WATER FILTERS, BUNDY STEAM TRAPS,
SNOW STEAM PUMPS, QUIMBY SCREW PUMPS,
GOUBERT FEED WATER HEATERS, STRATTON STEAM SEPARATORS,
SPENCER DAMPER REGULATORS, HYATT ROLLER BEARINGS.

Contracts for Installation of Power Plants,
Any Capacity.

SEND FOR CATALOGUES AND FULL INFORMATION.

32 FIRST STREET, SAN FRANCISCO, CAL.

SEATTLE BRANCH.............313 FIRST AVE. SOUTH.
LOS ANGELES BRANCH.......103 SOUTH BROADWAY.

SELBY SMELTING AND LEAD CO.,

REFINERS OF GOLD AND SILVER BARS, GOLD DUST, ETC.

Buyers of Gold, Silver, Lead and Copper Ores, Gold Concentrates, Lead Bullion, Cyanide Product, Etc.

ORE AND BULLION ASSAYERS.

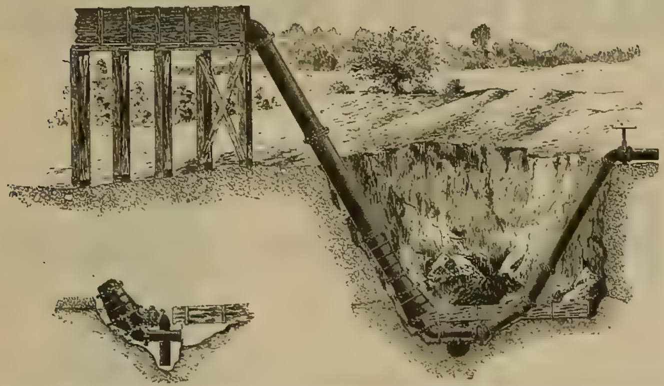
Works at VALLEJO JUNCTION, CAL. Office, 416 MONTGOMERY ST., SAN FRANCISCO, CAL.

JOSHUA HENDY MACHINE WORKS,

Principal Office: NO. 42 FREMONT STREET. - - - Works: Corners Bay, Kearny and Francisco Streets, SAN FRANCISCO, CAL.

SPECIAL DEPARTMENT OF

Hydraulic Mining Machinery,



Comprising Hydraulic Gravel Elevators, Double-Jointed Ball-Bearing and Single-Jointed Giants, Sheet-Iron and Steel Water Pipe and Fittings, Water Gates, Etc.

NOTICE.—All other forms of Hydraulic Gravel Elevators are simply poor imitations in construction and infringements of the patents held by us.

The Double-Jointed Ball-Bearing Giants recently perfected and patented by our MR. JOHN H. HENDY are incontestibly superior to any other form of Giants yet introduced.

We are prepared to furnish plans and estimates of cost of any proposed Hydraulic Mining Plants upon any specifications submitted to us, and tender the services of our Hydraulic Mining Engineer to erect and place same in successful operation under guarantee.

ELECTRICITY.

Standard of the World.

Hoist Driven by Electric Motor.

THE

Economical Solution

—OF THE—

MINING PROBLEM.

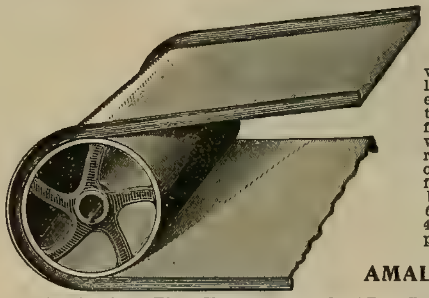
PUMPS,
HOISTS and
LOCOMOTIVES.

REFRACTORY MINES RENDERED PROFITABLE.

GENERAL ELECTRIC COMPANY,

SAN FRANCISCO, CAL., Claus Spreckels Building. DENVER, COLO., Kittredge Building.
PORTLAND, OR., Worcester Building. SALT LAKE CITY, UTAH, Templeton Building.

SPADONE'S CONCENTRATOR BELTS.



PATENTED.

This illustration shows the edge flanging outwardly as it passes over the pulley. This relieves the strain from the top and bottom of the edge by directing the strain automatically to the inside face surface of the edges. Heretofore all belts have been so constructed that when they pass over the pulleys or rolls, a direct strain comes upon the top or at the base of of the edges, causing the edges to break away from the body of the belts in a very short time. *We avoid this Mechanical Defect by our Spadone Curved Edge.* Belts made to fit any machine—4, 5 and 6 feet wide. Prices and samples on application.

AMALGAM PLATE CLEANERS.

Our Amalgam Plate Cleaners are made of Pure Rubber in moulds, thus insuring a plate cleaner which will not scratch the plates and a perfect edge which will clean the Amalgam plates evenly. They are made 6 inches long, 3 inches wide and ⅛ inch thick, making a convenient size to handle. Price by mail to any address, each 75 cents. Correspondence solicited.

Send us your order for Water, Air Drill, Steam, Suction and Fire HOSE, RUBBER BELTING, RUBBER PACKING and LEATHER BELTING.

THE GUTTA PERCHA RUBBER AND M'F'G CO.,
30 and 32 FREMONT STREET, Telephone Main 1813. SAN FRANCISCO, CAL.

THE BLAZED PATH

IS A GOOD ONE TO FOLLOW.

The money-making manufacturers advertise in this paper with most successful results. Results are what count.

You can buy advertising space for less money elsewhere, but you can't buy a CHEAPER advertisement. Cheapness is not regulated by what you pay, but by what you get for what you pay.

In the MINING AND SCIENTIFIC PRESS you reach over 30,000 probable customers fifty-two times a year.

330 MARKET ST., SAN FRANCISCO, CAL.

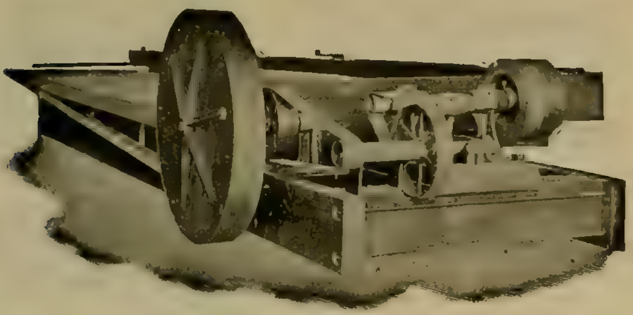
WHITE, ROGERS & CO.,

Contracting Engineers and Millwrights,

OFFICES, 306 PINE STREET, - - SAN FRANCISCO, CAL.

Sole Pacific Coast Agents and Builders of the Celebrated

WILFLEY CONCENTRATOR.



The Wilfley Table is fully covered by U. S. patents Nos. 580,338 and 590,675. Infringements will be prosecuted to the full extent of the law.

PRICE, $450, F. O. B., San Francisco.

One of these machines will take the place of two or three belt concentrators of any style and do very much better work. Easy adjustment. Little wear.

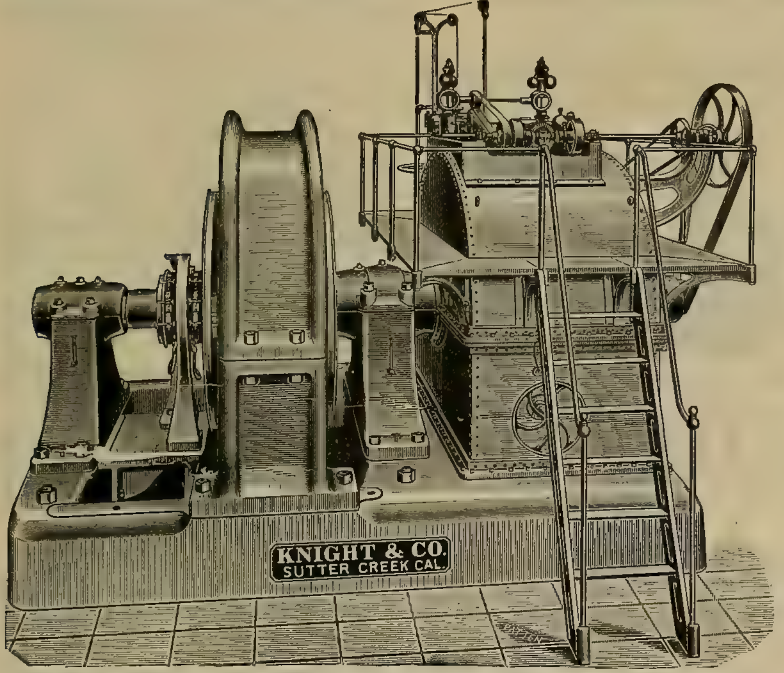
Some Practical Reasons Why the Wilfley Concentrator Should Be Used in Gold Mills:

1. It will successfully handle three or four times more material than any belt Concentrator made, without exception.
2. It will save more sulphurets in proportion while so doing, and catch any float gold, amalgam or quicksilver which may escape from mortars or plates.
3. It will make cleaner and much more valuable concentrates, thus saving useless expense for transporting valueless material, as also extra cost for treatment.
4. It requires little or no attention when once adjusted and no expert is required to either adjust or run the machine.
5. It will save much expense in power and room, and the first cost of a mill requiring concentrators.
6. It has no expensive belts to crack and wear out, nor complicated machinery to keep in repair.
7. It is the only sensible plan of concentration, as any kind of material can be worked, which is not true of any style of belt machine.

—— SEND FOR CIRCULARS. ——

These Machines are Kept in Stock Ready for Immediate Shipment.

KNIGHT'S WATER WHEEL.


KNIGHT & CO.
SUTTER CREEK CAL.

The accompanying cut shows the general arrangement of **The Knight Water Wheel**, direc-coupled to a 750 kilowatt generator, with governor mounted on top of wheel casing.

These wheels are designed for **100 to 2500 H. P. Highest efficiency and regulation guaranteed.**

WHEELS FROM 6 TO 24 INCHES, ENCLOSED IN CAST-IRON CASING.

Wheels for mill and reversible hoisting works a specialty.

KNIGHT & CO., Sutter Creek, Cal.

For full particulars, send for descriptive catalogue.

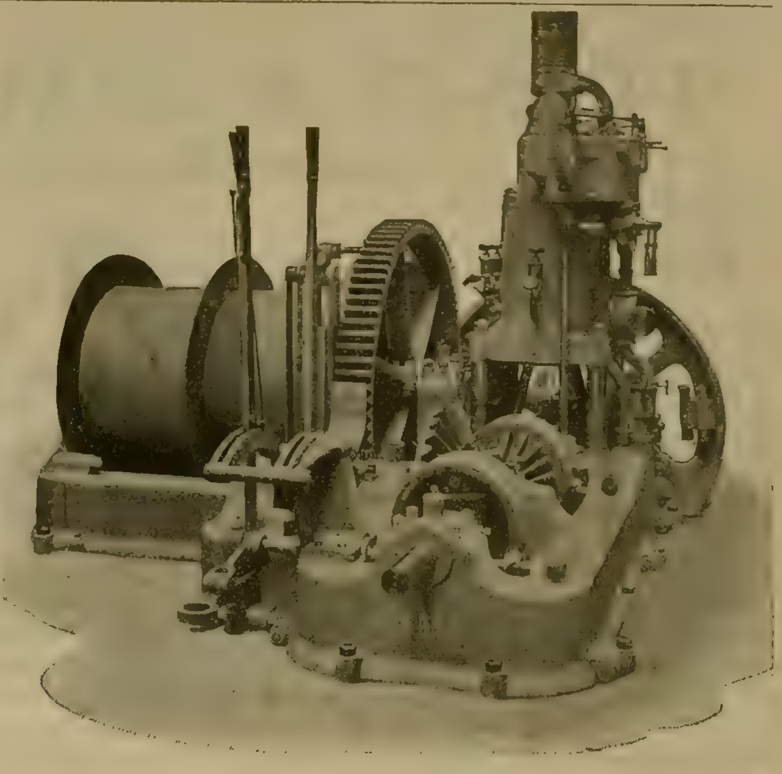
THE BUCYRUS COMPANY,

DESIGNERS AND BUILDERS OF

DREDGES, STEAM SHOVELS, EXCAVATING MACHINERY,
WRECKING CARS, LOCOMOTIVE CRANES, PILE DRIVERS,
CENTRIFUGAL PUMPS, WITH SIMPLE, COMPOUND OR TRIPLE EXPANSION ENGINES,

MACHINERY FOR PLACER MINING.

SOUTH MILWAUKEE, WISCONSIN.



The above illustrates the "Union" 25 H. P. double cylinder divided drum mining hoist for double compartment shaft. Cages and cars balance each other, therefore power is only used to raise ore; cost of hoisting ore is therefore reduced to the minimum. Made in sections for mountain transportation.

THE UNION GAS ENGINE CO.

—— BUILD THE ——

"Union" Gas Engines,

Which use either MANUFACTURED or NATURAL GAS, ORDINARY STOVE GASOLINE (NAPHTHA or BENZINE), DISTILLATE or KEROSENE.

STATIONARY ENGINES for All Kinds of Work, Built in Sizes from 3 to 200 h. p.

"UNION" COMBINED HOISTS in Sizes from 2 to 40 h. p.

"UNION" COMBINED COMPRESSORS—20, 30, 40 h. p.

HOISTS and COMPRESSORS Can Be Built in Larger Sizes to Order.

"UNION" MARINE ENGINES, 4 to 200 h. p., of Single, Double and Four-Cylinder Types.

TEN YEARS' EXPERIENCE Building Gas and Oil Engines.

"UNION" ENGINES Are In Use All Over the United States.

"UNION" ENGINES Are Simple, Durable and Economical.

Office, 244 First Street. Works, Corner First and Clementina Streets. SAN FRANCISCO, CAL.

THE

Pelton Water Wheel Company

Gives exclusive attention to the development and utilization of water powers by the most modern, economic and improved methods. An experience of more than fifteen years, involving both the theory and practice of hydraulic engineering as relates to power development in its widest range of application, is at the service of its customers.

Nine Thousand Wheels Now Running,

Averaging some 700,000 H. P.

ELECTRIC POWER TRANSMISSION.

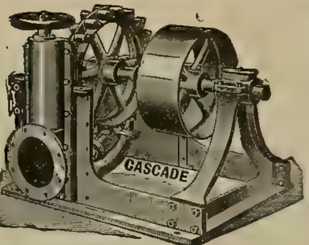
Pelton wheels afford the most reliable and efficient power for such service and are running the majority of stations of this character in the United States, as well as most foreign countries. Highest efficiency and absolute regulation guaranteed under the most extreme variations of load.

The Pelton Water Wheel Company,

121 & 123 MAIN STREET, SAN FRANCISCO, CAL.

TURBINE AND CASCADE WATER WHEEL

Adapted to all Heads from

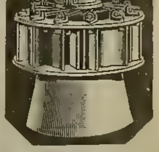


3 Feet to 2000 Feet.

Our experience of **38 YEARS** building Water Wheels enables us to suit every requirement of Water Power Plants. We guarantee satisfaction.

State your Head and requirements. Send for pamphlet.

JAMES LEFFEL & CO.
SPRINGFIELD, OHIO, U. S. A.

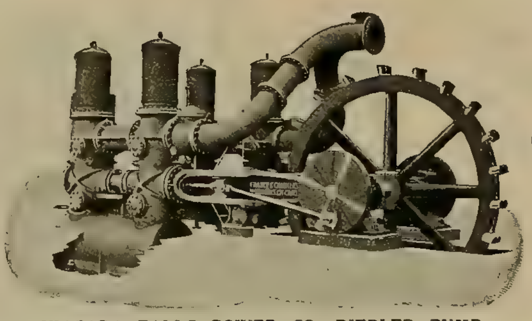


DEWEY, STRONG & CO., Patent Solicitors, 330 Market St., San Francisco, Cal.

WRITE TO
FRASER & CHALMERS,
CHICAGO, ILL.,

If you are interested in

Rock Crushers,
Air Compressors or Pumping Engines,
Hoisting Engines,
Boilers, Etc.



NIAGARA FALLS POWER CO. RIEDLER PUMP.

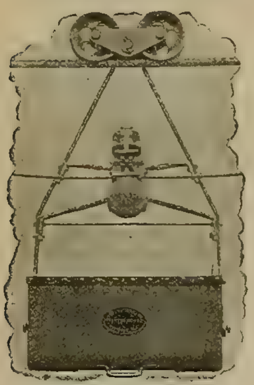
Gold or Silver Mills,
Smelting Furnaces,
Concentrating Plant,
Screens, Jigs,
Frue Vanners,
Huntington Mills.

Specify the descriptive catalogue you require by giving the subject of your interest.

TO OBTAIN LOWEST NET PRICES examine these catalogues and write describing the machinery needed. A SPECIAL ESTIMATE will then be promptly sent you with points of valuable information and advice.

FRASER & CHALMERS, CHICAGO, ILL.

Webber Patent Compression Grip
IS USED ONLY ON THE PATENT
Bleichert Wire Rope Tramway,
And Others Manufactured by the
TRENTON IRON COMPANY,
TRENTON, N. J.



No lugs or knots of any kind required on the traction rope, giving longer service, and saving in repairs. . . .

Illustrated book upon application.

ENGINEERS AND CONTRACTORS, and Sole Licensees in North America for the Bleichert System.
Also, Wire Rope Equipments for Surface and Underground Haulage, Transmission of Power, Etc.

For Particulars, Address . . .
NEWTON M. BELL, Agent, 308 Market Street, San Francisco.

A full stock of the Trenton Iron Co.'s Wire Ropes, made from "SPECIAL" Crucible and Plough Steel, carried in San Francisco.

HARD

TOUGH

TAYLOR IRON AND STEEL COMPANY,
HIGH BRIDGE, NEW JERSEY, U. S. A.

Sole Licensees in America under the HADFIELD System and Patents for
MANGANESE STEEL,

Best Metal Known for Roll Shells, Stamp Shoes and Dies, Crusher Plates and Side Liners, Toggles and Toggle Bearings, Gyratory Cones and Concaves, or Liners, Mine Car Wheels, Coal Crushing Rolls, Etc.

PACIFIC COAST PARTIES INTERESTED PLEASE ADDRESS PARKE & LACY CO., SAN FRANCISCO, CAL.
WRITE FOR INFORMATION AND PRICES.

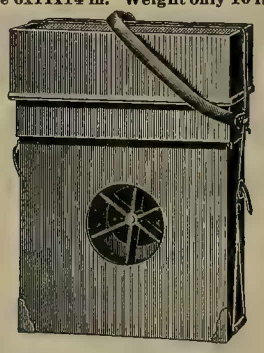
Established 1865. NOTICE TO GOLD MINERS. Incorporated 1890.

Silver-Plated Copper Amalgamated Plates
FOR SAVING GOLD
IN QUARTZ, GRAVEL OR BEACH MINING. MADE OF BEST SOFT LAKE SUPERIOR COPPER.
AT REDUCED PRICES.

Our Plates are guaranteed, and by actual experience are proved, the best in weight of Silver and durability. Old Mining plates replated, bought, or gold separated. THOUSANDS OF ORDERS FILLED.

SAN FRANCISCO NOVELTY AND PLATING WORKS,
☞SEND FOR CIRCULARS. Telephone Main 976. 68, 70, 72, 74 and 76 FIRST STREET, COR. MISSION, SAN FRANCISCO, CAL.

NO MORE PACKING DIRT TO WATER.
THE
PNEUMATIC PROSPECTOR.
Size 6x11x14 in. Weight only 10 lbs.



PACKED FOR MOVING.

NO WATER NEEDED.

Gives a clean prospect from placer ground or free-milling ore by compressed air. The operation is purely mechanical. No chemicals, no quicksilver; no black sand remains with the gold. Will do work equal to careful panning.

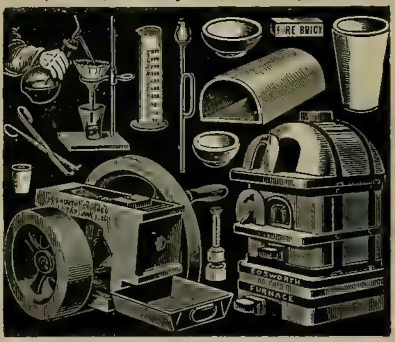
THE PNEUMATIC SEPARATOR.
Weight 160 lbs.

Has a capacity of 20 to 30 cu. yds. of gravel per day. Will save fine and coarse gold and nuggets of any size, comparatively free from black sand. Will do better work under favorable circumstances than a sluice box. Indispensable for dry countries.

SEND FOR DESCRIPTIVE CIRCULAR.

P. P. CUPLIN,
Inventor and Manufacturer,
WEST BEND, IOWA, U. S. A.

THE DENVER FIRE CLAY CO.,
1742 to 1746 Champa St., DENVER, COLO.



Manufacturers, Importers and Dealers in
Chemicals, Apparatus and Assayers' Supplies, Fire Brick and Tile.
Sole Agents for the "AINSWORTH BALANCES."
WRITE FOR CATALOGUES.

DENVER & RIO GRANDE R.R.
SCENIC LINE OF THE WORLD

The ∴ Mining Man's Favorite Route

BETWEEN

Denver, Colorado Springs, Pueblo and Florence, Cripple Creek, Leadville, Glenwood Springs, Aspen, Gunnison, Lake City, Creede, Durango, Silverton, Telluride and Ouray,

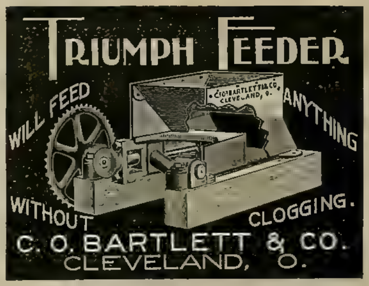
Reaching all the Mining, Milling, Cyaniding, Chlorinating and Smelting centers in Colorado and Utah, and all mining points in California, British Columbia and the Pacific Northwest by close connections and a perfect system of through car service.

Pullman Palace and Tourist Sleeping Cars between Denver and San Francisco and Los Angeles, and Pullman Palace and Tourist Sleeping Cars and Free Reclining Chair Cars between Denver and Portland. : : A Perfect Dining Car Service on All Through Trains. : :

For Illustrated Pamphlet, address

W. J. SHOTWELL,
G. A. D. & R. G. R. R.,
126 California St.,
San Francisco, Cal.

S. K. HOOPER,
G. P. & T. A.,
Denver,
Colo.


TRIUMPH FEEDER
WILL FEED ANYTHING
WITHOUT CLOGGING.
C. O. BARTLETT & CO.
CLEVELAND, O.

PRICE, $50.00.

DEWEY, STRONG & CO.,
PATENT AGENTS, 330 Market St., S. F., Cal.

SMOOTH-ON CASTINGS.

TRADE MARK

An iron cement for repairing leaks or fractures in steam or hydraulic work. When hard it will withstand a red heat, steam, water or oil, and expands and contracts with heat and cold the same as iron, insuring a tight joint at all temperatures. Difficult flange connections can easily be made with Smooth-On, as it adapts itself to the flanged faces whether parallel or not. Connections are easily taken apart. Unequaled for boiler patching, and repairing blemishes in iron castings. Write for catalogue and prices. Sole proprietors and manufacturers: Smooth-On Mfg. Co., Jersey City, N. J., U. S. A.

MESSRS. MADISON, BRUCE & SELLERS,

34-36 STEUART ST., SAN FRANCISCO, CAL.......................AGENTS FOR PACIFIC COAST.

C. H. EVANS & CO., Machine Works,

183-185-187 FREMONT STREET,

Where, with Enlarged and Increased Facilities, they are better than ever prepared to do

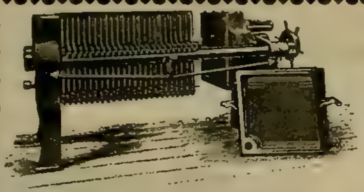
First-Class Machine Work

Promptly, and at Reasonable Prices, and will continue the manufacture of

Thomson & Evans Steam Pumps,

Deep Well Pumps, Power Pumps, Etc.,

Also Marine Engines, Ship and Steamboat Work, Pipe Cutting, General Jobbing and Repairing.



FOR Removing Slimes

BROMINE
CYANIDE
CHLORINATION

And Other Aquarious Chemical Solutions.

Our FILTER PRESS

Removes all Slimes and Hastens the Deposition of the Metals.

THE STILWELL-BIERCE & SMITH-VAILE CO., 276 Lehman St., Dayton, Ohio. Risdon Iron & Locomotive Works, San Francisco, Cal.; C. B. Boothe & Co., Los Angeles, Cal., Sales Agents.

TO SECURE GOOD RESULTS BUY

JESSOP'S STEEL

FOR TOOLS, MINING DRILLS, ETC.

Chief American Office,
91 John St., New York, N. Y.

Wm. Jessop & Sons, Ltd.
Manufactory, Sheffield, England.

I. WILLARD BEAM, Agent,
29 MAIN STREET,
SAN FRANCISCO, CAL.

PIPE BARGAINS.

Suitable for Water Mains, Mining, Irrigation, Air, Oil etc, etc. New Spiral Welded Asphalted Steel Pipe with any style coupling desired.

460 ft. 6-in. 3,480 ft. 10-in. 1,828 ft. 14-in. 1,077 ft. 18-in.
50,000 " 8 " 2,428 " 12 " 520 " 16 " 1,623 " 24 "

All Sizes Wrought Pipe, Well Casing and Straight Riveted Pipe in Stock. Equipment of All Kinds for Mine, Railroad and Contractors' Outfits. Write for Prices and Particulars.

BOWES & CO., 23 Lake St., Chicago, Ill.

GENERAL PHOTO-ENGRAVING CO.

[SUCCESSORS TO DEWEY ENGRAVING CO.]

FINE ZINCOGRAPHS, HALF-TONES, AND DESIGNING.

ENGRAVINGS OF MACHINERY OUR SPECIALTY.

SEND FOR SAMPLES AND PRICES.
TELEPHONE BLACK 1466.

NO. 536 CLAY STREET,
SAN FRANCISCO, CAL

MINE BELL SIGNALS.

Adopted, Used and in Force in Accordance with Law.

We print in legal size, 12x36 inches, the Mine Bell Signals and Rules provided for in the Voorhies Act passed by the California Legislature. The law is entitled "An Act to Establish a Uniform System of Bell Signals to Be Used in All Mines Operated in the State of California, for the Protection of Miners." We furnish these Signals and Rules, printed on cloth so as to withstand dampness. **50 Cents a Copy.**

MINING AND SCIENTIFIC PRESS, 330 Market St., San Francisco, Cal.

FOWLER'S AIR SPACE and Asbestos Sectional Covering.

As a Non-Conductor, Unequaled.

Special Rates for Steam Boilers and Drums.

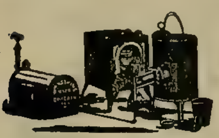
G. C. Fowler, 656-58 Howard St., S. F.

THE CAL. ANTI-CALORIC COMPANY,

Tel. Main 5752. Office, 217-219 Mission St., San Francisco, Cal.

Sole Manufacturers of ANTI-CALORIC SECTIONAL COVERINGS AND BLOCKS FOR BOILERS. ANTI-CALORIC PLASTER for Boilers, Domes, Pipes, Heaters, Etc., — the Best and Cheapest Insulating Plaster in the Market. Send for Samples and Prices. Factory, Potrero.

Hoskins' Patent Hydro Carbon Blow-Pipe and Assay Furnaces.

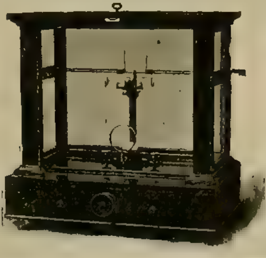


No dust. No ashes. Cheap, effective, economical, portable and automatic.

SEND FOR PRICE LIST TO

W. HOSKINS, 81 South Clark St., Room 55, CHICAGO, ILL.

AMERICAN AND FOREIGN
TRADE MARKS
SCIENTIFIC PRESS
PATENTS
PATENT AGENCY
CAVEATS
DEWEY, STRONG & CO. 330 MARKET ST.



SMITH & THOMPSON,

Manufacturers of Fine

ASSAY BALANCES.

Write for Catalogue.

2219 Stout St., Denver, Colo.

FULDA'S PATENT SELF-TIGHTENING TANK.

Fulda's Planing Mills and Tank Manufactory,

30-40 SPEAR STREET, SAN FRANCISCO, CAL.

—MANUFACTURERS OF—

RAILROAD,
MINING,
OIL,
WATER,
WINE,
TANKS.

Chemical and Cyanide Vats a Specialty.

WRITE FOR PRICE LIST.

We Carry in Stock a Complete Line of

BELTING AND PACKING.

—AGENTS FOR—

Dow Steam Pumps,
Goulds Power Pumps,
Hercules Gasoline Hoists,
Giant Air Compressors,
Giant Rock Drills.

JOHN WIGMORE & SONS CO.,
117-123 S. LOS ANGELES ST.,
LOS ANGELES, CAL.

McFARLANE & CO.,

1734 FIFTEENTH ST., DENVER, COLO.

Mining and Milling Machinery.

STAMP AND CONCENTRATING MILLS BUILT AND ERECTED.

STEAM AND ELECTRIC HOISTS, CRUSHERS, ROLLS, REVOLVING SCREENS, JIGS, ORE CARS, CYANIDE TANKS, CORNISH PUMPS, CORLISS ENGINES.

STEEL RAILS, TRACK FIXTURES,

PRODUCT PENNSYLVANIA STEEL COMPANY.

BAR, SHEET AND BOILER STEEL,

STRUCTURAL MATERIAL,

Cold Rolled Shafting.

GEORGE W. GIBBS COMPANY,

33-39 Fremont Street, 38-40 Beale Street,
CORRESPONDENCE SOLICITED. SAN FRANCISCO, CAL.

THE WM. HAMILTON MANUFACTURING CO., LIMITED,

MINING MACHINERY,

PETERBOROUGH, ONTARIO,

CANADA.

AARON'S ASSAYING, PART I.

FOURTH EDITION.

Revised, Rewritten, New, Improved.

This practical treatise on assaying has long been the favorite among practical men. The new edition, just out, is up to date. Price $1, postpaid anywhere.

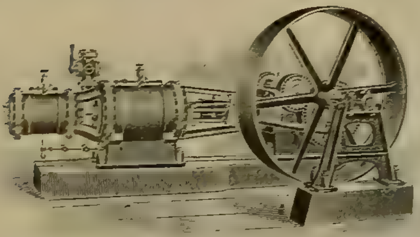
Book Dept., Mining and Scientific Press,
330 MARKET ST., SAN FRANCISCO, CAL.

The Best Time to Advertise :: ::

In the MINING AND SCIENTIFIC PRESS is When You Want More Business.

WHY NOT have our catalogues specifications and prices before you purchase

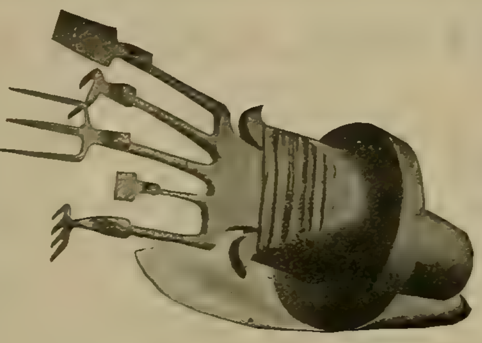
AIR DRILLS OR COMPRESSORS?



Our guarantees are strong; our customers are satisfied. We can satisfy YOU.

J. Geo. Leyner,
729 Seventeenth St.,
DENVER, COLO.

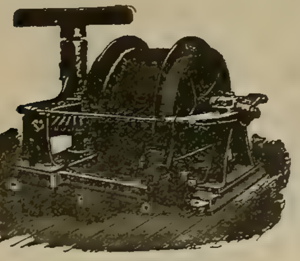
SHOES and DIES of **SUPERIOR** quality and at prices 20 to 30% lower than any other maker.
FURNISHED BY
ARTHUR KOPPEL, 66 Broad St., N. Y. City.
WRITE FOR PARTICULARS.



MINING CARS of every description.
PORTABLE RAILWAYS, Rolling Stock, Railway Outfits for Mines of every description. Export Work a specialty.
ARTHUR KOPPEL, 66 Broad St., N. Y. City.
SEND FOR CATALOGUE AND ESTIMATES.

Pacific Coast Agents, Baker & Hamilton, San Francisco and Sacramento.

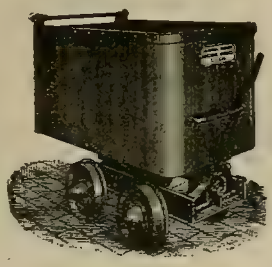
JOSHUA HENDY MACHINE WORKS,
No. 42 FREMONT STREET, SAN FRANCISCO, CAL.
—BUILDERS OF—
"Davis" Horse Power Whims. Ore and Rock Cars.



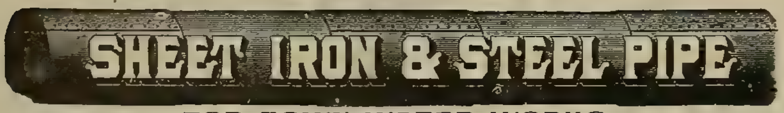
Specialty of
PROSPECTING,
MINING and
MILLING
PLANTS.

ORE and WATER BUCKETS.

"T" RAIL OF USUAL WEIGHTS, EITHER NEW OR SECOND-HAND, FOR SALE CHEAP.



FRANCIS SMITH & CO.,
—MANUFACTURERS OF—



FOR TOWN WATER WORKS.
Hydraulic, Irrigation and Power Plants, Well Pipe, Etc., all sizes.
46 FREMONT STREET, - - - - SAN FRANCISCO, CAL.

Iron cut, punched and formed, for making pipe on ground where required. All kinds of Tools supplied for making Pipe. Estimates given when required. Are prepared for coating all sizes of Pipes with Asphaltum.

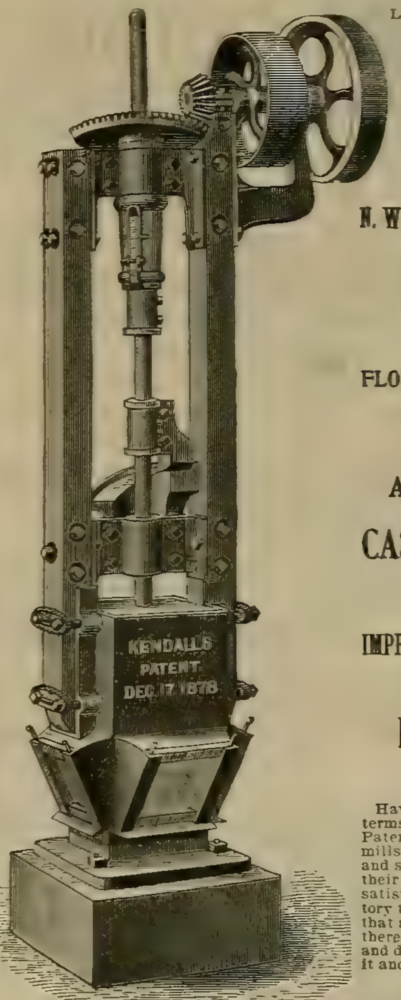
Aaron's Assaying, PARTS II and III.

THIRD EDITION—REVISED AND REWRITTEN.

The Third Edition of Parts II and III of this great work on assaying is now ready; new type; new illustrations; new matter; better than ever; reduced in price to $1.50 postpaid to any part of America. The practical character of this book has made it the favorite everywhere in the mining world among men who want such a manual on assaying.

Address Book Dept. Mining and Scientific Press,
330 MARKET ST., SAN FRANCISCO, CAL.

L. C. MARSHUTZ. T. G. CANTRELL.



NATIONAL IRON WORKS,
N. W. Cor. Main & Howard Sts., San Francisco.
MANUFACTURERS OF
STATIONARY AND COMPOUND ENGINES,
FLOUR, SUGAR, AND QUARTZ MILL MACHINERY.
AMALGAMATING MACHINES.
CASTINGS AND FORGINGS
OF EVERY DESCRIPTION.
All work tested and guaranteed.
IMPROVED PORTABLE HOISTING ENGINES

Sole Manufacturers of
Kendall's Patent Quartz Mills.

Having renewed our contract on more advantageous terms with Mr. S. Kendall for the manufacture of his Patent Quartz Mill, we are enabled to offer these mills at **Greatly Reduced Prices.** Having made and sold these mills for the past 16 years, we know their merits, and know that they have given perfect satisfaction to purchasers, as numbers of commendatory testimonials prove. We feel confident, therefore, that at the prices we are now prepared to offer them, there is placed within the reach of all a light, cheap and durable mill that will do all that is claimed for it and give entire satisfaction.

MARSHUTZ & CANTRELL

Send for Circulars and Price List.

JOHN A. ROEBLING'S SONS Co.
IRON & STEEL
WIRE ROPE
TELEGRAPH WIRE
COPPER WIRE
Works at Trenton, N.J.
WAREHOUSES,
117 LIBERTY ST., NEW YORK.
25 FREMONT ST., SAN FRANCISCO.
173 LAKE ST., CHICAGO, ILL.
MAGNET WIRE
&
INSULATED ELECTRIC WIRES.

ADAMANTINE SHOES AND DIES.

◆◆◆◆◆ CHROME CAST STEEL. ◆◆◆◆◆

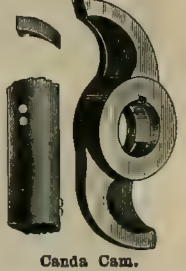
CANDA Improved Self-Locking CAMS.

TAPPETS, BOSSES, ROLL SHELLS AND CRUSHER PLATES.

These castings are extensively used in all the mining States and Territories of North and South America. Guaranteed to prove better and cheaper than any others. Orders solicited subject to the above conditions. When ordering, send sketch with exact dimensions. Send for Illustrated Circular.

Manufactured by **CHROME STEEL WORKS**, Brooklyn, N. Y.

H. D. & H. W. MORRIS,
AGENTS,
Room 194 Crocker Building, San Francisco, Cal.



Canda Cam.

DEWEY, STRONG & CO., Patent Solicitors, 330 Market St., San Francisco, Cal.

THE IDEAL CONVEYOR BELT

Is the one that will carry stone, ore, coal, wet or dry material, holding buckets firmly and securely; will stand all kinds of exposure, and resist the heaviest strains during a long period of service. This is what the **LEVIATHAN BELT** has done, and we quote the following from a letter from the New York Steam Co.:

"We have used Leviathan Belting for four years, up to 24-inch by 8-ply, elevating and conveying coal. Some of the Belting is outside, exposed to freezing weather; some in a steam bath. In both conditions the results have been very gratifying, over 500 tons having been handled in ten hours time."

MAIN BELTING COMPANY,
1225–41 Carpenter Street, Philadelphia.
55–57 Market St., Chicago. 120 Pearl St., Boston.
SEND FOR PRICE LISTS AND SAMPLE.

Small Portable Saw Mills and
DRAG SAWING MACHINES
FOR RANCHES AND MINES.

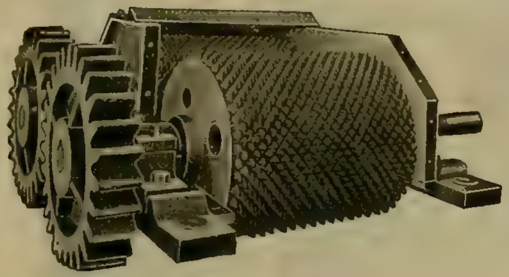
Woodworking Machinery.

LINK BELTING, SPROCKET WHEELS,
ELEVATOR BUCKETS & BOOTS,
TAKEUPS, FRICTION CLUTCH
PULLEYS, ETC.

ALL STYLES AND SIZES IN STOCK FOR IMMEDIATE DELIVERY.

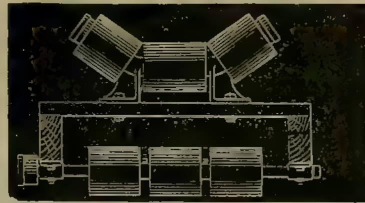
JNO. D. EBY,
17 & 19 MAIN STREET, - SAN FRANCISCO, CAL.

LINK-BELT ELEVATORS —AND— CONVEYORS.



BREAKER ROLLS,
PICKING TABLES,
MALLEABLE IRON BUCKETS,
SHAFTING, PULLEYS,
GEARING, CLUTCHES, Etc.
Catalogue Upon Application.

LINK-BELT MACHINERY CO.,
Engineers, Founders, Machinists,
CHICAGO, U. S. A.
DENVER, 1328 17th St.,
A. E. LINDROOTH, Manager.



ROBINS BELT CONVEYORS

For handling Ore, Coal, Tailings and Dredgings. Catalogue mailed on application.
ROBINS CONVEYING BELT CO., Park Row Building, NEW YORK.

WHY NOT PUT IN YOUR OWN PLANT
FOR DEPOSITING SILVER ON YOUR AMALGAM PLATES
WE FURNISH DYNAMOS & COMPLETE EQUIPMENT FOR THIS WORK
WRITE FOR PARTICULARS
THE HANSON & VAN WINKLE Co.
CHICAGO. NEWARK N.J. NEW YORK.

RIVETED IRON AND STEEL PIPE

FOR HYDRAULIC MINES, IRRIGATION AND POWER PLANTS. Manufactured from the best grades of IRON or STEEL by MODERN MACHINERY.

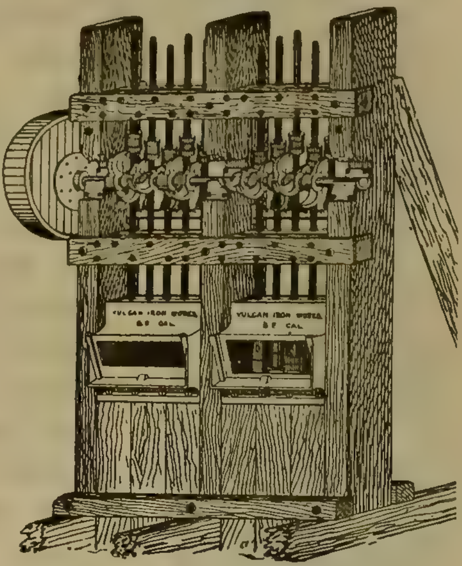
AGENTS FOR THE Celebrated CANTON STEEL.

Schaw, Ingram, Batcher & Co., 539 Mission St., SAN FRANCISCO. 211 to 219 J St., SACRAMENTO.

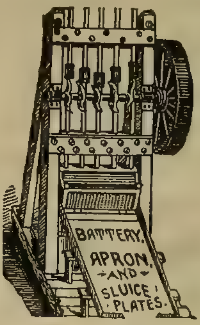
Mining Machinery.

Stamp Mills
Of the Latest Improved Design for
Gold Milling.

VULCAN
WIRE ROPEWAYS
For Conveying Ore, Etc.


VULCAN IRON WORKS S F CAL.
VULCAN IRON WORKS S F CAL.

Vulcan Iron Works,
Office: 505 Mission Street,
San Francisco, Cal.

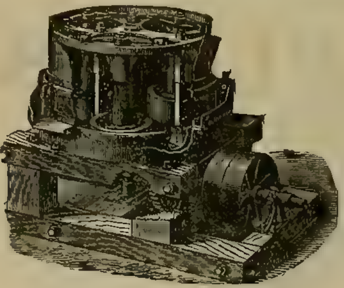

BATTERY, APRON, AND SLUICE PLATES.

To Gold Miners!

Silver Plated Copper Amalgamating Plates
For Saving Gold in Quartz and Placer Mining.

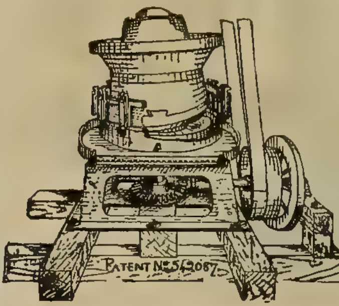
ONLY BEST COPPER AND REFINED SILVER USED. OLD MINING PLATES BOUGHT OR TAKEN IN EXCHANGE FOR NEW PLATES. GOLD EXTRACTED FROM OLD PLATES AT A MODERATE COST. OLD PLATES REPLATED. GOLD, SILVER, NICKEL, COPPER AND BRASS PLATING.

Denniston San Francisco Plating Works,
652 Mission Street, Cor. Annie, San Francisco, Cal.
E. G. DENNISTON, ... Proprietor.
—:Send for Circular.:—



Centrifugal Roller Quartz Mill.

F. A. HUNTINGTON,
—Manufacturer of—
CENTRIFUGAL
Roller Quartz Mills.
CONCENTRATORS and ORE CRUSHERS.
Mining Machinery of Every Description.
Steam Engines, Shingle Machines.
Room 1, 3d Floor, Mills Building,
SAN FRANCISCO, CAL.



THE "LIGHTNER" QUARTZ MILL.

W. H. Birch & Co.
No. 127 to 135 First St., San Francisco, Cal.
— BUILDERS OF —
LIGHTNER QUARTZ MILLS.

No. 1	works	3	tons	per	day	with	1½ H. P.
No. 2	"	4 to 7	"	"	"	2½	"
No. 3	"	10 to 15	"	"	"	3½	"

LARGER MILLS BUILT. SEND FOR CIRCULAR.
"Birch" Two-Stamp Mills, McGlew Concentrators,
And All Kinds of Mining Machinery.

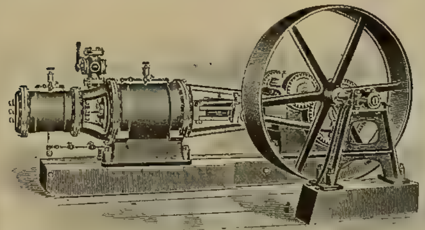
FLINT & LOMAX,
DENVER, COLO.
ELECTRICAL AND MECHANICAL ENGINEERS.
—— DEALERS IN ——
BOILERS, ENGINES, DYNAMOS, MOTORS, ICE MACHINERY,
SHAFTING, HANGERS, BELTING, PULLEYS, and
ELECTRICAL SUPPLIES OF EVERY KIND.
OPERATING MACHINE, PATTERN, BLACKSMITH AND PLATING SHOPS. MAKERS OF SPECIAL APPARATUS TO ORDER.

TELEPHONE MAIN 5303
Union Photo-Engraving Co.
DESIGNING HALF-TONES ZINC ETCHING
523 MARKET ST
SAN FRANCISCO, CAL.

WHY NOT

have our catalogues specifications and prices before you purchase

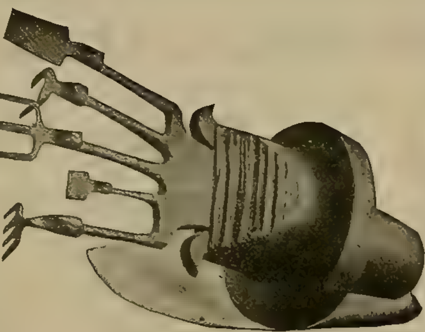
AIR DRILLS OR COMPRESSORS?



Our guarantees are strong; our customers are satisfied. We can satisfy YOU.

J. Geo. Leyner,
729 Seventeenth St.,
DENVER, COLO.

SHOES and DIES of SUPERIOR quality and at prices 20 to 30% lower than any other maker.
FURNISHED BY
ARTHUR KOPPEL, 66 Broad St., N. Y. City.
WRITE FOR PARTICULARS.



MINING CARS of every description.
PORTABLE RAILWAYS, Rolling Stock, Railway Outfits for Mines of every description. Export Work a specialty.
ARTHUR KOPPEL, 66 Broad St., N. Y. City.
SEND FOR CATALOGUE AND ESTIMATES.

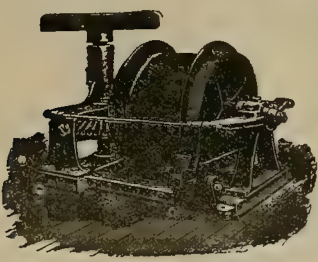
Pacific Coast Agents, Baker & Hamilton, San Francisco and Sacramento.

JOSHUA HENDY MACHINE WORKS,

No. 42 FREMONT STREET, SAN FRANCISCO, CAL.

—BUILDERS OF—

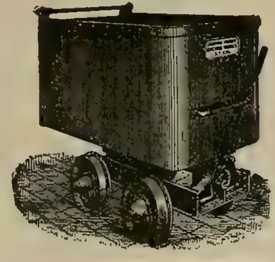
"Davis" Horse Power Whims. Ore and Rock Cars.



Specialty of
PROSPECTING, MINING and MILLING PLANTS.

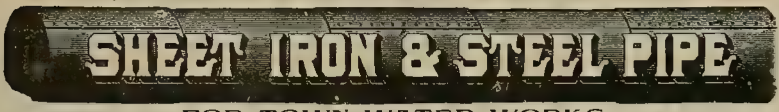
ORE and WATER BUCKETS.

"T" RAIL OF USUAL WEIGHTS, EITHER NEW OR SECOND-HAND, FOR SALE CHEAP.



FRANCIS SMITH & CO.,

—MANUFACTURERS OF—



FOR TOWN WATER WORKS.

Hydraulic, Irrigation and Power Plants, Well Pipe, Etc., all sizes.

46 FREMONT STREET, - - - - SAN FRANCISCO, CAL.

Iron cut, punched and formed, for making pipe on ground where required. All kinds of Tools supplied for making Pipe. Estimates given when required. Are prepared for coating all sizes of Pipes with Asphaltum.

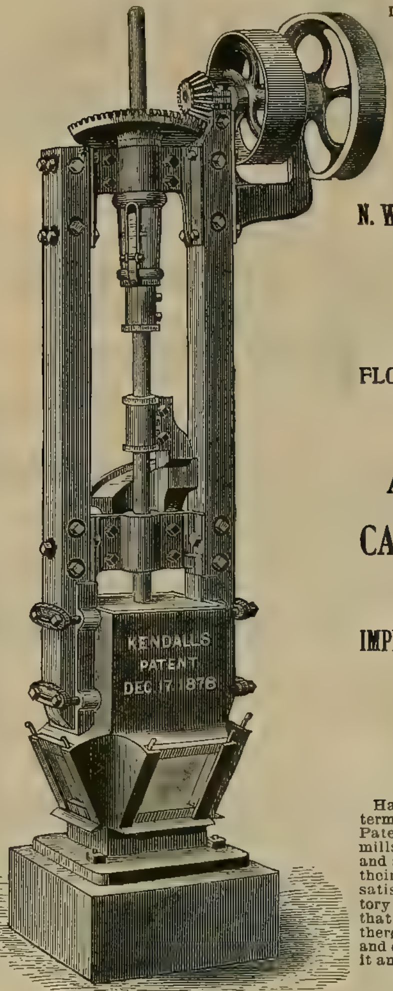
Aaron's Assaying, PARTS II and III.

THIRD EDITION—REVISED AND REWRITTEN.

The Third Edition of Parts II and III of this great work on assaying is now ready; new type; new illustrations; new matter; better than ever; reduced in price to $1.50 postpaid to any part of America. The practical character of this book has made it the favorite everywhere in the mining world among men who want such a manual on assaying.

Address Book Dept. Mining and Scientific Press,
330 MARKET ST., SAN FRANCISCO, CAL.

L. C. MARSHUTZ. T. G. CANTRELL.



NATIONAL IRON WORKS,

N. W. Cor. Main & Howard Sts., San Francisco.

MANUFACTURERS OF

STATIONARY AND COMPOUND

ENGINES,

FLOUR, SUGAR, AND QUARTZ MILL

MACHINERY.

AMALGAMATING MACHINES.

CASTINGS AND FORGINGS

OF EVERY DESCRIPTION.
All work tested and guaranteed.

IMPROVED PORTABLE HOISTING ENGINES

Sole Manufacturers of

Kendall's Patent Quartz Mills.

Having renewed our contract on more advantageous terms with Mr. S. Kendall for the manufacture of his Patent Quartz Mill, we are enabled to offer these mills at **Greatly Reduced Prices.** Having made and sold these mills for the past 16 years, we know their merits, and know that they have given perfect satisfaction to purchasers, as numbers of commendatory testimonials prove. We feel confident, therefore, that at the prices we are now prepared to offer them, there is placed within the reach of all a light, cheap and durable mill that will do all that is claimed for it and give entire satisfaction.

MARSHUTZ & CANTRELL

Send for Circulars and Price List.

ADAMANTINE SHOES AND DIES.

✦✦✦✦✦✦CHROME CAST STEEL.✦✦✦✦✦✦

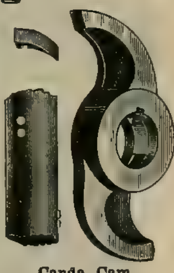
CANDA Improved Self-Locking CAMS.

TAPPETS, BOSSES, ROLL SHELLS AND CRUSHER PLATES.

These castings are extensively used in all the mining States and Territories of North and South America. Guaranteed to prove better and cheaper than any others. Orders solicited subject to the above conditions. When ordering, send sketch with exact dimensions. Send for Illustrated Circular.

Manufactured by **CHROME STEEL WORKS,** Brooklyn, N. Y.

H. D. & H. W. MORRIS,
AGENTS,
Room 194 Crocker Building, San Francisco, Cal.



Canda Cam.

DEWEY, STRONG & CO., Patent Solicitors, 330 Market St., San Francisco, Cal.

THE IDEAL CONVEYOR BELT

Is the one that will carry stone, ore, coal, wet or dry material, holding buckets firmly and securely; will stand all kinds of exposure, and resist the heaviest strains during a long period of service. This is what the **LEVIATHAN BELT** has done, and we quote the following from a letter from the New York Steam Co.:

"We have used Leviathan Belting for four years, up to 24-inch by 8-ply, elevating and conveying coal. Some of the Belting is outside, exposed to freezing weather; some in a steam bath. In both conditions the results have been very gratifying, over 500 tons having been handled in ten hours time."

MAIN BELTING COMPANY,
1225-41 Carpenter Street, Philadelphia.
55-57 Market St., Chicago. 120 Pearl St., Boston.
SEND FOR PRICE LISTS AND SAMPLE.

Small Portable Saw Mills and DRAG SAWING MACHINES FOR RANCHES AND MINES.

Woodworking Machinery.

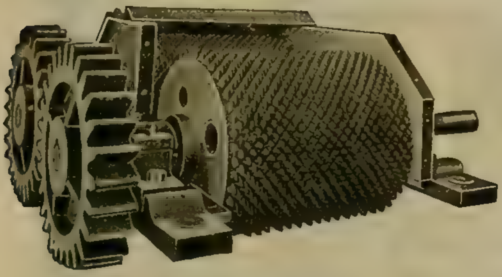
LINK BELTING, SPROCKET WHEELS,
ELEVATOR BUCKETS & BOOTS,
TAKEUPS, FRICTION CLUTCH
PULLEYS, ETC.

ALL STYLES AND SIZES IN STOCK FOR IMMEDIATE DELIVERY.

JNO. D. EBY,
17 & 19 MAIN STREET, - SAN FRANCISCO, CAL.

LINK=BELT

ELEVATORS
—AND—
CONVEYORS.



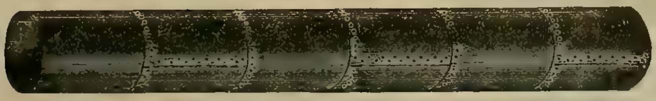
BREAKER ROLLS,
PICKING TABLES,
MALLEABLE IRON BUCKETS,
SHAFTING, PULLEYS,
GEARING, CLUTCHES, Etc.
Catalogue Upon Application.

LINK-BELT MACHINERY CO.,
Engineers, Founders, Machinists,
CHICAGO, U. S. A.
DENVER, 1328 17th St.,
A. E. LINDROOTH, Manager.

For handling Ore, Coal, Tailings and Dredgings. Catalogue mailed on application.
ROBINS CONVEYING BELT CO., Park Row Building, NEW YORK.

WHY NOT PUT IN YOUR OWN PLANT
FOR DEPOSITING SILVER ON YOUR AMALGAM PLATES
WE FURNISH DYNAMOS & COMPLETE EQUIPMENT FOR THIS WORK.
WRITE FOR PARTICULARS
THE HANSON & VAN WINKLE CO
CHICAGO. NEWARK N.J. NEW YORK.

RIVETED IRON AND STEEL PIPE



FOR HYDRAULIC MINES, IRRIGATION AND POWER PLANTS. Manufactured from the best grades of IRON or STEEL by MODERN MACHINERY.

AGENTS FOR THE Celebrated **CANTON STEEL.**

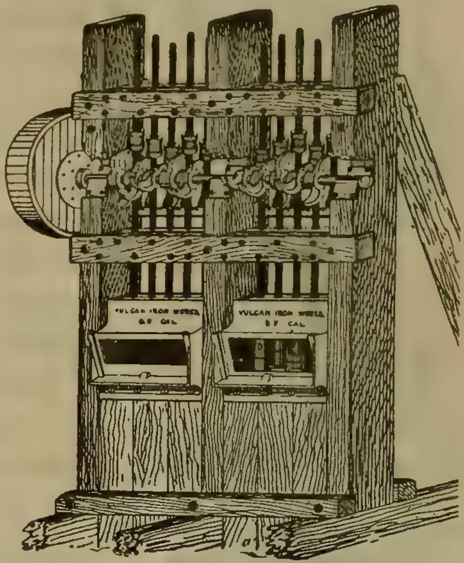
Schaw, Ingram, Batcher & Co.,
539 Mission St., SAN FRANCISCO.
211 to 219 J St., SACRAMENTO.

Mining Machinery.

Stamp Mills

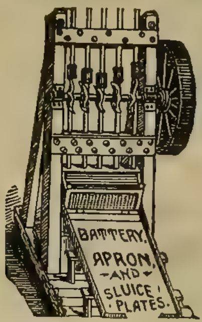
Of the Latest Improved Design for

Gold Milling.


VULCAN IRON WORKS S F CAL
VULCAN IRON WORKS S F CAL

VULCAN
WIRE ROPEWAYS
For Conveying Ore, Etc.

Vulcan Iron Works,
Office: 505 Mission Street,
San Francisco, Cal.


BATTERY, APRON, AND SLUICE PLATES.

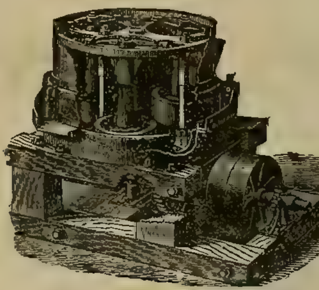
To Gold Miners!

Silver Plated Copper Amalgamating Plates

For Saving Gold in Quartz and Placer Mining.

ONLY BEST COPPER AND REFINED SILVER USED. OLD MINING PLATES BOUGHT OR TAKEN IN EXCHANGE FOR NEW PLATES. GOLD EXTRACTED FROM OLD PLATES AT A MODERATE COST. OLD PLATES REPLATED. GOLD, SILVER, NICKEL, COPPER AND BRASS PLATING.

Denniston San Francisco Plating Works,
652 Mission Street, Cor. Annie, San Francisco, Cal.
E. G. DENNISTON, ... Proprietor.
—:Send for Circular.:—

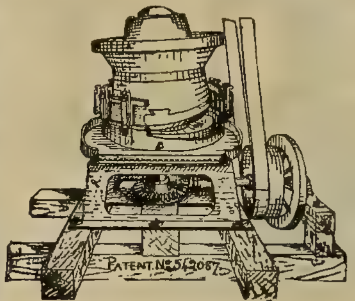


Centrifugal Roller Quartz Mill.

F. A. HUNTINGTON,

—Manufacturer of—

CENTRIFUGAL
Roller Quartz Mills.
CONCENTRATORS and ORE CRUSHERS.
Mining Machinery of Every Description.
Steam Engines, Shingle Machines.
Room 1, 3d Floor, Mills Building,
SAN FRANCISCO, CAL.



THE "LIGHTNER" QUARTZ MILL.

W. H. Birch & Co.

No. 127 to 135 First St., San Francisco, Cal.

—BUILDERS OF—

LIGHTNER QUARTZ MILLS.

No. 1	works	3	tons	per	day	with 1½	H. P.
No. 2	"	4 to 7	"	"	"	2½	"
No. 3	"	10 to 15	"	"	"	3½	"

LARGER MILLS BUILT. SEND FOR CIRCULAR.

"Birch" Two-Stamp Mills, McGlew Concentrators,
And All Kinds of Mining Machinery.

FLINT & LOMAX,

DENVER, COLO.

ELECTRICAL AND MECHANICAL ENGINEERS.

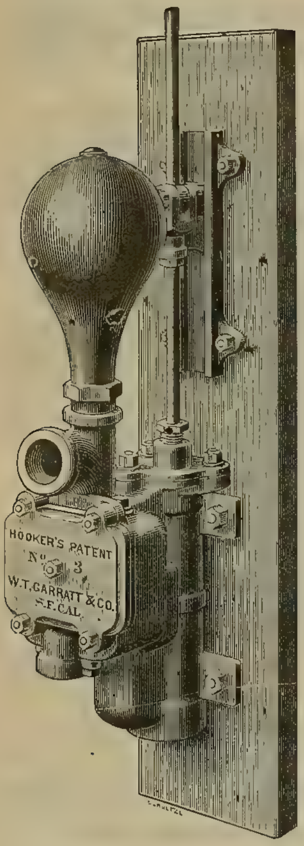
—DEALERS IN—

BOILERS, ENGINES, DYNAMOS, MOTORS, ICE MACHINERY, SHAFTING, HANGERS, BELTING, PULLEYS, and

ELECTRICAL SUPPLIES OF EVERY KIND.

OPERATING MACHINE, PATTERN, BLACKSMITH AND PLATING SHOPS. MAKERS OF SPECIAL APPARATUS TO ORDER.

TELEPHONE MAIN 5303
Union Photo-Engraving Co.
DESIGNING
HALF-TONES
ZINC ETCHING
523 MARKET ST
SAN FRANCISCO, CAL.


HOOKER'S PATENT
No 3
W.T.GARRATT & CO.
S.F.CAL.

A GOOD MINING PUMP.

The Hooker Double Acting Pump.
Well Built, Simple, Durable, Efficient.
All Working Parts Easy of Access.
Duplicate Parts in Stock.
We furnish these pumps with suction pipes, hose and strainers complete. Estimates on application.
Can furnish up to number three with double brake for hand power.
Just the pump for a small mine.
Larger sizes, larger capacities.
Send for our catalogue on pumps.

W. T. GARRATT & CO.,
Cor. Fremont and Natoma Sts,
SAN FRANCISCO, CAL.

TANKS!

AND COMPLETE

CYANIDE PLANTS.

ILLUSTRATED CATALOGUE

MAILED FREE.

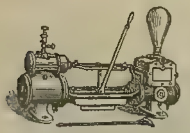
Zinc Lathes with Automatic Feed

FOR CUTTING ZINC SHAVINGS.

Pacific Tank Co., Manufacturers.

348 East Second Street,
Los Angeles, Cal.

35 Beale Street,
San Francisco, Cal.



SOLE AGENCY

Worthington Steam Pumps and Water Meters.

Pumping Plants of any Capacity.

TATUM & BOWEN,

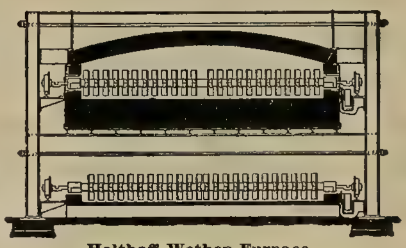
34-36 Fremont Street, San Francisco, Cal. 29-35 First Street, Portland, Or.

MACHINERY—ALL KINDS

ROASTING FURNACES.

WE MANUFACTURE TWO TYPES:

THE WETHEY MULTIPLE DECK and
HOLTHOFF-WETHEY STRAIGHT LINE.



Holthoff-Wethey Furnace.

THESE FURNACES ARE BUILT FROM ORIGINAL DESIGNS EMBODYING MANY NEW FEATURES IN THE CONSTRUCTION OF ORE ROASTING FURNACES, AND DO NOT IMITATE ANY OF THE OLD AND FAULTY MODELS.

THESE FURNACES ARE FULLY COVERED BY PATENTS WHICH WE CONTROL AND WILL PROTECT ALL USERS AGAINST CLAIMS FOR INFRINGEMENT.

MINING MACHINERY
—AND—
REYNOLDS CORLISS ENGINES.

WE INVITE CORRESPONDENCE.

THE EDWARD P. ALLIS COMPANY,
MILWAUKEE, WIS.

The only roofing without a fault

P & B
Ready Roofing

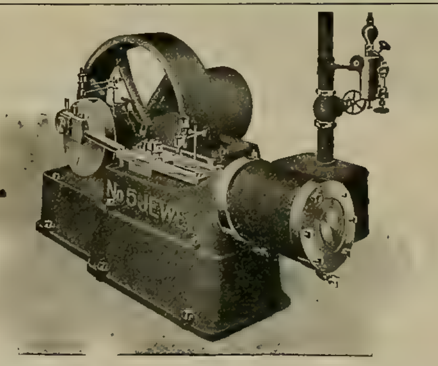
Paraffine Paint Co
116 Battery Street—San Francisco

The best builders in America use P & B Ready Roofing

Shingles may warp, slate may chip, tin may sweat, tar may run, or iron expand, but P & B will stand any climatic condition—the weather of the west requires it

Demand it of your dealer

JEWEL

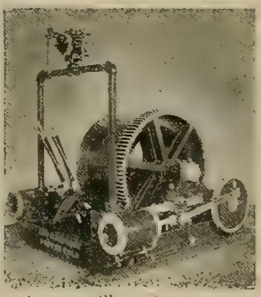


ENGINES

A THOROUGHLY RELIABLE, SIMPLE, HIGH CLASS, PERFECTLY GOVERNED AUTOMATIC ENGINE AT A REASONABLE PRICE.

BAKER & HAMILTON,

SAN FRANCISCO, SACRAMENTO, LOS ANGELES.



The above cut illustrates my new and improved Hoister.

Hoisting Engines

A SPECIALTY.

REVERSIBLE, LINK-MOTION, GEARED and FRICTION CLUTCH HOISTS carried in stock.

Special Machinery Built to Order.

GEO. G. JACKSON,

1724-34 Wynkoop St., DENVER, COLO.

"GIANT" DRILLS AND COMPRESSORS
ARE THE BEST.
"GIANT" BABY DRILLS CHEAPEN MINING.
WRITE US FOR PARTICULARS.
THE COMPRESSED AIR MACHINERY CO., 11-13 First St., San Francisco, Cal.

SULLIVAN

Diamond Core Drills
FOR PROSPECTING. Catalogue 29.
The most extensive line of sizes and styles ever offered.
CONTRACTORS FOR PROSPECTING WITH DIAMOND DRILL.

ROCK DRILLS
FOR MINING. Catalogue 30.
Superior valve and ratchet motions. The highest possible grade.
Send for Our New Catalogues.

Sullivan Machinery Co.,
New York. Pittsburg. Claremont, N. H.
Main Office, **CHICAGO**....................54 to 60 N. CLINTON ST.
Western Office, **DENVER**....................332 SEVENTEENTH ST.
Pacific Agency, **SAN FRANCISCO**, HENSHAW, BULKLEY & CO.
Cable Address, Diamond, Chicago. Codes: A. B. C. 4th Edition, Postal Directory, Western Union, Liebers.

Established 1837.
I. C. Yawger,
Successor to VICTOR BISHOP & CO.
IMPORTER OF CARBONS FOR DIAMOND DRILLS.
21 Maiden Lane, - NEW YORK.

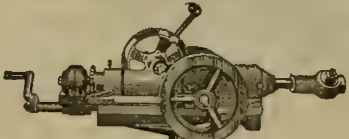
DIAMOND DRILLS
FOR PROSPECTING.
AMERICAN DIAMOND ROCK DRILL CO.
120 LIBERTY ST N.Y.

THEODOR LEXOW, 14 JOHN STREET, N.Y.
......Importer of......
CARBONS
(BLACK DIAMONDS)
For DIAMOND DRILLS and all Mechanical Purposes.
HENRY DEMMERT.

RAND ROCK DRILLS and Drill Mountings.

HIGHEST DEGREE OF PERFECTION ATTAINED. ∴ INDISPENSABLE IN MINING, TUNNELING & EXCAVATING.
AIR —AND— Gas COMPRESSORS.
STANDARD TYPES! SPECIAL PATTERNS! ALL SIZES!
RAND DRILL CO., 100 BROADWAY, New York, U. S. A.
San Francisco Office: 223 First St.
1328 Monadnock Blk., CHICAGO, ILL.

THE JACKSON HAND POWER ROCK DRILL.



Works in Any Rock, in Any Position.
Write for Circulars and References.
THE JACKSON DRILL & M'F'G CO.,
1756 Larimer Street, DENVER, COLO.
Sole Licensees for all Foreign Countries and Eastern United States: THORNTON N. MOTLEY COMPANY (INC.), 48 John St., New York.
AGENTS: The Joshua Hendy Machine Works, 38 Fremont St., San Francisco, Cal.; Chas. B. Boothe & Co., 126 So. Los Angeles St., Los Angeles, Cal.

FIRTH'S DRILL STEEL,
16 cents per pound.

The best drill steel on the market. Has no equal for hard rock drilling. Miners cannot afford to use an inferior steel when FIRTH'S can be bought at the above price.

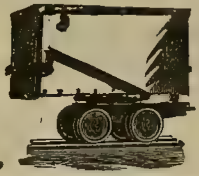
Abner Doble Company, Gen. Agts.,
Fremont and Howard Sts., SAN FRANCISCO, CAL.

THE Best None Too Good
When in Hard Rock.

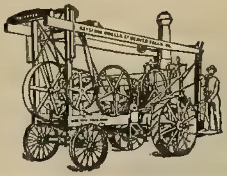
CANTON DRILL STEEL.

UNEQUALED IN ROCK-CUTTING QUALITIES. Ask Your Dealer for CANTON Brands.
—— FOR SALE IN CALIFORNIA BY ——
SCHAW, INGRAM, BATCHER & CO., Sacramento — San Francisco.
HARPER & REYNOLDS CO., Los Angeles.

WE HAVE MOVED TO LARGER QUARTERS.
TRUAX ORE CARS
CARS ALWAYS IN STOCK TO FILL RUSH ORDERS.



WE MAKE CARS FOR YOUR CAGE AND SKIPS FOR YOUR INCLINE SHAFT.
SEND FOR PAMPHLET AND REFERENCES.
Truax Mfg. Co., 69 STEVENSON ST., S. F.



Prospecting Machinery.

Multitudes in use for testing for minerals. Sizes and equipments to suit any and all conditions. Unexcelled for Placer Testing, Oil Wells, Water Wells, testing for Lead and Zinc, Iron and Coal; goes through anything; brings up everything. Large sizes drill as much as 1500 feet. In use all over the world. Every purchaser pleased. Used on boats for testing river and lake beds. Water no hindrance. No skilled labor required.

KEYSTONE DRILLER CO., Beaver Falls, Pa., U. S. A.

BULLOCK DIAMOND DRILLS

If you are interested in prospecting send for our new Diamond Drill Catalogue (No. 33).

BULLOCK MINING MACHINERY

PORTABLE HOISTS—Send for our new Catalogue (No. 40). CHAMPION MINE VENTILATORS—Send for our new Catalogue (No. 35).
HOISTING AND HAULAGE PLANTS, ORE CARS, SKIPS, CAGES, ETC., ETC.

PARKE & LACY CO., Agent,
21 & 23 Fremont St., San Francisco, Cal.

M. C. BULLOCK MFG. CO.,
1172 West Lake St., Chicago, Ill., U. S. A.

PROFESSIONAL CARDS.

R. H. POSTLETHWAITE, M.I.E.E.
Hydraulic Mining Engineer.
River Dredging for Gold a Specialty.
1815 Leavenworth St........San Francisco, Cal.

THEO. F. VAN WAGENEN, E. M.
Consulting Mining and Hydraulic Engineer.
1508 Fillmore St., DENVER, COLO.

D. B. HUNTLEY,
Mining Engineer and Metallurgist,
De Lamar, Owyhee Co., Idaho.

BERNARD MACDONALD,
Consulting Mining Engineer.
General Manager British America Corporation, Ltd., Rossland, B. C.

DRAPER & McLEOD,
Assayers, Chemists, and Mining Engineers,
1736 CHAMPA STREET,
DENVER.............................COLORADO.

JOHN DWYER, Mining Engineer,
MEXICO.
Address 762-17th Street......East Oakland, Cal.

RICKARD & FROST,
ASSAYERS, 1752 Champa St., Denver, Colo. Formerly assayers at Argo smelter. Specimen, Control and Umpire Work. Prompt attention given to all mail and express samples.

Established 1879.
CHAS. B. GIBSON,
Chemist, Metallurgist and Mining Engineer,
81 CLARK ST., CHICAGO, ILL.

E. H. BENJAMIN, Mining Engineer.
A. M. HUNT, Mechanical & Hydraulic Engineer.
WYNN MEREDITH, Electrical Engineer.
EXPERT EXAMINATIONS. ADVISORY REPORTS.
CONSTRUCTION SUPERVISION
331 Pine Street,...........San Francisco, Cal.
Telephone Main 1870. Cable Address "Edben."

JOHN W. GRAY,
Mining and Hydraulic Work.
Prospecting Operations and Exploration Work.
Examinations, Surveys, Development, Equipment of Mines, Gold-Bearing Gravels, and Water Supplies.
923 Linden St.,..................Oakland, Cal.
Cable "Espra." Correspondence invited.

ABBOT A. HANKS,
CHEMIST AND ASSAYER.
Successor to Henry G. Hanks, est. 1866. The supervision of sampling of ores shipped to San Francisco a specialty.
—531—
California Street,
San Francisco.

RICHARD A. PEREZ, E. M.
Assayer and Analytical Chemist,
120 North Main St., - Los Angeles, Cal.

S. W. TYLER,
Mining and Metallurgical Engineer,
6 Windsor Hotel Block.
Cable: Retyl, Denver. DENVER, COLORADO.

The SPOKANE BUREAU OF MINING,
N. E. LINSLEY, Manager.
SPOKANE, : : WASHINGTON.
Consulting Mining and Milling Engineer.
Will Examine and Report on Mines.

W. J. ADAMS, E. M.,
Mining Engineer and Metallurgist.
Graduate of Columbia School of Mines.
Author of "Hints on Amalgamation," etc., etc.
ROOM 14, 434 CALIFORNIA STREET,
SAN FRANCISCO, CAL.

CLARENCE HERSEY,
Assayer and Chemist,
(Established 1879.) LEADVILLE, COLO.
Gold, Silver and Lead..................$1.00.
Any two of above 75c; any one of above 50c.
Copper analysis................................$1.00.
Platinum, Nickel or Tin, each..............$5.00.
Twenty-one years successful experience in the mining metropolis of Colorado.
Write for mailing envelopes and price list.

ALMARIN B. PAUL, M. E.,
ROOM 27, CROCKER BUILDING, SAN FRANCISCO.
Will act as AGENT for the sale of RELIABLE Mining Property. SPECIAL AGENT FOR
MacArthur-Forrest Cyanide Process
for California north of and including Mono, Madera and Merced counties; also for State of Nevada. Will act as agent for Eastern parties owning mining interests in California.

F. H. HARVEY,
GALT, CAL.,
Mining and Metallurgical Work in All Branches.
Assays, Chemical Analysis of Ores and experiments on rebellious ores for treatment by cyanide or other processes. Surveys and reports upon mining properties.

L. W. TATUM. Consulting Mining Engineer and Metallurgist.
Genl. Mgr. Providencia Mining & Milling Co.,
DOLORES HIDALGO Gto. MEXICO.
Is prepared to examine mines and mills and undertake the supervision of mine development or milling operations, making visits at stated intervals as case may require, anywhere in Mexico.
High Class References. Codes: Bedford McNeill, Moreing & Neal, A. B. C. 4th Ed. and Liebers.

Simonds & Wainwright,
Mining Engineers,
Assayers and Chemists,
159 Front Street,
NEW YORK.

DAVIDGE & DAVIDGE, Attorneys and Counsellors at Law, Corcoran Building, Washington, D. C. Practice in the Supreme Court of the United States, the Court of Claims, the Courts of the District of Columbia, and the General Land Office. Western Union Code.

Geo. W. Schneider, E. M.,
Mining Engineer,
U. S. Deputy Mineral Surveyor.
Mineral Properties examined and reported on.
Central City, Colorado.

A. F. WUENSCH, M. E.
Inspection and Valuation of Mines.
Ref. D. H. Moffat, Pres. 1st Nat'l Bank, Denver.
827 Equitable Bldg..................Denver, Colo.

WM. VAN SLOOTEN,
Consulting Mining Engineer and Metallurgist.
Cable address: "Yadoplata."
35 WALL STREET........... ....NEW YORK, N. Y.

R. J. WALTER,
1452 Blake St., DENVER, COLO.
Mining Engineer and Metallurgist.
Reports on mining properties.
Assay office and chemical laboratory. Established in Colorado 1879.

SAM'L A. RANK,
MINING ENGINEER,
U. S. DEPUTY MINERAL SURVEYOR.
Mine Examinations and Reports.
514 Cooper Building,
DENVER ....COLORADO.

EDWARD L. HAFF,
MINING ENGINEER,
U. S. DEPUTY MINERAL SURVEYOR.
Mine Examinations and Reports.
National Annex Block,
P. O. Box 21. CRIPPLE CREEK, COLO.

FRANK C. MANDELL,
MINING ENGINEER,
U. S. Deputy Mineral Surveyor for Idaho and Oregon.
Mine Examinations, Surveys and Reports.
HAILEY, IDAHO.

COBB & HESSELMEYER,
Designing and Consulting
MECHANICAL AND HYDRAULIC
ENGINEERS.
421 Market St., Cor. First St.,
Telephone BLACK 3882....San Francisco, Cal.

School of Practical Mining, Civil,
Mechanical and Electrical Engineering.
Surveying, Architecture, Drawing, Assaying, Cyanide Process and Metallurgy.
933 Market St., S. F., Cal. OPEN ALL YEAR.
A. VAN DER NAILLEN, President
Assaying of Ores, $25; Bullion and Chlorination Assay, $25; Blowpipe Assay, $10. Full course of Assaying, $50. Established 1864.
☞ Send for Circular.

FRED H. BROWN,
Electrical Mining Expert.
Inventor of the Electro-Geodetic Mineral Locator. Patented March 20, 1900.

Will electrically survey mines and lands for mineral; furnish charts showing run of ore, extensions, pay streaks, and their approximate depth from surface.

References include scientific men, and miners for whom we have located rich mines.

Address, 1025 West 7th St.,
LOS ANGELES, CAL.

W. C. WYNKOOP, M. E.
Woodbury (Cochiti District),
New Mexico.
Economic Geology and Mine Examinations.

ERNEST H. SIMONDS,
Late Instructor in Assaying, University of California.
ASSAYS AND ANALYSES.
LABORATORY TESTS OF ORES.
Special Attention Given to the Instruction of Students.
521 Sacramento St., Cor. Leidesdorff, S. F., Cal.

MINERS' ASSAY OFFICE.
(JNO. HARRIGAN)
10 Stevenson Street, - San Francisco, Cal.
Telephone Clay 972.

Assaying, Analyses, Sampling, Grinding and Pulverizing of all kinds.

Practical Working Tests of Ore by all Processes. Mining Machinery Bought and Sold. Check Assays. Instructions given in Assaying. All Work Guaranteed. Mines Examined, Sampled and Reported on by M. P. BOAG, M. E. and Cyanide Expert.

LOUIS FALKENAU,
STATE ASSAY OFFICE,
434 California St., near Montgomery.

Analysis of Ores, Metals, Soils, Waters, Industrial Products, Foods, Medicines, etc., etc.

Court Experting in all branches of Chemical Technology. Working Tests of Ores and Investigation of Metallurgical and Manufacturing Processes. Consultations on all questions of applied chemistry. Instructions given in assaying and all branches of chemistry.

Samples by Mail or Express Will Receive Prompt Attention.
ALBERT I. GOODELL,
ASSAYER AND CHEMIST,
1430 Stout Street......................DENVER, COLO.

JAMES ANGUS SNEDAKER,
Mining Engineer,
721-722 Equitable Building, Denver, Colo., U. S. A.

J. W. RICHARDS,
(Late of Aspen, Colo.)
ASSAYER AND CHEMIST. 1754 Champa Street, DENVER, COLO.
Ore Shippers' Agent. Write for Terms.

Independent Assay Office.
ESTABLISHED 1888.
D. W. Reckhart, E. M., Proprietor.
Agent for Ore Shippers.
Assays and Chemical Analysis.
Mines Examined and Reported Upon.
BULLION WORK A SPECIALTY
P. O. Box 88. Office and Laboratory:
Cor. SAN FRANCISCO & CHIHUAHUA Sts.
EL PASO, TEXAS.

E. E. BURLINGAME & CO.,
ASSAY OFFICE AND CHEMICAL LABORATORY
Established in Colorado, 1866. Samples by mail or express will receive prompt and careful attention
Gold & Silver Bullion Refined, Melted and Assayed OR PURCHASED.
Concentration Tests—100 lbs. or car load lots. Write for terms.
1736-1738 Lawrence St., Denver, Colo.

RELIABLE ASSAYS.

Gold................	$ .50	Gold and Silver....	$ .75
Lead	.50	Gold, silver, copper	1 50

Samples by mail receive prompt attention.
Rich Ores and Bullion Bought.
OGDEN ASSAY CO.,
1429-16th St., Denver, Colo.

DEWEY, STRONG & CO.
SCIENTIFIC PRESS PATENTS PATENT AGENCY
330 MARKET ST. S.F.

CHAS. BUTTERS & CO., Limited.

E. S. LEAVER, Manager.

Ore Testing Works,
Chemical and Metallurgical Laboratory,
Assay Office,

DOOLY BLOCK, - SALT LAKE CITY, UTAH.

Telephone, MAIN 5104. —◆ESTABLISHED 1869.◆— A. H. WARD.
Cable Address, LUCKWARD.

C. A. LUCKHARDT CO.,

NEVADA METALLURGICAL WORKS,
71 & 73 STEVENSON STREET, - - - - SAN FRANCISCO, CAL.

Assaying, Analyses, Sampling.

PRACTICAL WORKING TESTS OF ORE BY ALL PROCESSES.
STAMP MILL AND CONCENTRATOR IN OPERATION ON PREMISES.

Thomas Price & Son,

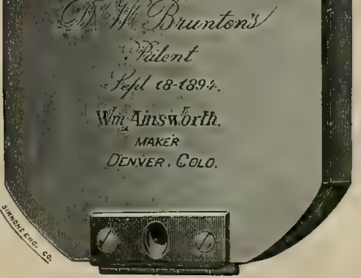
Assay Office, Sampling Works

And Chemical Laboratory.

526 Sacramento Street, San Francisco, Cal.

Brunton's Pat. Pocket Mine Transit.

1-3 ACTUAL SIZE.

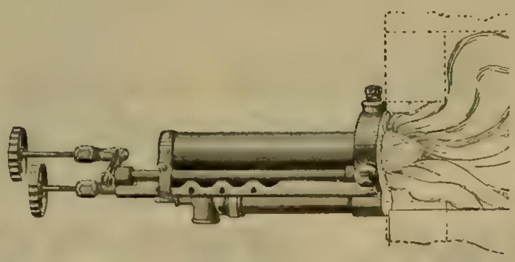


The engraving herewith illustrates Brunton's Pat. Pocket Mine Transit as it appears when folded ready for the pocket.

The working parts are enclosed by an aluminum case, the outside dimensions of which are but 2¾x2¾x1 inches and the total weight but 8 ounces.

There are over two hundred of the above instruments in daily use at the present time, and those using them unite in pronouncing them the most convenient, accurate and reliable pocket instruments on the market. Send for Catalogue B to

WM. AINSWORTH & SONS,
(Successors to WM. AINSWORTH.)
Denver, Colorado, U. S. A.



CARY HYDROCARBON BURNER.

CARY COMBINATION FURNACE.

TO ASSAYERS:

With the CARY BURNER AND COMBINATION FURNACE (PATENTED), shown above, it is possible to melt and cupel 144 assays in 12 hours with 5 gallons of gasoline.

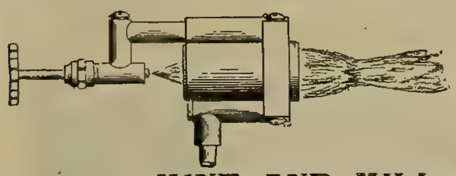
Gasoline is cheaper, quicker, cleaner and cooler to work with than any other fuel.

We make Blow Pipe Outfits in various sizes for use with these appliances. Write for a copy of our new catalogue, in which these and our other specialties are fully described.

F. W. BRAUN & CO.,
Manufacturers of Assayers' Appliances,
LOS ANGELES, CAL.

Taylor's Coal Oil and Gasoline Burner

(PATENTED)



A new heating burner for Assayers and Chemists, or for brazing, in which coal oil at 33 deg. to 45 deg., Beaume and 150 deg. fire test, or gasoline at 74 deg. test can be used for fuel. Adapted to crucible, muffle and brazing work. **Price $6.** For sale by

JOHN TAYLOR & CO.,
63 FIRST STREET,
SAN FRANCISCO, CAL.

MINE AND MILL SUPPLIES.
Importers and Manufacturers of Assayers' Materials, Chemicals and Acids, Etc.
CATALOGUE ON APPLICATION.

TRADE MARK.

CYANIDE PROCESS.

The MacArthur-Forrest Cyanide Process is the Best

For the Treatment of Refractory and Low Grade Gold and Silver Ores and Tailings. We are the Originators of the Cyanide Treatment, and have kept up with the times in all Improvements in Cyanide Methods.

Successful Plants in Operation in all Western Mining States.

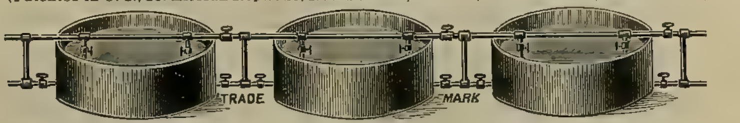
Samples Assayed and Fully Reported Upon. Properties Examined Designs Furnished. For Terms and Particulars, Address

The Gold and Silver Extraction Co. of America, Ltd.
GEO. A. ANDERSON, General Manager,
208-210 McPhee Building, Denver, Colo.

(M'ARTHUR-FORREST PROCESS.)
Testing Works: 1716 Blake Street, Denver, Colo.
ALMARIN B. PAUL, Agent, 27 Crocker Building, San Francisco, Cal.

"PNEUMATIC" CYANIDE PROCESS.

(Patented in U. S., So. African Republic, New Zealand, Victoria, New So. Wales, So. Australia.)



WILL DO IN 7 HOURS WHAT REQUIRES FROM 2 TO 6 DAYS BY OLDER METHODS.
SEND FOR PAMPHLET.
THE PNEUMATIC CYANIDE PROCESS CO., 306 Boston Bldg., Denver, Colo.

Are You Confronted With a Difficult Ore-Separating Problem?

THE WETHERILL MAGNETIC SEPARATING PROCESS

may prove the solution. Apply to Wetherill Separating Company, 52 Broadway, N. Y.

IMPROVED BONE ASH.

It is 100% better than Bone Ash now being used; will absorb more lead, will never crack or split in the Muffle, can be dropped before or after using without breaking. Cupels can be made and used at once; no drying required. Excessive heat has no effect on them. Will stand shipping any distance. It takes up none of the precious metals in cupeling. Cupels much quicker. Once used always used. Sold under a positive guarantee or money refunded. Now being used by all smelters and assayers who have tried it.

Price of Improved Bone Ash, $60.00 per ton; $3.50 per 100 lbs.; or manufactured Cupels, $1.50 per hundred.

CUMMINGS & SWEARS, Sole Mfrs.,
Telephone Clay 972. 10 STEVENSON ST., SAN FRANCISCO, CAL.

For Sale by Justinian Caire Co., Dealers in Assay Goods and Mining Supplies, 521-523 Market St.

PIONEER REDUCTION CO.

Established 1858. Nevada City, Cal.

Buyers of Gold, Silver and Copper Ores and Concentrates.

HIGHEST PRICES PAID FOR COPPER ORES.
WRITE FOR RATES.

ESTABLISHED 1866.

Controls and Check Assays

(A SPECIALTY.)

MARINER & HOSKINS,
ASSAYERS AND CHEMISTS,
Mining Engineers and Metallurgists.

81 South Clark Street.
Rooms 51-55,
CHICAGO, ILLINOIS.

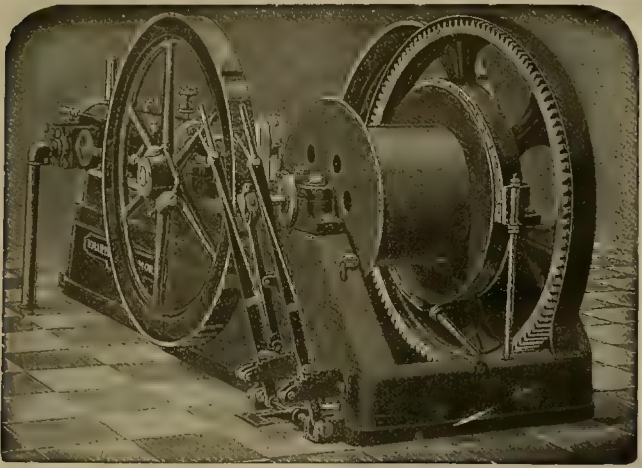
SEND SAMPLES BY MAIL OR EXPRESS.
MAILING SACKS ON APPLICATION. : :

ST. LOUIS SAMPLING & TESTING WORKS,

1225 and 1227 Spruce St.,
ST. LOUIS, MO.

The Largest and Most Complete Ore Testing Works in Existence for Making all Kinds of Practical Working Tests of Ore, etc., to Determine the Most Suitable Method of Treatment.

PLANT FOR COAL WASHING, COKING AND STEAMING TESTS OF FUELS. ASSAYS, ANALYSES, CHEMICAL AND PHYSICAL INVESTIGATIONS OF ALL KINDS. MINERAL PROPERTIES, MINES AND METALLURGICAL PROCESSES EXAMINED AND REPORTED UPON. CORRESPONDENCE SOLICITED.



FAIRBANKS-MORSE GASOLINE-DISTILLATE GEARED HOISTER.

An efficient and reliable combination of a Fairbanks-Morse Gasoline-Distillate Engine on the same base with a Friction Hoist. Modern and up to date. We publish a special catalogue describing our Hoister which we gladly mail prospective purchasers.

FAIRBANKS-MORSE GASOLINE-DISTILLATE ENGINES.

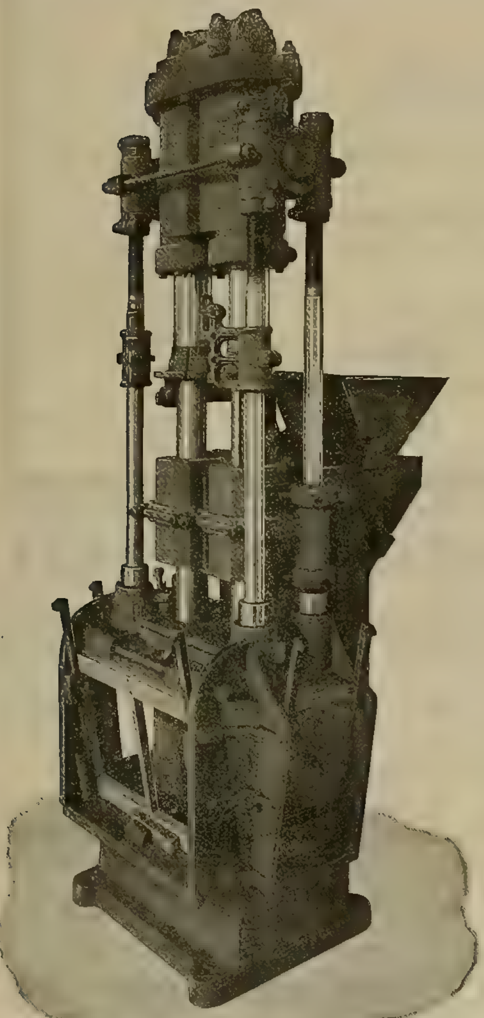
ALL SIZES UP TO AND INCLUDING 54 HORSE POWER.
For Pumping, Milling, Lighting, Air Compressors, Etc.

FOR CATALOGUES AND FULL INFORMATION, ADDRESS

FAIRBANKS, MORSE & CO.,

310 MARKET ST., SAN FRANCISCO, CAL.
201 N. LOS ANGELES ST., LOS ANGELES, CAL.
FIRST AND STARK STS. PORTLAND, OGN.
1600 SEVENTEENTH ST., DENVER, COL.
FRANKLIN AND MONROE STS., CHICAGO, ILL.

GATES IRON WORKS.



THE TREMAIN STEAM STAMP MILL

has made many fortunes for its owners. It costs but little money. Can be transported anywhere.

A Money Maker in Nicaragua.

MURRA GOLD MINING COMPANY, NICARAGUA, C. A.
NICARAGUA, June 20, 1899.

GATES IRON WORKS, CHICAGO.—GENTLEMEN:

After an experience covering a period of three years with both the first and improved "Tremain Steam Stamp Mill," in every particular I have found it perfection—a money maker, and just the thing for a small capital, while companies organized on a large scale would do well to look into its merits.

I find no difficulty in crushing eight tons of ore per day and running on hard ore. This mill should be a winner.

Very truly yours,

[SIGNED] L. W. ADAMS,
General Manager Murra Gold Mining Co.

Eight Years in Operation Without a Cent for Repairs.

GOLDEN P. O., JOSEPHINE CO., COLO., December 23, 1899.

GATES IRON WORKS, CHICAGO.—GENTLEMEN:

Our Tremain Mill is giving us good results, and although being in operation since 1892 has not cost us $1 for repairs, and to-day is making 180 drops per minute with 95 lbs. steam pressure.

The ore we are working at present is soft and we mill in 24 hours, using No. 10 slot screen, 15 tons.

Yours truly,

M. C. DAVIS,
Superintendent Sarah Belle Mines.

Running Under Compressed Air in West Australia.

293 ST. GEORGE'S TERRACE, PERTH, W. A., February 6, 1900.

F. R. PERROT, ESQ, AGENT OF GATES IRON WORKS, PERTH, WEST AUSTRALIA.

DEAR SIR: In reply to your enquiry as to the working of the Tremain Mill on the Burbanks Grand Junction, I would state that at the start we worked this from the boiler supplied by the Gates Iron Works Company, but owing to certain irregularities of the running, which were in a measure due to the intermittent supply of ore and the short time that we were able to run it per day, I finally laid on air piping from my air compressor, a quarter of a mile distant, and used the boiler as an air receiver, with the result that I got an absolutely constant run, which, I believe, averaged about 105 drops per minute, and this was kept up with great regularity and showed a much better return in the treatment of the ore. The usual air pressure in this case was 80 lbs., whereas under steam we were not so satisfied with the result as worked at 100 lbs. By this we were also saved in cost the charges of stoker, fuel and water, and it was worked with much greater cleanliness, and during the whole time the mill was running—which was several months—it never froze up on us or showed any signs of trouble in that direction.

The mill is now temporarily stopped, but when it is again started I shall most decidedly continue the use of compressed air.

Yours faithfully,

[SIGNED] GEO. HEWER.

Send for Catalogue No. 8.

San Francisco Agents:
AMERICAN M'F'R'S ASSOCIATION,
20 & 22 Fremont St.

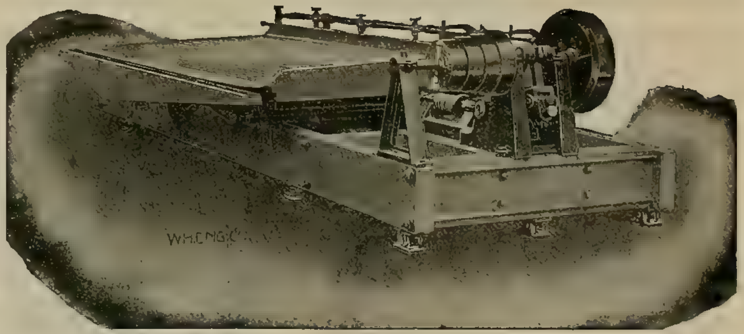
MAIN OFFICE AND WORKS:
650 ELSTON AVENUE,
CHICAGO.

THE : CAMMETT : CONCENTRATOR.

Designed with some Regard for the Laws of Concentration.

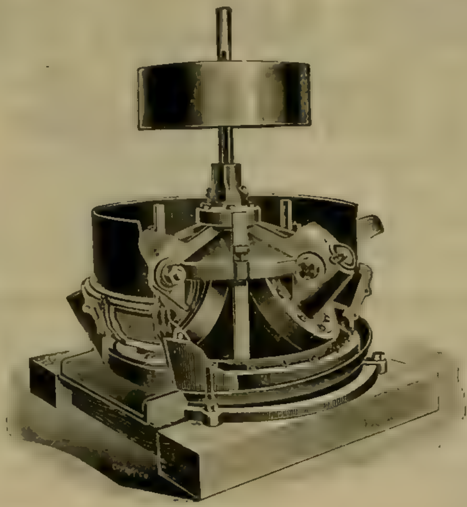
From **The Denver Evening Post,** March 2nd, 1900.

"Empire, Colo.: **The success achieved** by the **Cammett tables** in handling the ore from the Maud S. mine, **an ore especially difficult to concentrate** on account of the **great variety** of its **metallic contents,** has given the Bonaccord mill a reputation that will firmly establish it as a safe plant for general custom work."



Manufactured Under U. S. Patent No. 632,892; Dated Sept. 12, 1899.

Denver Engineering Works,---Shepard & Searing,---Sole Manufacturers,
30[illegible] Blake Streets, - - - - DENVER, COLORADO.



THE GRIFFIN
THREE ROLLER
ORE MILL.

The Griffin Three Roller Ore Mill is a simply constructed Mill, suitable for working all kinds of ores that require uniformly fine crushing by the wet process. This Mill is a modification of the well-known Chilian Mill, but the rollers run upon a crushing ring or die, which is inclined inwardly at an angle of about 30 degrees, the rollers themselves also being inclined to the central shaft of the Mill, thus utilizing the centrifugal force, as well as the weight of the rollers themselves as a crushing agent. The Griffin Three Roller Ore Mill is therefore a Mill of great strength, and has few wearing parts. We construct these Mills with extreme care, using only the best of raw materials, which are most carefully worked by men who are specialists as mill builders. We sell the Griffin Ore Mill on its determined merits, and will gladly supply full information regarding it to any one.

SEND FOR FREE ILLUSTRATED AND DESCRIPTIVE CATALOGUE TO

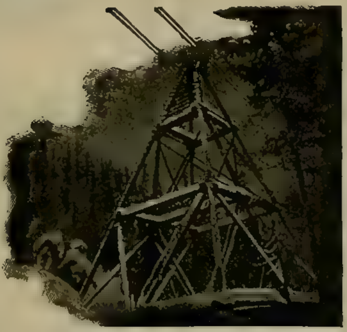
Bradley Pulverizer Co., Boston, Mass.

THE MINE AND SMELTER SUPPLY CO.,
DENVER, - - COLORADO.
Mining and Milling Machinery and Supplies.

We beg to call your attention to

THE FINLAYSON PATENT WIRE ROPE TRAMWAY—

the latest and best system of double-rope automatic aerial tramway in the market. If interested in the most economical system of transporting ores from mine to mill and to shipping stations, send for our special tramway catalogue.



We carry a complete stock of Machinery and Supplies for immediate delivery.

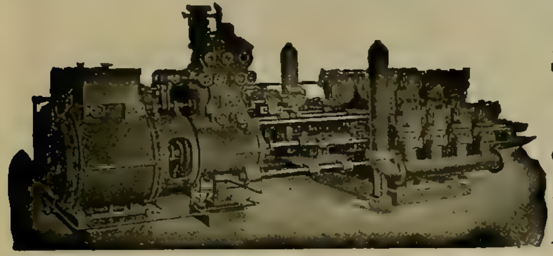
Send for our special catalogues on Mining Machinery, Milling Machinery, Wilfley Concentrators, Tramways, Power Transmission Machinery, Machine Tools, Etc.

THE MINE AND SMELTER SUPPLY CO.,....................Denver, Colorado
THE MINE AND SMELTER SUPPLY CO.,................Salt Lake City, Utah
THE MEXICO MINE AND SMELTER SUPPLY CO.,
No. 16 San Francisco St., City of Mexico.

BOILERS, ENGINES, STEAM HOISTERS, ELECTRIC HOISTERS, ROLLS, CRUSHERS, WILFLEY TABLES, CARS, CAGES, ORE BUCKETS, RAIL, PIPE, FITTINGS, BELTING, ETC., ETC.

The Best MINE PUMPS in the World.
COMPOUND CONDENSING AND TRIPLE EXPANSION STATION PUMPS.

We carry in our Denver store a stock of Improved Pattern Sinkers and Duplex Station Pumps, with duplicate parts for repairs.



Write for Catalogue and Estimates.

Jeanesville Iron Works Co.,
JEANESVILLE, PA.

Western Office,
Columbia Hotel Building,
1328 17th St.
Denver, Colo.
Telephone 2298 A.
A. MIDDLEBROOK, Manager.

SECOND-HAND MACHINERY

SPECIALTIES:
PULLEYS, SHAFTING,
BELTING, BOXES,
BOILERS, ENGINES,
HOISTERS,
STAMP MILLS,
RAILS, CABLE,
and all but little used.

THE S. S. MACHINERY CO.,
Sixth and Market Sts.,
Denver, Colo.

Write or Ask for Descriptive Circulars.

MACHINERY BARGAINS.

I have some splendid Air Compressors, Hoisting Engines, Rock Drills, Rock Crushers, Channeling Machines, Steam Pumps, Boilers, Steam Shovels, Locomotives and Relaying Rails, all in splendid condition. Send for printed list and specify your requirements. I can save you money. WILLIS SHAW, 627 New York Life Building, CHICAGO.

STRICTLY **C. P. ACIDS** and **C. P. AMMONIA**

MANUFACTURED BY
The Western Chemical Co.,
DENVER, COLO.
For Laboratory Use and Fine Chemical Work
PURITY GUARANTEED.
Also COMMERCIAL ACIDS.

THE MARION STEAM SHOVEL CO.,

Steam Shovels Dredges and Traction Dredges

Suitable for all kinds of Excavating Work, making a specialty of

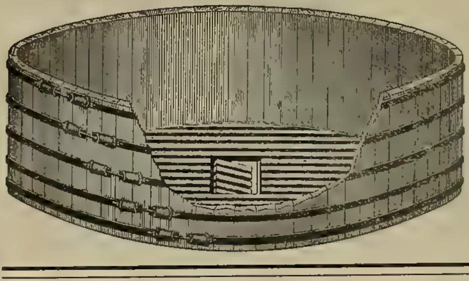
PLACER MINING MACHINES,

separate or self-contained, either as a dry land excavator or floating dredge.

The Marion Steam Shovel Co.
MARION, OHIO.

GEO. W. BARNHART, No. 4 Sutter St., San Francisco, Cal.

FOR CYANIDE PLANTS OR MINING— TANKS
OF ANY DESCRIPTION.



Write to
PACIFIC TANK CO.,
348 E. 2nd Street, Los Angeles.
35 Beale Street, San Francisco.
Illustrated Catalogue Mailed Free.

CARY SPRING WORKS,
240 & 242 WEST 29th STREET, NEW YORK, U. S. A.

Telephone, 3346—38th St.

WIRE SPRINGS
OF EVERY DESCRIPTION.

MANUFACTURERS OF
All kinds of ROUND AND FLAT WIRE, TEMPERED AND UNTEMPERED.
SPRINGS
For Machinery, Rolling Shutters, Motors Etc.

MUSIC BOX AND FINE SPRINGS OUR SPECIALTY.

Founded by Mathew Carey, 1785.

HENRY CAREY BAIRD & CO.,
NDUSTRIAL PUBLISHERS, BOOKSELLERS & IMPORTERS,
810 Walnut St., Philadelphia, Pa., U. S. A.

☞ *Our New and Revised Catalogue of Practical and Scientific Books, 92 pages, 8vo; a Catalogue of Books on Steam and the Steam Engine, Machinery, etc.; a Catalogue of Books on Sanitary Science, Gas Fitting, Plumbing, etc., and our other Catalogues and Circulars, the whole covering every branch of Science applied to the Arts, sent free and free of postage to any one in any part of the world who will furnish his address.*

ASSESSMENT NOTICES.

MAMMOTH GARFIELD GOLD MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Shasta County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 5th day of June, 1900, an assessment of seventeen and one-half (17½) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Rooms 54 and 59, No. 120 Sutter St., San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 4th day of August, 1900, will be delinquent and advertised for sale at public auction; and unless payment be made before, will be sold on TUESDAY, the 2nd day of October, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

SAM W. CHEYNEY, Secretary.

Office—Rooms 54 and 59, No. 120 Sutter St., San Francisco, California.

NATIONAL CONS. MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Rich Gulch, Shasta County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 4th day of June, 1900, an assessment (No. 12) of five cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, 773 Mission St., San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 9th day of July, 1900, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on WEDNESDAY, the 1st day of August, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

GEO. W. FLEISSNER, Secretary.

Office—773 Mission St., San Francisco, California.

DELINQUENT SALE NOTICE.

MAY DAY GOLD AND SILVER MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Calaveras County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 4) levied on the 19th day of April, 1900, the several amounts set opposite the names of the respective shareholders, as follows:

Name.	No. Cert.	No. Shares.	Amt.
J. P. E. Heintz	156	1.000	$100 00
Wm. A. Junker	71	500	50 00
Annie D. Weeks	133	500	50 00
C. G. Von Treutler	127	400	40 00
Duncan S Hayne	157	1,000	100 00
A. Feist	165	1,250	125 00
George Schoenwald	131	100	10 00
Thos. A. De Lay, Trustee	88	6,000	600 00

And in accordance with law, and an order from the Board of Directors, made on the 19th day of April, 1900, so many shares of each parcel of such stock as may be necessary, will be sold at public auction, at the office of the company, Heald's Business College, 24 Post street, San Francisco, California, on WEDNESDAY, the 25th day of July, 1900, at the hour of 1 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

E. P. HEALD, Secretary.

Office—Heald's Business College, 24 Post street. San Francisco, California.

DELINQUENT SALE NOTICE.

ARRASTRAVILLE MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Tuolumne County, California.

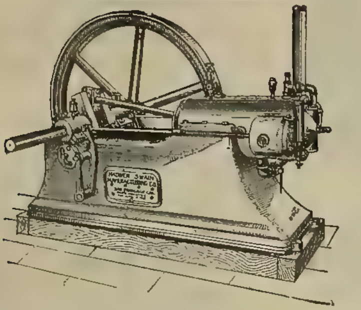
Notice.—There are delinquent upon the following described stock, on account of assessment (No. 5) levied on the 8th day of May, 1900, the several amounts set opposite the names of the respective shareholders, as follows:

Name.	No. Cert.	No. Shares.	Amt.
Richard Rising	409	1,000	$100 00
W. H. Langford	628	500	50 00
Inman Sealby	614	2,900	290 00
Reese Llewellyn	414	200	20 00

And in accordance with law, and an order from the Board of Directors, made on the 8th day of May, 1900, so many shares of each parcel of such stock as may be necessary, will be sold at public auction at the office of the company, 213 Jackson street, San Francisco, California, on WEDNESDAY, the 11th day of July, 1900, at the hour of 2 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

J. MIDDLETON, Secretary.

Office—213 Jackson street, San Francisco, Cal.



Distillate Engines and Hoists.
Air Compressors.
HADWEN SWAIN MFG. CO.,
215-217 SPEAR ST., SAN FRANCISCO, CAL.
CATALOGUES MAILED.

STEAD'S
Boiler
Scale
Solvent.

This Solvent is the most valuable article known for preserving and keeping Steam Boilers in good condition.

PREVENTS AND REMOVES SCALE.
SAVES FUEL, TIME AND LABOR

It dissolves the Scale into a precipitate, which should be blown out often. It is perfectly harmless. Steam can be used for cooking. Try it and you will not be without it—you'll use nothing else.

☞ **Write to-day for prices, directions and testimonials.**

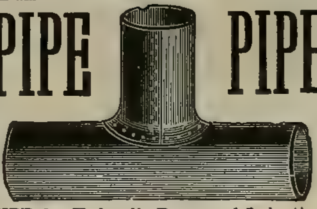
MANUFACTURED ONLY BY
STEAD CHEMICAL COMPANY,
SAN DIEGO, - CALIFORNIA.

THE LITTLE ALASKA GOLD WASHER.

Price $6. **Saves the Gold.** *Weighs only* **7 1-2 Lbs.**

After several years' practical use in different fields, our washer has established its superiority over all placer or beach washers. It is just the washer for Cape Nome; it was used extensively in Alaska last year with every success. In working the operator does not have to wet his hands and can stand in an upright natural position. It is just the washer for the poor man who has not the money to put in expensive machinery. It will do the work of ten men with gold pans. It is just the washer for the prospector, being light and easy to pack. Don't fail to write us if in need of a washer; we can save you *time, labor* and *money.* RUSSELL & KINSEY, 1237 Magnolia Ave., Los Angeles, Cal.

PIPE **PIPE**



PIPE for Hydraulic Power and Irrigation.
OIL STORAGE TANKS.
GENERAL SHEET IRON WORK.
Lacy Manufacturing Co.,
LOS ANGELES.

THE MINES OF
Eastern Oregon
Which are now attracting so much attention are reached only by the lines of the
OREGON RAILROAD & NAVIGATION CO.
For Descriptive Pamphlets, Through Rates, Etc., Address
E. C. WARD, Gen. Agt.,
630 Market Street, San Francisco.

COLORADO'S GOLD

Output for 1899 is unequaled by any State in the Union. Cripple Creek, Leadville, and all the important mining towns are reached by

THE COLORADO & SOUTHERN RY...

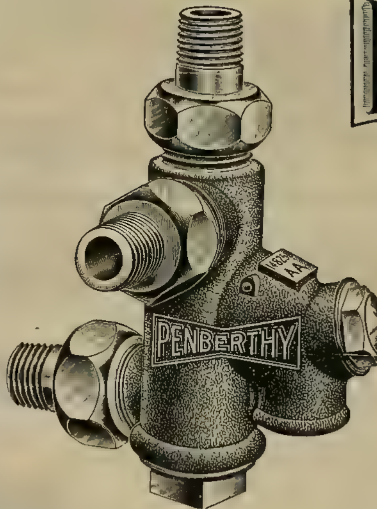
For copies of our publications on the Swandyke and Pine Creek Gold Districts, or our pamphlet "Hints to Prospectors," address

T. E. FISHER, GEN. PASS. AGT.,
DENVER, COLO.

10,000 Boiler Feed Waters Are Being Treated by Dearborn Methods.

Send us a jug of your feed water for analysis and let us prepare you a compound to suit.

DEARBORN DRUG & CHEMICAL WORKS,
Manufacturing and Analytical Chemists. Makers of Boiler Compounds.
29, 30, 31, 32 and 33 Rialto Bldg. - - - CHICAGO, ILL.



TRADE **PENBERTHY** MARK.

AUTOMATIC INJECTOR.

14 Years in the Market.
SALES 200,000.

The result of a business established on
MERIT
and built up by the production of Injectors unequaled for
SIMPLICITY, RELIABILITY AND ECONOMY.

Penberthy Injector Co.,
DETROIT, MICH.

THE COLORADO IRON WORKS CO.,
DENVER, COLORADO.
Manufacturers of HIGH CLASS
Ore Milling Equipments.

WE ARE THE ORIGINATORS
—OF THE—
Narrow Face, Large Diameter, High Speed
CRUSHING ROLLS.

ANY BOOK

ON ANY SUBJECT Connected with Mining, Metallurgical, Mechanical or Industrial Interests,

WILL BE SENT ANYWHERE, POSTPAID,

AT PUBLISHER'S PRICES.

SEND FOR CATALOGUE OF LINE DESIRED.

ADDRESS BOOK DEPT. MINING AND SCIENTIFIC PRESS,
NO. 330 MARKET STREET, SAN FRANCISCO, CAL.

Most reliable for controlling steam and other fluids. Can be reground, if necessary, while valve is inposition on steam pipe.

—MADE BY—

The Wm. Powell Co.,

CINCINNATI, O.

Carried in stock by Miller, Sloss & Scott, San Francisco.

■●■●■●■●■●■●■

PATENTS

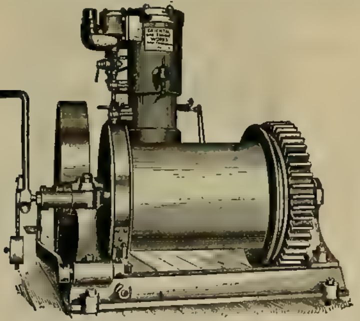
■●■●■●■●■●■●■

Our U. S. and Foreign Patent Agency presents many and important advantages as a Home Agency over all others, by reason of long establishment, great experience, thorough system, intimate acquaintance with the subjects of inventions in our own community, and our most extensive law and reference library, containing official American reports, with full copies of U. S. Patents since 1872. All worthy inventions patented through DEWEY, STRONG & CO.'s Patent Agency will have the benefit of a description in the *Mining and Scientific Press.* We transact every branch of patent business, and obtain patents in all countries which grant protection to inventors. The large majority of U. S. and foreign patents issued to inventors on the Pacific. Coast have been obtained through our agency. We can give the best and *most reliable* advice as to the patentability of new inventions. Our prices are as low as any first-class agencies in the Eastern States, while our advantages for Pacific Coast inventors are far superior. Advice and circulars free.

DEWEY, STRONG & CO.,

PATENT AGENTS,

330 Market Street, San Francisco, Cal.



This cut illustrates our 4 H. P. to 8 H. P. **HOISTING PLANT.**

Larger sizes built to suit the demands of our customers.

It is strong and exceedingly simple and durable, being entirely under the control of the operator, by the use of a single hand lever for hoisting, while the lowering is governed by a foot lever and brake.

No better device has been designed for this purpose. For prices and further information address the builders.

Oriental Gas Engine Co., 227 Folsom St., S. F.

LARGE VARIETY.

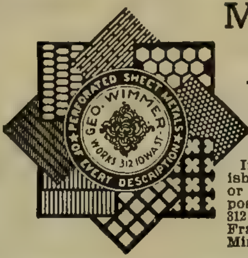
Perforated Metal

THE ROBERT AITCHISON PERFORATED METAL C°
303-305 DEARBORN ST. CHICAGO ILLS.

SUPERIOR WORK.

QUARTZ SCREENS

A specialty. Round, slot or burred slot holes. Genuine Russia Iron, Homogeneous Steel, Cast Steel or American planished Iron, Zinc, Copper or Brass Screens for all purposes. CALIFORNIA PERFORATING SCREEN CO., 145 and 147 Beale St., S. F



Mining Screens

A SPECIALTY.

Diagonal Slot,
Straight "
Burred "
Round Holes.

In American planished or Russian iron or steel for all purposes. GEO. WIMMER, 312 Iowa Street, San Francisco. Telephone Mint 1332.

—EASTERN PRICES BEATEN.—

SAN FRANCISCO Pioneer Screen Works,

JOHN W. QUICK, Prop.

Improved Facilities! Finest Work! Lowest Prices!

Perforated Sheet Metals, Steel, Russia Iron, American Planish, Zinc, Copper and Brass Screens for All Uses.

MINING SCREENS A SPECIALTY.

221 and 223 First Street, San Francisco, Cal.

For Best Satisfaction and Lowest Prices

—IN—

PERFORATED METALS

—AND—

MINING SCREENS

PLACE YOUR ORDERS WITH

Fraser & Chalmers,

CHICAGO, ILL., U. S. A.

SEND FOR SAMPLES, MENTIONING THIS PAPER.

Mining, Mill, Driving Lamps

—AND—

Locomotive Headlights.

◆◆◆◆◆◆

SIZES ON HAND:

24-inch,
20 "
17 "
14 "
12 "
10 "
8 "
6 "

Boesch Lamp Co.,

Pacific Lamp and Reflector Factory,

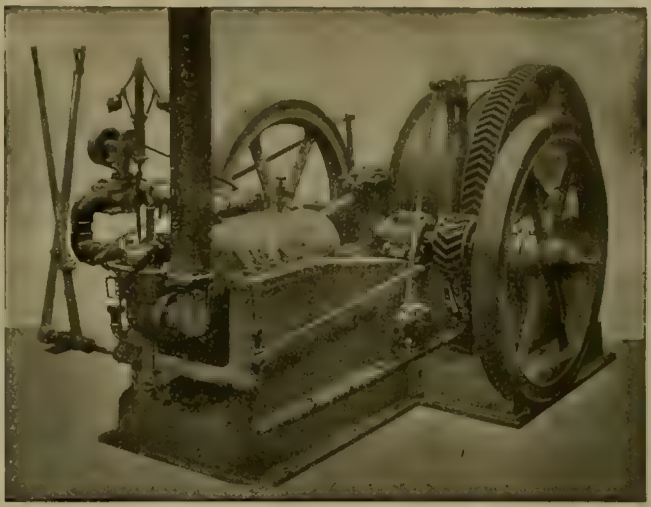
585 MISSION STREET, : : : : : SAN FRANCISCO.

INVENTORS, Take Notice!

L. PETERSON, MODEL MAKER,

544A MISSION STREET, bet. First and Second Sts., SAN FRANCISCO. Experimental machinery and all kinds of models. Tin and brasswork. All communications *strictly confidential.*

HERCULES HOISTS Are Sold the World Over.



Hercules Gasoline Hoist--Speed 385 Ft.; Load 2500 Lbs.

HERCULES GAS ENGINE WORKS,............141-143 FIRST STREET, SAN FRANCISCO, CAL.

DON'T SAVE PENNIES AND WASTE DOLLARS

in the purchase of a Gasoline and Oil Engine and Hoist. Buy the best—the Weber—and get results. Full particulars on request.

WEBER GAS & GASOLINE ENGINE CO.,

430 S. W. Boulevard,
Kansas City, Mo.

The Lunkenheimer Regrinding Valves

made of gun metal, are unsurpassed where thorough, reliable service is the first requirement. In screw and flange ends for medium (175 lbs.) and extra heavy (350 lbs.) working pressures, ⅛ to 4 inches. A trial order demonstrates their fitness and invariably results in their adoption. Have you need for such valves? If so, specify them.

Our catalog will acquaint you with our entire line of superior brass and iron specialties for Steam, Water, Oils, Gas, Air, etc. Write for one. "Lunkenheimer" specialties are carried in stock by dealers everywhere.

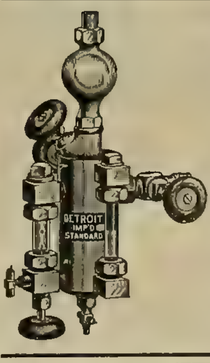
THE LUNKENHEIMER CO.

General Offices and Factories:

CINCINNATI, - - - U. S. A.

BRANCHES:

NEW YORK..26 Cortlandt Street
PHILADELPHIA....................................Bourse Building
LONDON, S. E.....................................35 Gt. Dover Street
MEXICO CITY....................Puente de San Francisco No. 6



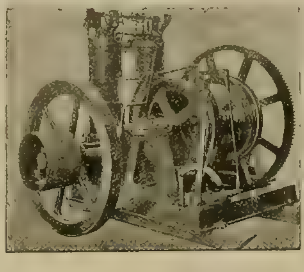
ALL ABOUT

Sight Feed Lubricators.

Our new catalogue for 1900 is ready for distribution. It explains in detail the principles governing the operation of **Sight Feed Lubricators,** using sectional view to show the internal construction, and containing cuts of the different styles in parts before being assembled into the complete lubricators, thus enabling every one to understand their construction and operation thoroughly.

In addition it shows our full line of **Glass Oilers, Oil Pumps, Oiling Devices, Multiple Oilers, Valves, Etc.** It will be sent to any address on application.

DETROIT LUBRICATOR CO., DETROIT, MICH.



Mining Hoist.

THE GOLDEN GATE GAS ENGINE

Will raise more ore than any other **AT LESS COST.**

MANY IN USE, Giving Satisfaction.

Built for any Capacity and for any Purpose.

Pumping Water, Propelling Boats, Hoisting Ore, Machine Shop Power, Etc.

Send for Particulars and Catalogue.

ADAM SCHILLING & SONS,

213 & 215 Main St., San Francisco, Cal.

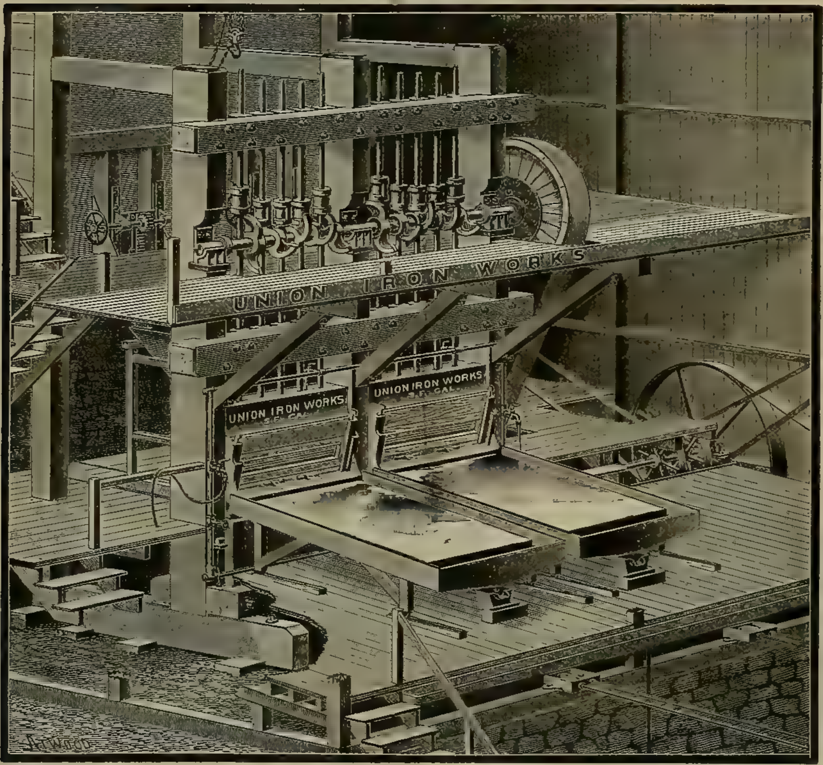
CALIFORNIA STATE

UNION IRON WORKS,

222 Market Street, San Francisco, Cal.

BUILD THIS

MODERN TEN-STAMP BATTERY.



Copyrighted.

The illustration shows the details of a modern 10-stamp battery of the back-knee type, driven by belt and tightener from a shaft located upon the battery frame sills below the mortars and plainly illustrates not only the battery and its various parts, but also shows the ore-bin gate, feeders, copper apron plates and water piping, all in their relative positions.

SEND FOR CATALOGUE No. 5.

THE HALLIDIE ROPEWAY

For Transporting Ore, Fuel, Earth, Sugar Cane, etc., by Wire Ropes.

SIMPLE, ECONOMICAL, PRACTICAL, DURABLE.

LOADS MECHANICALLY. DUMPS AUTOMATICALLY.

WIRE TRAMWAYS (Single and Double Rope Systems),

Cableways, Transmission by Wire Ropes,
Incline Planes, Cable Grips,
Logging by Cables, Automatic Loaders,

PLOWING, SCRAPING AND TRANSPORTING by Wire Ropes,

DESIGNED, SUPPLIED AND ERECTED. Estimates Furnished.

Improved GRIP PULLEY.

Patents Nos. 483,442; 610,353.

EFFECTIVE, SIMPLE, AUTOMATIC.

Saves Wear on Wire Rope and Cable.

Send for Illustrated Pamphlet.
Correspondence Solicited.

CALIFORNIA WIRE WORKS, - 9 Fremont St., San Francisco, Cal.

TRIPLE DISCHARGE

Two and Three Stamp Mills.

HOISTING AND PUMPING,
MINING, MILLING AND SMELTING
MACHINERY.

Sole Manufacturer Dodge Mining Machinery,

Including Pulverizers, Wet and Dry Jigs, Amalgamators,
Distributor and Sizing Boxes, Rock Breakers.

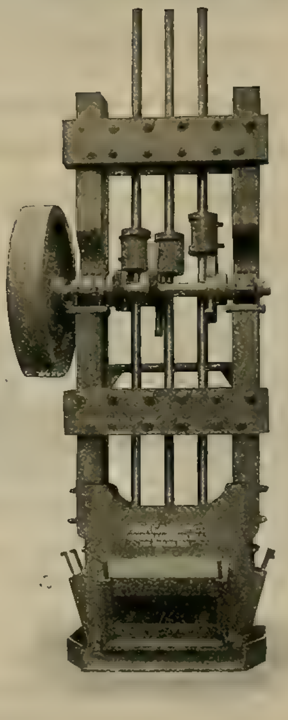
We Carry in Stock: Horizontal, Vertical and Portable Engines and Boilers, Rock Breakers, Cornish Rolls, Pulverizers, Concentrators, Ore Feeders, Hoisting Engines, Horse Power Hoisting Whims, Water Wheels, Steam Pumps, Ore Cars, Wire Rope, Ore Buckets, Water Buckets, Skips, Blowers and Exhaust Fans, Shafting and Pulleys, Belting, Oils and Mine Supplies.

PARKE & LACY CO.,
21 & 23 Fremont St., San Francisco, Cal.

AGENT FOR

KNOWLES PUMPS AND PULSOMETER PUMPS, BULLOCK DIAMOND DRILLS,
INGERSOLL-SERGEANT ROCK DRILLS AND AIR COMPRESSORS.

CATALOGUES FREE ON APPLICATION.



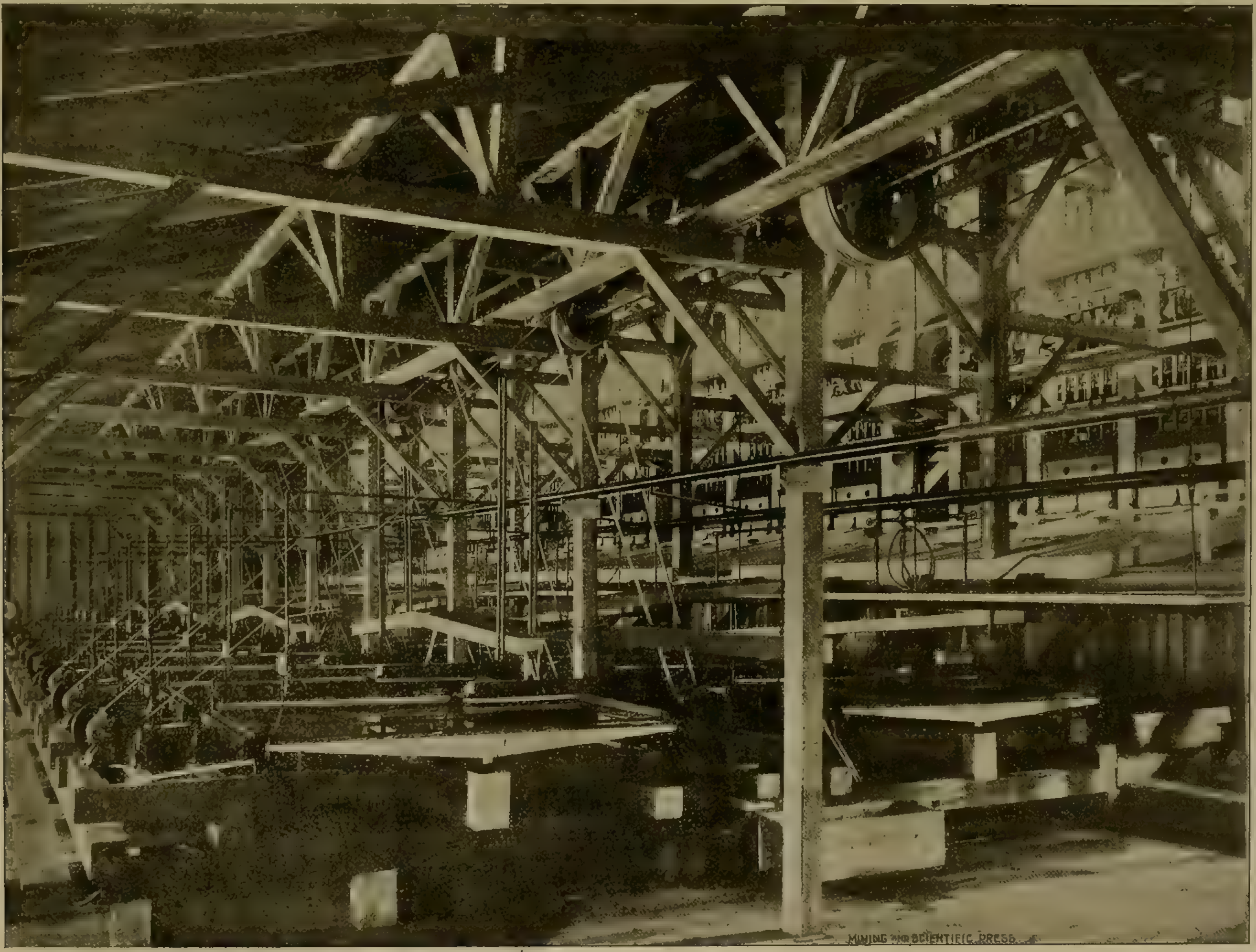
This paper not
to be taken from
the Library.

MINING AND SCIENTIFIC PRESS.
AND PACIFIC ELECTRICAL REVIEW.

No. 2086.—VOLUME LXXXI. Number 2. SAN FRANCISCO, SATURDAY, JULY 14, 1900. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

High Explosives.

In the three preceding issues of this paper have appeared technical articles on dynamites and their manufacture, details of the make-up and method of application of the principal high explosives in present use. In the current number of the International Monthly appears an article on the same general subject by Capt. E. L. Zalinski, whose "dynamite gun" attracted some attention two years ago in the American squadron's practice off the Cuban coast. A condensation of Capt. Zalinski's article may serve as a fitting conclusion to what has already appeared herein concerning this subject.



Interior View of the 80-Stamp Mill at the Boston & Denver M. & M. Co., Blackhawk, Colorado.—(See page 42).

He considers that the touchstone of experience has eliminated from practical use most of the explosives which have recently been presented in such large numbers, there being now left, as the chief explosives in use, nitro-glycerine, gun cotton, dynamites consisting of nitro-glycerine combined in various proportions with various bases; blasting gelatine; explosive gelatines and gelatine dynamites consisting of various combinations of nitro-glycerine and gun cotton, with a mixture of saltpetre, cellulose and soda. Besides these are the Sprengel group of explosives. This consists of two practically inert substances, which, upon being mixed, produce powerful explosives. One of these substances is usually a hydrocarbon. An almost infinite variety of explosives of this class has been produced. Whenever an announcement is made of a new high explosive, insensitive and powerful, with secret ingredients, one is likely to be correct in the assumption that it is of the Sprengel group. Among the better known of these are:

Rack-a-rock—Chlorate of potash and a liquid hydrocarbon (dead oil). Two hundred and fifty thousand pounds of this explosive were used in blasting out Hell Gate. Bellite—ammonium nitrate, nitro-benzole and saltpetre. Roburite—ammonium nitrate with chlorinated di-nitro benzole. Hellofite—naphthalene, phenol or benzine in fuming nitric acid. Securite—meta di-nitro benzole with nitrate of ammonia or saltpetre.

The composition of a sufficient number of this class of explosives has been given, to indicate the variety of constituents which can be used in making high explosives of this group. They are all insensitive and require a very powerful initial explosion to educe their full power. Those having nitrate of ammonium are likely to be objectionable and not of advantage in submarine work and places where water is present, owing to the hygroscopic quality of that salt, which tends to deliquesce, unless well protected from moisture. Two recent explosives, of secret composition, which have been much vaunted, marsite and thorite, probably belong to this class. It is thought that the latter may be usefully employed for the torpedo shell, but it is as yet a question whether it can be completely exploded when in large charges, so as to give an explosion of the first order.

In the opinion of Capt. Zalinski the picric acid class of explosives deserves attention, more because of public notoriety than of intrinsic merit. Among these are melinite, for which the French have claimed so much, and lyddite, used by the English in the South African war. These are both essentially the same, consisting chiefly of picric acid combined with nitro-cellulose, and in some cases with cresilite.

The relative power of explosives is difficult to estimate, and authorities differ regarding it, for there is a notable difference in the results obtainable, depending on the physical conditions attendant upon the placement of the explosive and the means and method of the initial explosion. Some confinement or tamping is essential; the difference in the results secured between an explosion in the open and when covered, however slightly, is very great, and should be borne in mind by those using explosives for industrial purposes. The same amount or degree of tamping is not as necessary for the high explosives as for gunpowder, and much needless and dangerous work might be avoided if due consideration were given to this point of difference. According to the best authorities, the following table is given as showing the relative force of the various high explosives, submarine work excepted, gunpowder being taken as one:

Gunpowder, 1; dynamite No. 1, 10; gun cotton 5.5; bellite (Sprengel), 6; nitro-glycerine, 12; roburite (Sprengel), 3; explosive gelatine, 14; melinite, 3; blasting gelatine, 16; lyddite, 3.

MINING AND SCIENTIFIC PRESS.

ESTABLISHED 1860.

Published Every Saturday at 330 Market St., San Francisco, Cal.

ANNUAL SUBSCRIPTION:
United States, Mexico and Canada........$3 00
All Other Countries in the Postal Union........4 00

Entered at the S. F. Postoffice as second-class mail matter.

J. F. HALLORAN........Publisher.

Special Representatives:

EASTERN.
E. H. HAVEN........150 Nassau St., New York City.
MIDDLE WEST.
CHAS. D. SPALDING........153 La Salle St., Chicago, Ill.
INTER-MOUNTAIN.
W. A. SCOTT........43 Jacobson Building, Denver, Colo.
SOUTHERN CALIFORNIA.
W. D. CURTIS........223 W. Second St., Los Angeles, Cal.

San Francisco, July 14, 1900.

TABLE OF CONTENTS.

ILLUSTRATIONS.—Interior View of the 80-Stamp Mill at the Boston & Denver M. & M. Co., Blackhawk, Colorado, 33. Volcanic Vent in Granite, at Victor, Cripple Creek, 37. Latest Mining and Metallurgical Patents, 38. Clean-Up Pan and Whin; Sturtevant Roll Jaw Crusher, 39. Hoist at Cook Mine, Blackhawk, Gilpin County, Colo.; Interior Shaft House, Cook Mine, Blackhawk, Gilpin County, Colo., 40.

EDITORIAL.—The Telephone in Business; An Advance in Silver; Heartily Appreciated; Miscellaneous, 34.

MINING SUMMARY.—41-42-43.

LATEST MARKET REPORTS.—44.

MISCELLANEOUS.—High Explosives, 33. Concentrates, 35. The Cripple Creek Volcano, 36. The Factors in Concentration, 37. Latest Mining and Metallurgical Patents, 38. Born Before the Flood; Clean-Up Pan and Amalgam Safe; Quartzite and Whin; A Three-Candle Power Incandescent Lamp; Sturtevant Roll Jaw Crusher; Concentration of Ores by Petroleum; Central California Electric Co., 40. Personal; List of U. S. Patents for Pacific Coast Inventors; Notices of Recent Patents; Books Received; Recently Declared Mining Dividends; Commercial Paragraphs, 43-44.

PRESENT CONDITIONS in the Witwatersrand, South Africa, mining district illustrate forcibly the advantage of a mining investment as a permanent proposition. Though the storm of war has swept the surface of the Rand the mines themselves are intact. The value of the ore therein can not be destroyed by fire or water, nor any destruction wreaked by revenge. Of no other industry can this be said. Any other form of industrial life would have been annihilated by the warfare of the past few months there; but in sixty days after the cessation of hostilities the Johannesburg mines will be turning out gold profitably as heretofore. Nor is there any depreciation in the price of the product in the markets of the world, nor do the producers have to seek customers, for coined or in bullion the refined product is worth $20.67 per ounce the world over. Of no other industry can these things be truthfully said.

◆

IT was noted herein some months ago that while in the nature of the case mining precluded the formation of "trusts" in their present meaning, yet the tendency in mine management is to follow the example of the trusts in observance of the intents and purposes that characterized their initial movements, viz: consolidation, because of economy of operation. Since then several mines in Cripple Creek district, Colo., the Mercur and Golden Gate properties in Utah, two in South Dakota and two in Idaho have consolidated with economic intent, and now from southern Nevada is report of similar negotiations by the April Fool and DeLamar. Such is the tendency of the times. In connection therewith it is to be noted that in such consolidation lies partial solution of the problems of "apexes" and "extralateral rights." It were vastly easier for two contiguous properties to consolidate than to fight over incursions into each other's property, besides the saving occasioned by such action.

◆

SENSATIONAL "scientific" announcements in Sunday papers and popular magazines serve a good purpose as light summer reading, but are not to be taken seriously. N. Tesla is usually good for a column of alleged statement of fact, his latest being announcement that aluminum will so supersede copper as to render the red metal of secondary value. P. Metchnikoff, of the Pasteur Institute, is credited with discovery of "a series of lymphs," which, properly introduced into the human body, will "check decay and indefinitely prolong life." M. Metchnikoff naturally denies and dislikes such statement, modestly saying that he is "a scientist and not a charlatan," that he is studying certain forms of disease from decay, and hopes later on to have some results of possible value, which is about what a true scientist would say. Men who really do something—Bessemer, Thompson, Edison and such as they—first made sure that what they gave out was accurate, and never indulged in fanciful prophecies in flash journals, nor announced what they were "going" to do.

The Telephone in Business.

Recent mention of the Western Union Telegraph Co.'s intent to apply twenty million dollars to active competition in long distance telephone service illustrates how that device is entering into intimate commercial life, and how it is eating into the business of the telegraph company. It is equally noticeable how telephony has cut into the business of the railroads. Railway managers say that since the introduction of long distance telephone systems travel is much lighter. This is evident. It is vastly easier for a San Francisco man to talk to a Los Angeles correspondent, or a Chicago man to a New York resident, than to travel between the two cities, and to all intents and purposes a talk over a long distance telephone has all the practical points of a private, personal interview at much less cost and with equally satisfactory results.

The great advantage of the telephone over any other means of communication is that one is in direct communication with his correspondent, that his message is replied to on the spot, that there can be no reason for mistakes, no misunderstanding of the message; that each party to the interview knows at once what the other says, clearly and fully, and that without leaving one's own home or office he can have all the advantage of an immediate personal talk without the expense or annoyance of travel or the delay incidental to letters or even telegrams. Great as is the increase in the telephone service it is probable that it will extend still more; for despite its drawbacks and incidental annoyance, its advantages so outweigh those that it is universally recognized as an economical business proposition. More especially does it cater to the wants and tastes of the American people who always would fain do two days' work in one and compress the affairs of a day into an hour. This is the great claim of the telephone, that it makes it possible to do in one minute what before took an hour; or in five minutes what used to require an entire day. It enlarges the volume of business, shortens the time, and lessens the labor of its transaction.

The scientific importance of the telephone has long been distanced by its practical commercial application. Men who by reason of their position should know what they are talking about claim that it is possible to establish telephonic communication with Europe, for, while there is too great resistance to successfully operate a direct telephone cable across the Atlantic, it is claimed that by a longer route, with landings at the different islands, it will be entirely feasible to construct an international telephone line that would give good practical results. At present toll line conversations in this country are held over distances of 2000 miles; as, for instance, San Diego, California, to Boise, Idaho. Like all other great enterprises, only more especially in this case, the tendency of telephone management is toward monopoly and exclusive control, and it is probable that the result of present combinations and consolidations and pooling of issues will be the operation and control of the telephone service of the entire country under one general management.

The profits of the service are enormous. With the exception of transportation to Alaska, there is probably no money invested in any enterprise that produces such great and immediate return in per cent of profits as that invested in telephones, and paradoxical as it may seem, that very fact, which would ordinarily invite competition, will tend more than anything else to demoralize opposition and result in a close monopoly.

Like other forms of electrical appliance, telephony is a progressive science. The latest development is the telephonograph, devised by M. Paulsen, Leipzig, Germany. It is described as "a combination of a telephone and a phonograph for the purpose of recording messages received during the absence of the operator. The person called up has only to hold the trumpet to his ear upon returning to the office, even after an absence of days, to receive the message. Many inventors have tried to effect sucha combination, but all failed on account of the difficulty of transferring the message onto a wax cylinder."

Instead of a wax cylinder, Paulsen uses a flexible steel band in his phonograph, messages being more easily removed from the steel band than from the wax cylinder. The band is wound on two spools, moving quickly from one to the other, coming in contact with a very small electro-magnet, switched into the circuit, which affects the steel band in such a way as to record on it any sounds that may penetrate to the phonograph. The inventor says: "It is only necessary to cause the steel band to repass the magnet in order to have the sounds repeated. Each vibration of the electro-magnet produces a corresponding vibration of the steel band. In order to remove a message from the steel band, a magnet is passed over the surfacc on which the message was recorded."

An Advance in Silver.

The silver market has improved since the close of the fiscal year and an upward movement is noted. Two causes contribute to this, the first being the demand from the Indian Government, owing to an increase in coinage, and in China the present troublous conditions in that country have stimulated the export trade and diminished the imports. Present hostilities in the latter country have caused some hoarding and have restricted the selling of European wares. The Chinese banks have consequently found themselves called upon for larger quantities of silver than usual. The second cause of the advance arising from this must be credited to the smelting trust. The American Smelting & Refining Co. keeps silver bullion off a weak or failing market, and in the case cited the demand was exploited by the utmost possible advance in price.

As noted in last week's issue, Russia also appears in the market. Silver is now being shipped to Port Arthur in considerable quantities—apparently to the Russo-Chinese bank, a sort of political institution. The Russians are probably desirous of accumulation of a big military chest with the kind of money in it that the Orient wants. In connection with this whole matter, it is also to be noticed that, in the shipment of gold, that metal comes back; but in the shipment of silver to the Orient, it is absorbed. India, China and now Russia constitute sinks of silver, and to the demand from these three countries may be ascribed its recent rise in value.

Heartily Appreciated.

With cordial appreciation is noted numerous kindly references to this paper in the columns of its contemporaries. In these days of numerous publications any journal can count itself fortunate to be able to secure favorable notice among its fellows, and because of this we feel it all the more complimentary that such praise is accorded this paper in so many friendly columns. It will be our endeavor to deserve it. To reproduce the hundreds of editorial expressions of good will and esteem would take up about all the space in one issue. The Denver Daily Post begins an article that would take over a column of our space this way:

> The MINING AND SCIENTIFIC PRESS of San Francisco closed its eightieth volume June 30th. It is not extravagant to say that for the miners of the West—gold, silver, copper, coal and iron—it is the best newspaper of its class in the English language.

In a three-quarter column article the Denver Mining Reporter says:

> The MINING AND SCIENTIFIC PRESS is the best chamber of commerce San Francisco ever had. Its story is told weekly to thousands of people who never heard if there be such a thing in San Francisco as a chamber of commerce.

These are samples of what is said about this paper by many competent critics in kindly confirmation of the facts, and we may be pardoned for an expression of pleasure therein.

Concentrates.

A "KNOT" is a nautical mile, and is equal to 6080.27 feet, or 1.15156 statute miles.

FLUOR SPAR is worth $5 or $6 per ton, delivered to iron smelters. There is little demand for it west of the Rockies.

GOLD and silver dissolve at nearly the same rate, atom for atom, in solutions containing equal proportions of potassium cyanide.

CERITE is an ore found in Sweden, containing silicates and oxides of cerium, didymium and lauthanum, and is imported free of duty.

THE Stevens process is essentially a chloro-bromo process, and if successful anywhere the fact has as successfully eluded general observation.

THE only substance which will act as a screen for magnetism is iron. Surround a space with a thick shield of iron and magnetism cannot penetrate it.

THE lighted candle test for foul air is not a safe one. Gas destructive to human life, yet permitting a candle to remain lighted, may exist in underground workings.

IN the case of corrosive mine waters, iron or lead pipe are usually unavailable unless lined with ¾-inch pine. Bronze is probably the best material to use in such cases.

THERE is little use for selenium except in electrical use, and even in that only to a very limited extent. It is not a United States production, but is imported from Germany.

PLATINUM has been found in the sands of the Yukon creeks, but there is no record of the amount saved. The account of the richness of those sands in platinum is doubtless exaggerated.

DIAMONDS of fair size and considerable value have been found in Butte and El Dorado counties, Cal., but no systematic or continued effort to determine their source has been put in practice.

CELESTINE is not found west of the Rockies. It is sulphate of strontium, is somewhat like barytes, and is used for making red fire and in beet sugar refining. It is worth about $3 per ton.

A STEAM ENGINE, the cylinder of which is 2x4 inches, at sixty pounds boiler pressure, and with 150 revolutions per minute, would develop about 5 H. P., and would need a boiler having 10 square feet of fire heating surface.

A TON OF COAL—2000 pounds—has a heating capacity of about 28,000,000 units. A barrel of petroleum (42 gallons, or about 275 pounds) has a heating capacity of about 3,500,000 units, or one-eighth as much as a ton of coal.

UNDER ordinary conditions a grade of 180 feet to the mile would suffice for a self-acting gravity tramway. The weight of the car, the load, the size of the cable, the length of the line, are among the factors in the matter.

SO FAR as known, native copper is found in Arizona only in the Buster mine, Bradford mountain, where it occurs in leaf-like sheets in maximum size of 6x14 inches, and ¼-inch thick. It is more in the nature of a deposit than vein matter.

KAOLIN is not an uncommon deposit, nor of especial value. Ordinarily a kaolin bed will yield about one-third "China clay," as the material used is called. Unless specially favorably located, transportation charges would eat up the profit of production.

A "MILL RUN" of ore is ordinarily understood to mean a test of the value of a lot of ore large enough to be run through a quartz mill. It cannot, in that sense, be justly applied to a sample or small quantity. A "mill run" deals with tons, rather than pounds.

THE advantage and superiority of the metric system is unquestionable, and some day the United States will adopt it. We are a conservative people in some things, and it is only conservatism and inertia that keep in use the present system of weights and measures.

TO PLATINIZE fine copper or brass articles take 800 grams sal-ammoniac, 10 grams platinum-sal-ammoniac and heat to 212° F., with 400 grams water in a porcelain dish, place the article to be platinized therein, remove after ten minutes, dry and polish with whiting.

HENRY PICHOIR of San Francisco died October 24, 1898; Capt. Thomas Mein died at Oakland, Cal., on May 4, 1900; Hamilton Smith, as noted in last week's issue, at Durham, N. H., on the 4th inst. Many of the old and famous California miners are passing away.

A BELTED governor is not reliable in regulating the speed of a dynamo engine. The belt creeps irregularly under variation of speed in the governor, and has unequal tension from variation in the moisture of the engine room. It is also liable to slip and more liable to accident than gear-driven governors.

A LIEN for wages given by statute on all the property of a corporation in preference to all other liens except recorded mortgages and deeds of trust, in case of failure to pay employes monthly, is held (in Johnson vs. Goodyear M. Co., 47 Cal., L. R. A., 338) to constitute an unconstitutional discrimination against corporations and their employes.

REGARDING the statement in the issue of June 30, concerning hard-drawn copper wire, it is to be further said that soft-drawn copper wire is best adapted for dynamos, motors, etc., and any place where the wire must be bent to short turns, and where flexibility and high conductivity are the essential points. Hard-drawn copper wire is best adapted for line work, such as telephone lines and electric railway trolleys and feeders, or where the ability to stand strain without stretching or sagging, is necessary.

MINERAL entries of public land can only be made under the mining law; in homestead entry residence is compulsory; desert land entry costs $1.25 per acre—25 cents when entry is made, remainder when proof is made. There must also be an expenditure of $1 per acre per year for three years tending to the reclamation of the land.

THE California State Mining Bureau will, without charge, tell if certain metals or minerals are or are not in a sample submitted—that is, will make a qualitative analysis, but will not state in what quantity or proportion they exist in the proffered specimen. That department of the bureau answers about 1200 such questions annually.

DREDGING and drift mining are two forms of gold mining destined to be of great profit in California and elsewhere. The latter requires more capital and pluck than the former. Dredging offers about as near "a dead sure thing" as any form of mining can, where judgment is used in the selection of ground and in the mechanical appliances.

IT is with a patented claim as with any other real estate: optional with the owner whether it be utilized or allowed to lie idle year after year. Nor can any one other than the owner do any work or development thereon without his consent. Even the Federal Government parts with all power over it, and the patented property is subject only to State and local taxation.

IN the chlorination process an extraction of 98% is possible, if concentrates are very rich; but all depends on the character of the ore treated, as the tailings from some concentrates are high while others are correspondingly low; 90% or 92% extraction is very good on the average concentrates. As to the consumption of chemicals to the ton of ore, that also depends upon the character of the ore treated.

CARBOLITE is a by-product of iron making; it is a combination of carbon, calcium, aluminum and silicon, and from it is produced ethylene gas—a sort of improved acetylene, and produced at 50% less cost. For every ton of pig iron made, about 13,000 pounds of substance has gone to waste. Some of the slag has been used for ballast, cement and the manufacture of mineral wool; this latest product utilizes more of the former waste in iron manufacture.

IN a 12-foot piece of lumber, 4x4 inches at one end, 6x6 inches at the other, there are 25¼ feet b. m. To take the mean would give 25 feet; to take the contents top and bottom would give 26 feet. The accurate result is reached by assuming the stick extended to a perfect pyramid, then subtracting the top pyramid from the whole; the pyramid would be 36 feet long and would contain 36 feet; the lesser pyramid would be 24 feet long and would contain 10¾ feet; the difference is 25¼ feet.

A SOURCE of waste steam is leakage from the safety valves. Boilers need not blow off just at the working pressure. The safety valve may be adjusted to lift at five pounds above the working pressure—that is, if it is tight on its seat. A badly seated valve will blow off below the working pressure. Such a valve needs grinding in with fine emery powder. It is a lazy and dangerous practice to put a weight on the lever of a safety valve to prevent steam escaping. Grinding in is the only true remedy.

IN preparing white lead by electricity, a mixed solution of carbonate and chlorate of soda is subjected to the process of electrolysis; chlorate of lead is formed at the anode or lead plates by which the current enters the solution, and soda at the plates by which it leaves. The chlorate of lead forms, in contact with carbonate of soda, the hydro-carbonate of lead. The bath is agitated so as to keep it homogeneous and let the white lead fall to the bottom as it is formed. The soda is afterwards treated by a current of carbonic acid gas, which regenerates the carbonate of soda.

IN 1895 the Le Roi mine, Rossland, B. C., contracted to deliver 75,000 tons of ore to a smelter to be built at Trail, B. C., 11 miles from the mine. At the Trail smelter the freight and treatment cost $10 to $14 per ton; 95% of the assay value of the gold and silver was paid for, and 1.3% reduction made on account of copper. By the time the Trail contract was ended the Le Roi built a smelter at Northport, Wash., just across the line, where the cost of treatment is about $3 per ton. The C. P. R. R. acquired control of the Trail smelter, where freight and treatment charges now average about $7.50 per ton.

TO set borts in a diamond drill it is found by some experienced men that instead of setting the stones at regular distances in the face of the bit or crown that it is better to fix them in groups of twos or threes, leaving between the groups spaces of sufficient area to put in four plugs or pins of iron. These are firmly tamped in and left a shade long, so as to project a little beyond the exposed portions of the diamonds. The result of this is, that before the diamonds come into operation the iron plugs are gradually worn away until each diamond comes into work without undue prominence, and the risk of fracture when coming into contact with hard joint rock is obviated.

TO CLEAN MERCURY, many different ways have been repeatedly published herein. Probably in addition to what has already appeared anything good would not be new, and anything new might not be good. The following is recommended: Get a wooden half barrel or tub with faucet to draw off from the bottom; tilt at such an angle that the mercury put in may collect around the faucet; get a pound of per-chloride of iron (in lump, not in solution). The tub being half full of warm water, put in two lumps of the per-chloride, the size of walnuts, which should suffice for half a flask of mercury. Pour in the mercury and stir in the solution for six or eight minutes; let it stay twelve hours, giving it an occasional stirring. The mercury is to be drawn off as needed. The solution should clean the mercury without affecting it otherwise. An occasional little chunk of the per-chloride will keep the solution sufficiently strong. When it gets thick and foul it should be cleaned out and renewed.

WITH the development of larger and more efficient dynamos the effort has been to establish central power stations for transmitting energy electrically over large territories. This system has attained its highest development in the harnessing of natural cataracts. In speaking of electric energy the engineer thinks of two things: First, amount of electricity flowing through the wire; second, the force with which it is being driven along. This force is known as voltage, electricity flowing as the current; thus a certain current is transmitted at so many volts. By experiment it is known that the main loss of energy is due to heat radiation from the transmission lines and that this heat varies directly as the resistance offered to the current and as the square of the value of the current. From this it is seen that if only a small amount of current is conducted the per cent of loss is much reduced; the problem is, then, to transmit the electric energy in the form of a small current and at the same time provide for the development of a large amount of power where it is to be utilized. To do this the practice is to generate an electric current at a moderate voltage and, by means of suitable apparatus, convert it into a small current at high voltage. This high voltage current is transmitted to the point of utilization where the electric energy undergoes a reverse transformation which brings it to its original condition and to one better adapted to the propelling of machinery. The use of a small current at high voltage is analogous to that of a small water pipe conveying water under high pressure. Suppose two pipes varying widely in diameter to conduct water from "a" to "b." To transmit the same volume of water by each in the same time the water in the small pipe must evidently have a much greater pressure, or rather velocity. These two pipes may be made to fill two equal reservoirs in the same time and thus each made to do the same work. Just so in the case of electric transmission; the same power can be conveyed either by a large current at low voltage or by a low current at high voltage, but as the heating is much less in the latter case it is the method that is commonly used—in fact, it has rendered the long distance transmission of electric energy possible.

THE automatic compression of air by a column of water flowing down a shaft, referred to on page 547 of the issue of May 19, is a device for obtaining compressed air by the direct act of falling without the aid of any moving mechanism and depends upon the principle of the Sprengel pump. If a stream of water or any other liquid is allowed to fall down a vertical tube, into which air is also suitably admitted, each drop of the falling fluid will entangle and carry down with it a globule of air, the drops of the liquid forming pistons, so to speak, in the tube, which force down and compress the air. Its typical form is that of the trompe, the blowing machine used in the old extinct Catalan forge, which is said to have been invented in Italy as far back as the year 1640, but in these somewhat primitive forms the blast pressure was always low and the efficiency did not exceed 15%. The compressor referred to in the answer to the Redding, Cal., correspondent in the issue of May 19, consists essentially of a head tank, a vertical down-flow pipe, and separating tank placed at the base of the down-flow pipe. The water may be conveyed to the head tank by means of an open flume, or pipe; water entering the down-flow pipe passes the ends of a number of small air pipes, from which air is drawn in the form of small uniform globules, which, becoming entangled in the descending water, are carried down to the air tank, where separation takes place, the air rising to the top of the tank, and the water flowing out at the bottom, and up again outside the down-flow pipe to the tail race. The difference in height of the tail race and pipe to head tank gives the available head of water. The globules of air are uniformly compressed at constant temperature during their downward path, the temperature of the water remaining practically constant. The amount of compression of the air depends solely on the length of the down-flow pipe, being independent of available water fall. In the case of the machine erected at Magog, Quebec, the depth of the shaft is 128 feet, its size 6x10 feet; the down-flow pipe is 3 feet 8 inches in diameter; the inverted tank at the bottom of the shaft is 17x12 feet. The penstock, or inflow pipe, is 5 feet 6 inches in diameter, and in the headpiece there are thirty air pipes, each 2 inches in diameter, and each having thirty-two air inlets at their base, making a total of 960 air inlets. Through these the air mixes with the down-flowing water, thus subdividing the air into an innumerable number of small bubbles. The available working water head is 21 feet. Tests made by Mr. McLeod, of McGill University, indicated that the plant gave an efficiency of 60% of the actual H. P. of the water in dry cold air.

The Cripple Creek Volcano.[*]

The Cripple Creek district occupies a cluster of foothills on the south side of Pike's Peak, Colo. It is essentially a small volcanic area, of about 20 square miles, amid the granite of the Front range. The mines are situated amid a volcanic complex, consisting of tuffs and breccias, which have been penetrated by an extensive system of dykes and other intrusive masses. The prevailing formation is an andesite breccia, which lies upon the worn surface of the granite and fills the deep basin around a volcanic vent. The breccia, since its deposition, has been broken into by several eruptions of phonolite, and, later still, by a series of thin dykes of basalt and other allied rocks of a highly basic composition.

The Cripple Creek district represents the ground floor of a volcano, the superstructure of which has been removed by erosion.

At Cripple Creek the mine workings afford a good deal of information concerning the underground structure of the region. It is hoped that an inquiry into the history of the volcano which determined the interesting character of the district will contribute toward a clearer comprehension of the geology of the mines.

The operations of nature in the past are inferred from the observation of those which take place today. The intensity may vary; the forces are the same. This is the cornerstone of modern geology as laid down by Lyell. The volcanic complex at Cripple Creek is to be understood in the light of the evidence gathered for us by the patient investigators who have stood by the side of the craters of Stromboli, Vesuvius and Kilauea.

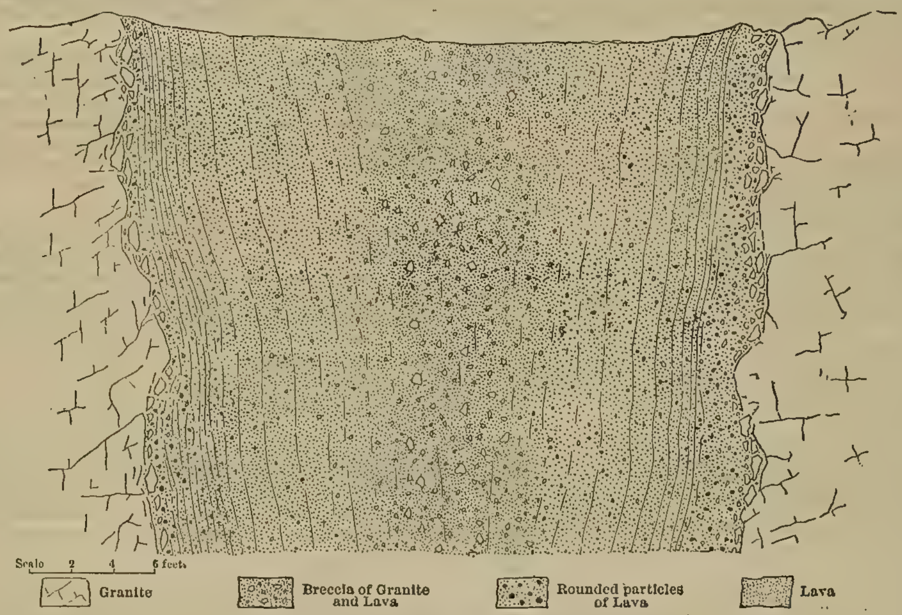
The conclusions of those who have made a specialty of this branch of geology may be summarized thus: The explosive violence of volcanic eruptions is due to the access of water to the fused rock within the conduit of the volcano; but, as it appears that this water is not contained within the substance of the lava emitted during the tranquil emissions succeeding the first paroxysmal outburst, it is inferred that the water is not the primary cause of volcanic action, which originates at a depth greater than that to which it is believed that water can penetrate. The evidence collected is not complete; but it warrants a reasonable conjecture that volcanoes owe their origin to the contraction, caused by the cooling of the earth's crust upon a yielding substratum, separating the solid outermost shell from an equally solid nucleus. While, therefore, the force which pushes large quantities of fused rock to the exterior of the earth has, probably, a deep-seated origin, nevertheless, the immediate cause of the uncertainty, the violence and the magnificent energy of volcanic action is traceable to the effects produced by water coming into contact with the lava as it approaches the surface.

The volcanic rocks of the Cripple Creek district have come up through the granite. It underlies them all; they rest upon it, and can be seen penetrating it in the form of dykes. Previous to the first eruption, the granite must have presented a weatherworn surface, such as characterizes the high hills. Ever since its first emergence from the ocean this region has been undergoing an intermittent elevatory movement, which culminated in making the Front range. Erosion had been continuous, but the uplift more than counterbalanced such wearing away; and the granite hills had been slowly raised far above the Cretaceous seas which washed their edges in the era preceding that to which the eruption is assigned. The forces which had done this work were of the most patient kind; their manifestation had about it nothing of a violent or paroxysmal character; time was an essential element of the process.

At the close of the Eocene period this apparent equilibrium was disturbed. The foundations of the granite hills trembled. Slight tremors were followed by earthquakes, and these were the precursors of greater violence.

There is ample evidence that water does not penetrate into the conduit of the volcano, and that it is originally derived from the surface. As against the contrary belief, namely, that the water vapor accompanying eruptions is an essential constituent of the lava, and, therefore, shares with it a deep-seated origin, there is the following evidence: It has been found, as the result of a large number of accurate observations in wells, shafts and boreholes, that the temperature underground increases 1° F. for every 48 feet of descent. At 7776 feet, the boiling point, and at 34,700 feet, the critical point, 773° F. of water would be reached. The expansive force of steam increases rapidly with the temperature, so that at 773° F. it would be equal to the pressure of 350 atmospheres. This is termed the "critical point" because at this temperature water, however great the pressure to which it is subjected, can no longer exist as a liquid, but becomes dissociated into its constituent gases. Although the exact conditions which obtain at these great depths can not be known with certainty, nevertheless, all the evidence goes to show that there is a limit set to the descent of surface water by the rapid increase in the expansive force of its vapor, due to the rising temperature. Prestwich put the maximum limit at 6 to 7 miles, and Delesse estimated it at 60,000 feet, or about 11 miles. Moreover, experience goes to show that the water encountered in mines is the drainage from the surface. Deep mines are usually dry ones. I may instance the deepest metal mines, the Calumet-Hecla and Tamarack, in the Lake Superior region, and the 180, New Chum-Victoria and neighboring shafts, at Bendigo, in Australia.

The evidence obtainable concerning the first eruption of the Cripple Creek volcano is necessarily very meager. The first vent must have been formed at some point along one of the fractures caused by the earthquake shocks; the lava, in forcing for itself a way to the surface, being aided by the force of the expanding steam. The pressure required to break a passage through the overlying rocks is stupendous; and, as a consequence, when the steam accompanying the lava is finally and very suddenly released from that pressure on its immediate arrival at the surface, it escapes with explosive energy and with projectile discharges which may reach to an astonishing height. Thus, when the outburst of Krakatoa, an island near Java, occurred in 1883, the finer fragments ascended skyward 10 miles and were recognized in the atmosphere of London. The winds carried the dust of Krakatoa around the world, and thus gave rise to the extraordinary sunsets observed in the autumn following.



MINING AND SCIENTIFIC PRESS

VOLCANIC VENT IN GRANITE, AT VICTOR, CRIPPLE CREEK.

FIG. 1.

The Cripple Creek volcano first ejected fragments of granite. They were probably small in size, and became further reduced by colliding with each other as they were discharged, so that they fell to earth in showers of particles like gravel. Of this first eruption there is little trace now, unless the grits of Straub and Grouse mountains be the remnants, as is probable, of the debris accumulated at that time. Material resembling this must certainly have covered the surface around the vent, until the larger portion of it was washed away. The steam, which in enormous volumes accompanies the first outbursts of volcanic action, becomes condensed as soon as it issues into the cold air and forms rain clouds, the downpourings of which frequently removes the accumulations formed at the initial stage of the volcano. The floods which succeed eruptions are due to the supersaturation of the atmosphere with the water vapor emitted by the volcano. Such floods are more feared by the dwellers around Vesuvius, for example, than the lava streams, the destructive effects of which are comparatively restricted. It was the formation of a liquid mud, by the action of heavy rains on the fine material, called tufa, which buried the city of Herculaneum.

It is unlikely that sufficient data will ever be forthcoming to give an exact presentation of the chief vent of the Cripple Creek volcano, unless one of the millionaires, enriched by the gold he has won from the mines, shall undertake the requisite explorations. Yet some very interesting information on this point is available. A miniature vent exists near the town of Victor, and the railroad has cut through it, so as to furnish the section of it shown in Fig. 1. As a hand specimen may exemplify the structure of a mountain range, so this small vent typifies many of the characteristics of the orifice probably existing in the earlier stages of the Cripple Creek volcano.

This vent occurs in the massive granite of Squaw mountain, about 1700 feet south of the main breccia formation of Battle mountain. In the railroad cut, where it is to be seen, it has a width of 35 feet. It is filled with fragments of granite and the gravel derived from the brecciation of granite. The edges are not particularly well defined, because the face of the enclosing rock is shattered. The most peculiar feature of the section is presented by pellets, nodules and rounded fragments of dark-red scoriaceous lava, which occur all through the material filling the vent. At the edges rounded inclusions of this lava can be seen in the mass of fragmentary granite; and in the center the lava, by reason of oxidation, forms a red granular matrix, in which large pieces of granite are separately discernible. The material, especially near the edges, has a laminated structure, parallel to the sides of the vent. These laminations vary in thickness according to the coarseness of the material.

This illustration is of great interest. The vent is in granite, as was the first vent of the volcano. It is now filled with breccia, as at one time that was. The shattering of the sides is suggestive of the mode of formation of the breccia, which now fills it. Had this vent been further enlarged, and subsequently penetrated by phonolite, not in fragments, forming a breccia, but in liquid form, solidifying to a compact mass, it would have presented a complete anology to the Cripple Creek volcano.

After the first outburst, a change took place in the matter ejected by the Cripple Creek volcano; there began to appear the fragmentary andesite which was destined to be accumulated to such an enormous thickness. It may be that flows of andesitic lava also welled out over the surface at this time. If so, they were subsequently eroded. During the long intervals of quiet separating one period of eruption from another, the lava became cooled, cracked, and then disintegrated by rain and frost, so as to be broken up and carried away by the mountain streams so as to form a part of the alluvium of the valleys. Thus the superficial flows were removed; but the corresponding bodies of lava which consolidated underground when the extrusion at the surface had ceased, are now, thanks to that very erosion, to be seen as bodies of andesite rock in several parts of the district, notably on the eastern side of Battle mountain and near Legal Tender hill, above Goldfield.

At this period similar outbursts were occurring among the neighboring hills, for the Cripple Creek volcano was but a minor incident among the eruptions which during the Tertiary epoch spread a vast thickness of breccia and lava over a large portion of southern Colorado. Out of the products of these eruptions were sculptured the serrated peaks of the Uncompahgre, the Cleopatra hills and the rugged ranges of the San Juan.

After the eruption had continued sufficiently long to form a vast accumulation of the fragmentary materials, which in process of time became consolidated into breccia, there came a period of comparative quiet.

(TO BE CONTINUED.)

Two slow but interesting changes are taking place in Behring sea. The immense quantity of debris that is borne down the Yukon from its sources and sides is being deposited in the sea beyond the mouth of that mighty stream, and its weight causes the bed of the sea to subside. A corresponding rise in the earth's crust is going on along the chain of the Aleutian islands. Not only are the islands themselves increasing in size in consequence of being lifted up out of the water, but new islands are being formed in the gaps between the others. In some instances the new islands are the result of the rise, and in others they are the result of volcanic action. Most of the Aleutians are of volcanic origin, and they mark the position of a fold in the earth's crust that is predisposed to eruption. In time there is likely to be a natural bridge from America to Asia along this route, but nobody now living is going to see it.

---

[*] Condensed from a paper read at the Washington meeting of the A. I. M. E. by T. A. RICKARD.

The Factors in Concentration.[*]

On attempting to segregate the factors in concentration into various groups they are found to vary regularly from purely commercial at one end to purely technical at the other.

Those from the extremities of a comparative list can be readily grouped, but the greater portion have their commercial and technical aspects so related that nothing is to be gained by attempting to consider them separately. Profits—the commercial aspect—mean that returns minus costs must have a positive value. The word "returns" is used to stand for the sum of all commercial values in the concentrates. The costs are made up of concentration, transportation of concentrates to point of sale and refining.

Considering the totals of any given proposition, the general law is that the greater the concentration the greater the loss of values; that is, the smaller the weight of material delivered for sale at point of refining the smaller would be the amount of values delivered for any given tonnage treated by concentration. The two practical limiting cases are:

First.—Where no concentration takes place and all the values are delivered, the cost of concentration being zero and transportation and refining each a maximum.

Second.—Where pure values are produced and the minimum amount delivered, the cost of concentration being a maximum, the cost of transportation being a minimum, and the refining cost reducing to zero.

This statement of the minimum limiting case exhibits the marked peculiarity in the form of the function expressing this general law, which, in definite concentrating problems, very greatly reduces the limits between which a solution need be sought. That is, the degree of concentration does not approach infinity as a maximum, but a definite value which is usually sharply determined by the existing mineralogical and industrial conditions. To the stamp mill man the definite demarcation between the specific gravity of the pyrites carrying his concentration values, and the accompanying silica or silicates, clearly indicates the minimum limit of his concentrating problem. In these same concentrates later the matte smelter finds as definite a minimum limit for his problem in the equally marked differentiation of the copper contents.

Yet, while both theoretically and in a general way these limits are well marked, in practice there is a marginal zone within which the more profitable course of operation is not evident from inspection. This is caused by:

First.—The fact that the influence of factors other than the specific gravity (such as surface tension, etc.) is modified by the character of the crushing that preceded the concentrating; and

Second.—By the fact that no practical limit of crushing will entirely release the materials whose separation is sought. Thus, instead of there being a sharp margin up against which concentration can be carried, even in cases where the difference in specific gravity is marked, the limit is made indefinite by the presence of particles, mechanical mixtures of varying proportions with specific gravities varying over the entire available difference. Within the marginal zone occur the problems of concentration, the solution of which is not a matter of off-hand professional experience, or of accumulated constants and data, but of comprehensive testing.

General experience (plus constants and data) will be of value in regard to the limits of this zone, and in the cases outside of it can, giving the transportation and refining factors, furnish a solution, both in regard to total investment and details of plant. Such a case would be the small concentrating plant usually placed below a stamp mill, or, in general, any proposition where on account of high transportation and refining charges the margin between smelting and concentrating ore is large.

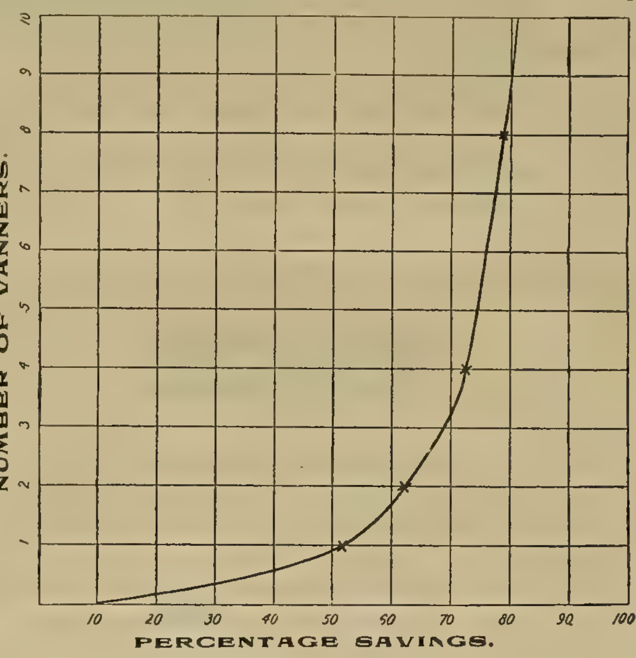
In such cases the criterion is the law of operation, that the saving will be higher the greater the investment per unit of ore handled. That is, the saving will increase with the investment and decrease with an increase of tonnage for any given investment. At the same time with increased investment comes increased cost as well as increased saving.

But while both the saving and cost of operation increase with the investment per unit of ore handled, the ratio of each to the investment is not constant, nor do they vary according to similar functions. Starting from the intermediate point where both cost of operation and investment are zero, the ratio of increase of cost of operation to increase of investment rapidly falls from that found in small, under-capitalized plants to a value near, but slowly approaching unity. A closer analysis of this function shows that it is the sum of two co-operating effects, one due to investment in actual concentrating machinery, which adds in a direct proportion to the cost of operation, and the other, the investment in handling the machinery, to the effect of which can be traced all the variating in the ratio. Within the practical limits between which any given concentration problem must be solved, this change in ratio may be neglected. (A 200-ton concentrator may be run with a lower cost per ton than one of fifty tons, but the fact is of no use when only fifty tons of ore are available.) In other words, if the investment per ton handled be doubled, the cost per ton will also be doubled.

Consider the simple case of a concentrating machine at work: Will it pay to split its load over two machines? If the saving increased proportionate to the investment it obviously would pay; but it is equally obvious that the saving can not increase in this way, for, no matter how large the investment, no more values can be taken from ore than it contains. That is, while the investment varies from zero to infinity the saving varies from zero to unity.

With any given set of conditions, values, freight rates, smelter charges, depreciation, interest, labor costs, for some given investment, the ratio of returns to costs must reach a maximum, this being a matter of comparatively simple mathematics to formulate. The difficulty at present lies in the fact that almost no work has been done towards determining the constants of such a formula, these constants having to be determined for each type of concentrating machinery. Some tentative testing with vanners under the necessary conditions of uniform surroundings showed that the ratio of investment to saving could be expressed closely enough by using three terms of the general conic equation, differentiating for the maximum value. But the desirability of using more than three values in the determination of the constants and the reduction of the constants so obtained to a single most probable formula by the method of least squares, makes the work, while simple, so tedious that the graphic method of plotting a curve has been found much the more suitable for general practice.

The accompanying curve plotted from the following values experimentally determined from 6-foot side-shake vanners illustrates the method:



Number of machines.	Percentages savings.	Loss.
1	51	49
2	62	38
4	72	29
8	79	21

Necessarily the curve proved asymptotic to the percentage value 100.

Applying the case of the single concentrating machine, with assumed conditions:

Values of concentrates in each ton of ore	$ 6
Tons handled per day	10
Ratio concentration with one machine	10
Cost of operating each machine per day, including depreciation and interest	1
Smelter charges and freight on concentrates	10

With one machine the net result is:

$$\text{Returns} = \frac{10 \times 6 \times 50}{100} = 30$$

$$\text{Costs} = \frac{10 \times 10 + 1}{10} = 10.1$$

$$\text{Returns—Costs} = 30 - 10.1 = 19.9$$

With two machines the net result is:

$$\text{Returns} = \frac{10 \times 6 \times 62}{100} = 37.2$$

$$\text{Costs} = \frac{10 \times 62 \times 10 + 2}{10 \times 50} = 12.4 + 2 = 14.4$$

$$\text{Returns—Costs} = 37.2 - 14.4 = 22.8$$

That is, under the conditions enumerated there would be a distinct gain in doubling the investment. Applying it to eight machines:

$$\text{Returns} = \frac{10 \times 6 \times 79}{100} = 47.4$$

$$\text{Costs} = \frac{10 \times 79 \times 10}{10 \times 50} + 16 = 15.8 + 16 = 3.18$$

$$\text{Returns—Costs} = 47.4 - 31.8 = 15.6$$

That is, with eight times the investment the net return is less than with one machine, although the amount of values shipped is greater.

By selecting various points on the curve the net result for various numbers of machines can be ascertained until the most profitable one under assumed conditions is determined.

This method as outlined is capable of ready application to the average concentrating problem. Given the data from which to plot the curve, the other factors will usually be found fixed.

To obtain the curve data it is not necessary to have available a varied number of machines, but the same results can be even more readily obtained from one machine by varying the amount of pulp handled. It should be noted that in such testing results obtained by hand panning of heads and tails are unreliable. The better plan is by analysis; in the common case of sulphides, analyzing for sulphur and in other cases for the constituent element that accompanies the concentrating values. As with the average concentrating machine the differentiation of gold is only incidental to the gold accompanying some more abundant material, assays are misleading in questions of relative saving. Further, in recording such tests that they may be of general value, the actual size of the maximum sized particles experimented with should be stated in millimeter and not in the indefinite phraseology of "mesh."

In cases where the proportion of concentrates is less than 5%, the variation due to a change in the concentration ratio can be neglected.

The question of crushing, while a definite factor in concentration, is usually so limited in range by the mineralogic and physical features of the ore as to render it practically as fixed a quantity in any concentrating problem as the smelter charges on the product.

But while the size of the product to be concentrated is presented in, is thus definite for a given case, it exercises a controlling influence on another factor in concentration—the type of concentrating machines to be used. In general, all practical machines make use of the varying ratio of the surface friction in some medium to the weight of the particle; in most, agitation being used to overcome the difference between the friction of motion and the friction of rest. The classification of a charge of particles being so effected, to render the process continuous requires that the classified particles be removed from the machine without admixture. From the method used to accomplish this, concentrating machines may be grouped in three types: those that discharge the concentrates through the bed they have settled on—such as the jig; those that shake the concentrates off of one edge of the bed—such as the modern stratifying tables—and those that remove the bed with its accumulated load of concentrates—such as the buddle and the various forms of vanners.

The differentiation of these types results from the fact that in the ratio, on which concentration depends, that of weight of particle to surface friction in some medium, this factor of surface friction is the resultant of two factors, the form of whose function differs so much as to make them practically independent variables. One is the friction of the liquid medium on the particle; the other is the friction between the particles and the surface that supports it. In the hydraulic classifier theoretically this factor is zero. In the jig is a minimum, greater in the shaking tables and is a maximum in the moving bed type of concentrators. Its proportionate influence on the total factor of surface friction is a function of the lineal dimensions of the particle, the influence being a maximum for the minimum sized particle and at a minimum with the larger sized particles.

A concentrating machine can be expected to do the best work when the ratio of these two factors of friction against fluid medium and friction against supporting surface, as used in its operation, compares most closely with the ratio of the influence of each on the mass of the given particle.

It should be noted that while the form of the function expressing this ratio remains the same for different materials, the constants in the function change. That is, with a given material to concentrate, such as galena, a certain-sized particle will always call for a certain type of machinery, while the same size of particle would probably require a somewhat different type of machine in the case of a different material, such as barytes. For most of the common mineral mixtures the best type of machine for a given size particle has been settled by the empirical experimentation of centuries and is recorded in the design of profitable plants in concentrating districts throughout the world.

Machines of a given type may differ in their mechanical arrangements for carrying out their typical work, but this difference should not be confused with the metallurgical difference of type. The fact that there are no sharp limits between which any type of machine must be used, the efficiency simply running down as it is used with other than its most efficient size of particle, has helped to confuse the distinction between mechanical and metallurgical adaptability, usually at the expense of the latter.

---

[*] By MR. F. T. SNYDER at the March, 1900, meeting of the Canadian Mining Institute.

While the voluminous experience in concentration has broadly settled the relation of type of machine to ore particle, there is great desirability for comprehensive testing over the limiting margins of each type; with the jig, from one-fifth millimeter down; with the stratifying machine, from 1-20 millimeter down, and with vanners up towards two and three millimeters. Here, when the usefulness of these machines overlap, the difference in adaptability is too small to be decided by inspection and awaits systematic recording.

SUMMARIZING.—Each concentration problem must be solved twice; first, backwards from general factors to details; then forward with settled details to a definite general result.

Starting with the general transportation and refining factors, the limits are found between which concentration is possible at any geographical point. Next, the physical conditions of the problem under consideration determine the types of crushing and concentration machinery and capacity of plant.

Lastly, the values in the ore determine the investment; that is the number of machines of each type to be used per ton capacity to be desired. Then with these definite quantities applied to the general factors, the solution is retraced and a definite showing decides whether the return minus the costs will have a positive value.

There is to-day no risk in concentrating investments, aside from inefficient business management.

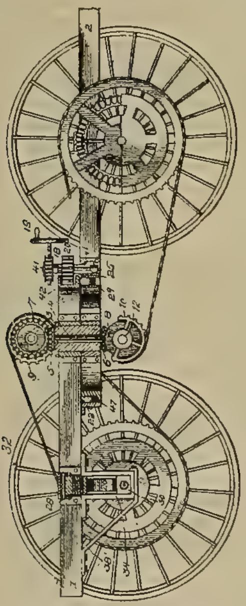
◆

Mining and Metallurgical Patents.

Patents Issued July 3, 1900.

Specially Reported for the MINING AND SCIENTIFIC PRESS.

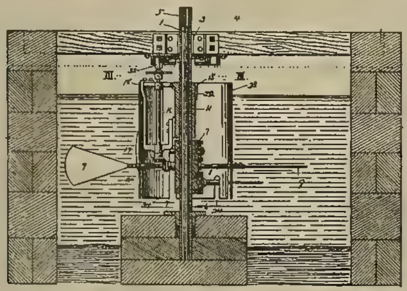
TRACTION ENGINE.—No. 652,648; F. Sommer, New York, N. Y.



A vehicle motor frame, composed of two parts joined together by pivotal connection, each having attached thereto semicircular piece, in combination with antifriction wheels or rollers, the frame 1 having supporting brace piece 31^a provided with opening for king bolt, in combination with king bolt having central opening, frame pieces 1 and 2, having brace pieces 31^a and 31^b and centrally bored king bolt or pin 3, passing through openings in brace pieces, axle and axle boxes and upright spring bearing on boxes, in combination with frame of vehicle bearing on spring.

◆

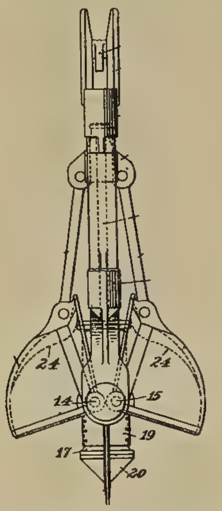
WATER WHEEL.—No. 652,774; W. T. Hoffman, Kansas City, Mo.



Combination of vertical rotating shaft, horizontal rotating blade-shafts mounted on vertical shaft, spider on vertical shaft having horizontally-extending legs, series of short vertical shafts mounted in bearings in legs and geared to blade-shafts, star-wheels on short shafts, above legs, vertical projections from frame for actuating star-wheels, angular blocks fixed on star-wheel shafts above star-wheels, and curved guide-flanges on stationary frame, above wheels, adapted to receive blocks, flanges having openings or breaks to permit blocks to rotate simultaneously with wheels.

◆

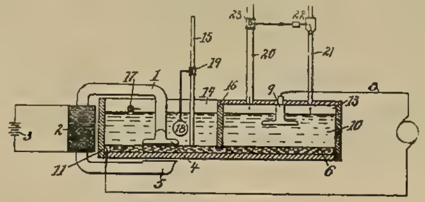
DREDGER BUCKET.—No. 652,738; W. H. Arnold, New York, N. Y.



Combination with dredging bucket having slot in upper end chains or cables by which bucket is suspended, equalizing-bar to ends of which chains or cables are attached, bar pivoted at its middle in slot and protected throughout its extent by walls of slot. Combination with frame and anchoring-blade of shells or scoops hinged to frame and having outer surface concentric with axis of hinge and inner surfaces eccentric thereto whereby scoops are thicker near rim and tend to enter deeper into material to be scooped up.

◆

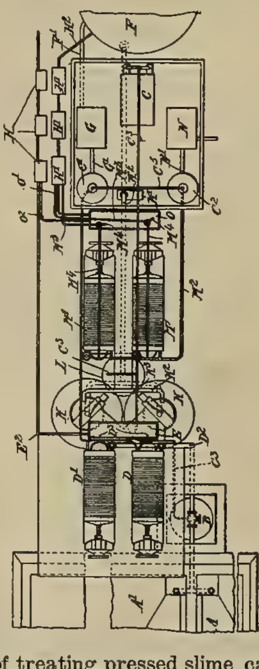
ELECTROLYTIC PRODUCTION OF CAUSTIC SODA.—No. 652,761; J. B. Entz, Philadelphia, Pa., assignor to American Alkali Co., New Jersey.



A process which consists in passing a current through mercury, electrolyzing superposed fluid to effect deposition on mercury, and subjecting mercury to influence of magnetic field to cause it to move and transfer the substance deposited.

◆

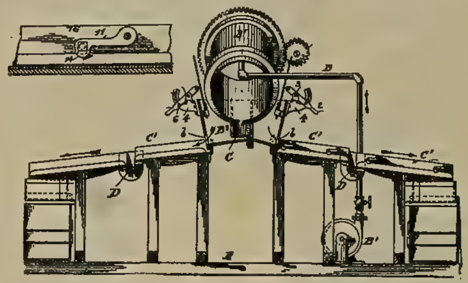
PROCESS OF EXTRACTING METALS FROM ORES OR SLIMES.—No. 652,849; S. H. Johnson and H. L. Sulman, London, England.



A method of treating pressed slime cakes containing residual water, which consists in displacing residual water with an equal volume of solvent solution, mixing cakes with further quantity of solvent solution, removing metal-bearing solvent solution by pressure, displacing remaining portion of such metal-bearing solution with water, and extracting metal from metal-bearing solution, whereby all operations may be performed with an approximately constant volume of solvent solution.

◆

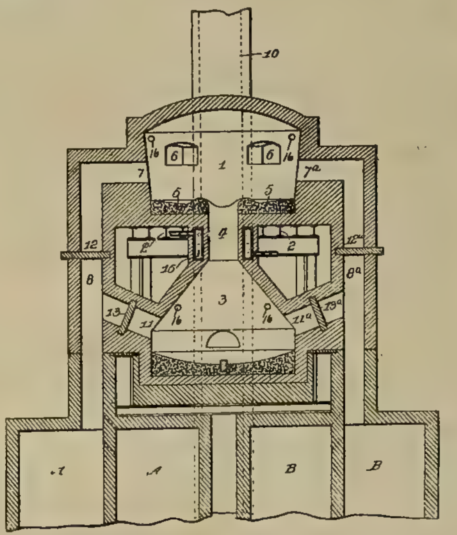
GOLD SAVING APPARATUS.—No. 652,900; R. H. Postlethwaite, San Francisco, Cal., assignor to the Risdon Iron & Locomotive Works, same place.



In gold saving apparatus combination of rotary open grizzly, distributing box arranged longitudinally beneath grizzly and adapted to receive material from different parts of latter, inclined perforated distributing trough arranged between upper portion of grizzly and box, series of escape openings formed along longitudinal sides of distributing box, gates for openings, and inclined tables or platforms arranged at sides of distributing box adapted to receive material escaping from openings; combination of series of parallel troughs or channels located side by side so as to form distinct runways for the material from which gold is to be extracted, blanket or layer of fibrous material located in each trough or runway, layer of perforated expanding material having roughened upper face placed over blanket or layer of fibrous material, rods or strips for holding layers in position, lock cams fulcrumed to flanges of troughs or channels, which cams hold rods or strips firmly in place.

◆

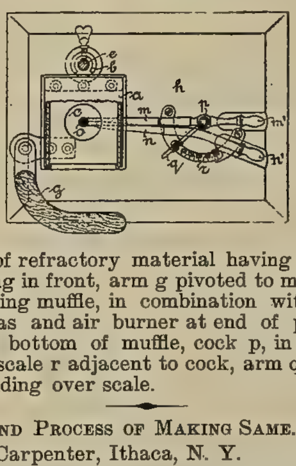
METALLURGICAL FURNACE.—No. 652,968; E. Kerr, Pittsburg, Pa.



Metallurgical furnace having in combination melting chamber, crucible arranged below melting chamber, opening or passage connecting crucible and melting chamber for passage of products of combustion and molten metal into crucible, ports or openings on opposite sides of melting chamber for admission of heating gases, valves controlling ports or openings, ports or openings on opposite sides of crucible, valves controlling flow of gases from crucible.

◆

PORTABLE MELTING APPARATUS.—No. 653,007; N. S. Jenkins, Dresden, Germany.



Muffle a of refractory material having hole in bottom, opening in front, arm g pivoted to muffle, rod e for supporting muffle, in combination with pipes m and n for gas and air burner at end of pipes below opening in bottom of muffle, cock p, in gaspipe m, graduated scale r adjacent to cock, arm q secured to cock, extending over scale.

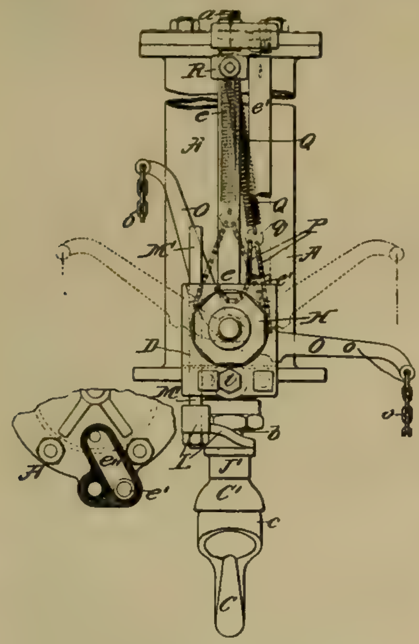
◆

ALLOY AND PROCESS OF MAKING SAME.—No. 652,833; R. C. Carpenter, Ithaca, N. Y.

An alloy of aluminum, zinc and tin combined in the proportion of fifty parts aluminum to twenty-five parts tin and twenty-five parts zinc; the process consists in first fusing aluminum, then adding thereto tin in quantity less than that of aluminum, lowering temperature of molten mass, then adding zinc in quantity less than that of aluminum.

◆

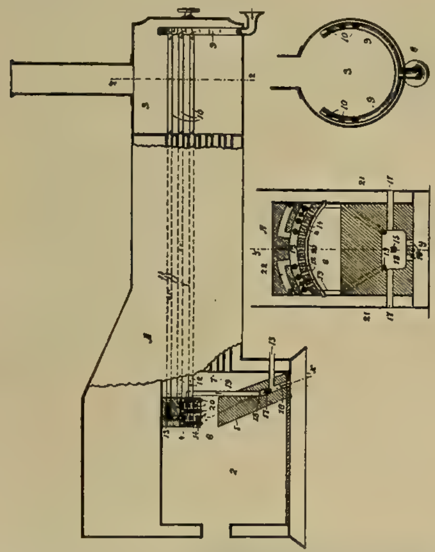
AIR HOIST.—No. 652,983; G. F. Steedman, St. Louis, Mo.



Combination with valve casing formed with pressure duct d, exhaust passage d′, cylinder port d″, of disk valve co-operating with cylinder port to open same to pressure from valve chamber, valve being provided with passage f″, for registry with cylinder port, a valve stem or spindle formed with passage g, in constant register with passages d′ and f′, and means connected to spindle for rotating valve; to admit or exhaust pressure to and from cylinder to compensate for increase or decrease in load carried by piston, means comprising lever O arranged on valve stem, link N connected to lever, rod M to which other end of link is connected, arm L on rod M, collar J on piston rod, with which collar arm L engages, binding screw k in collar, handle K on binding screw.

◆

FUEL ECONOMIZER.—No. 652,895; J. H. Hobart, El Paso, Tex., assignor of one-half to E. R. Phillips, same place.



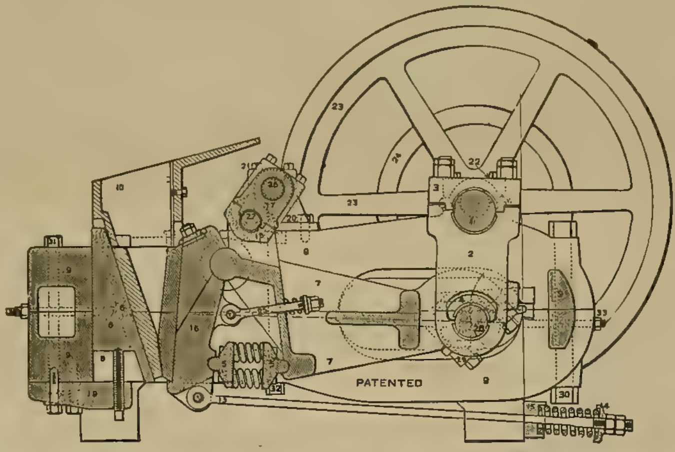
Combination of boiler and firebox thereof, arch fitted in upper part of firebox having an internal chamber, wall built up from lower part of firebox and forming heat passage between itself and arch above, passages made in wall and connections therewith from firebox, means connecting passages with chamber of arch and means connecting chamber with heat passage between arch and wall, openings in bottom of arch whereby air is delivered into intermediate heat passage.

◆

A THREE-CANDLE-POWER incandescent lamp is announced by T. A. Edison, the use of which, it is claimed, will prevent colliery disasters. The law governing the inspection of mines in Pennsylvania makes it mandatory that the lighting thereof, whether portable or stationary, shall have the approval of the chief of the inspectors, for on his judgment and intelligence is supposed to depend the safety of thousands of lives and millions of dollars in property. Application has been made to J. E. Roderick, chief of the bureau of mines in Pennsylvania, to order the use of the Edison system in place of the oil and gasoline lamps. The invention is a primary battery, in which the pots, carbons and all connections are fixed. It is claimed that a box weighing 4½ pounds will maintain a three-candle-power lamp for ten hours at a cost of 2 cents. A bevel-plate glass covers the lamp. Should this glass be broken by accident or design, the light is extinguished. No heat is evolved, and it is impossible to ignite either vapor or substance. From 1887 to 1896 the number of miners who lost their lives in the United States through accident was 8140, and fire damp was responsible for a large number of them.

Sturtevant Roll Jaw Crusher.

Crushing is the first and least expensive step in rock reduction, as any standard breaker will reduce the hardest ores at a minimum cost. Well-managed works seek to do as fine work as possible in the crushers. With intent to supply this requirement without tendency to clog, the Sturtevant roll jaw crusher, whose jaws can be set without danger of clogging to ¼ inch, has been designed. Its moving jaw does not approach and recede, but rolls opposite the fixed jaw, rolling over the rock to be crushed, which drops out after the rolling jaw has passed over it. Thus it is free to drop out, and only really sticky ores clog. The Sturtevant roll jaw crusher, herewith illustrated, is of the true jaw and toggle type, designed to be durable and effective for hard rocks, and it is claimed by its manufacturers that its unusual power, due to long leverages, makes it an easier running machine, rock breaks easily when rolling, and biting pressures are applied at the same time. In this the rock is reduced by rolling stresses without any rubbing action, promoting durability. The cut illustrates a 5x24 roll jaw crusher, weighing about 22,000 pounds and requiring about 15 H. P.

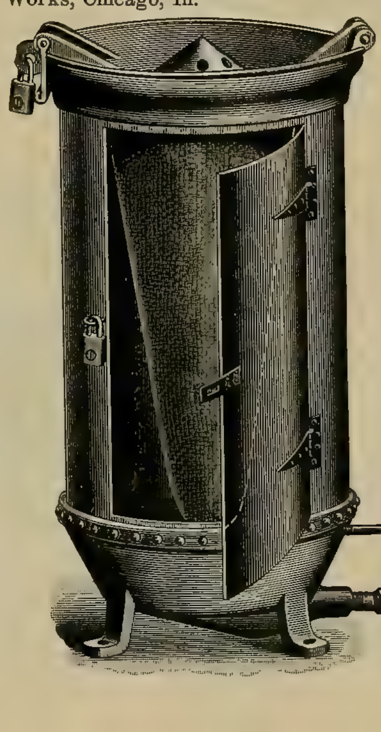


When the faces of the roll jaw crusher are set to ¼-inch, they take in as large rocks as a breaker of equal size, reducing them at once to gravel and sand, suitable for mills or finishing rolls, thus designed to do the work at one operation. They can also be set to do the common coarse breaking.

The Sturtevant roll jaw crusher is designed to last and to give the least possible trouble; its jaws are of steel and the toggles for all hard work of bronze. It is made by the Sturtevant Mill Co., Boston, Mass.

Clean-Up Pan and Amalgam Safe.

Herewith are depicted a convenient form of clean-up pan for cleaning up the scrapings from mortars and plates, and an amalgam safe, provided with canvas filter bag to draw off quicksilver excess at the bottom, provided with lock to insure safety. These devices as portrayed are furnished by the Gates Iron Works, Chicago, Ill.



Born Before the Flood.

A cedar tree, whose age has been reckoned by geologists at 25,000 years, has been found in California, standing in an excellent preserved state, the fibers so perfect and the wood so strong that it was used for timbering in the construction of a mining tunnel. This remarkable instance of the preservation of organic remains was found in the heart of a mountain, nearly 500 feet below the summit. This mountain is a spur of the Sierra Nevadas, near the Forest Hill divide, in Placer county, between the north and middle forks of the American river.

The mountain is lava-capped with one of those singular table tops which show that there was once a day when all those ravines with which the region now abounds did not exist, and that what is now the crest of the mountain was once the lowest plane in a topography vastly different from that which exists today. For all of these millions of tons of lava material were incumbent upon a river bed, and it was on a bank of this river that this cedar tree grew, and here it was found standing, 100 feet in height, 25,000 years after its submergence. The lapse of time since it was thus sealed to the world can not be more than approximated. It is known that its inundation occurred during the Pliocene period and that this was a Pliocene tree; the geologists of California estimate that the Pliocene period ended about 25,000 years ago.

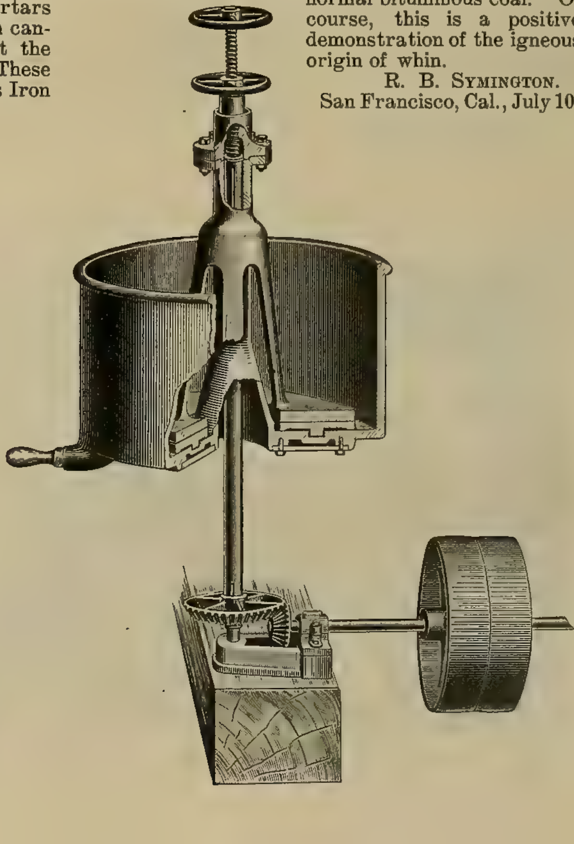
The ancient river bed on the bank of which the tree stood contained gold, and it was in quest of this that the vitals of the mountain were probed and the tree discovered. Several small oaks, having the appearance of what is common in the arid parts of California as scrub oaks, were also found upon the same and opposite bank of the dead river, but they were insignificant as compared with the majestic bearing and perfect preservation of this strong and noble cedar. All vestiges of needles had disappeared, but some of the elongated tips of the branches remained, and many cones were found upon it. These crumbled to dust as soon as brought to the air; as also did the bark, but the wood was firm and sound, the trunk being about 3 feet in diameter at its base, the roots tough and of the tenacity of seasoned wood.—West Coast Lumberman.

Quartzite and Whin.

TO THE EDITOR:—In last week's "Concentrates" "whin" is stated to be quartzite. Quartzite is metamorphic sandstone of sedimentary origin, but whin is a term applied to igneous rocks, popularly known as greenstone or trap, and embracing basalt, diabase, etc.

Whin dykes and overflows traverse the coal measures and indicate their vicinity by first rendering bituminous coals anthracitic in character, but closer approach destroys the coal. Where the whin dyke is cut through, the same thing, but in opposite order, is found on the other side: first the "burnt" coal, then the "blind" or smokeless anthracite, which gradually, but in a short distance, changes to the normal bituminous coal. Of course, this is a positive demonstration of the igneous origin of whin.

R. B. SYMINGTON.
San Francisco, Cal., July 10.



Concentration of Ores by Petroleum.*

By CHARLES M. ROLKER.

The working of the Elmore concentration process at Glasdir, Wales, consists in crushing low-grade copper ore by a Comet breaker, followed by smaller ordinary jaw breakers, passing the material to rollers (crushing wet), and the product of these to 5-foot Huntington mills provided with No. 6 (jabbed) needle mesh screens (the fines produced by the Comet are screened out and fed direct to the Huntington mills). The underlying principles of the process are:

The specific gravity of water being to that of the residuum oil as 0.89, a given quantity of residuum oil to a given quantity of water will float on its surface. The residuum oil, of proper consistency, can theoretically be loaded to 10% before the loaded oil will sink in water.

The viscosity of the oil is the all-important point. It varies with different temperatures. The thinner the oil, owing to higher temperature, the less the adhesive force and the power of carrying the intended mineral load, although the specific gravity is decreased and its loading capacity should be increased under No. 1.

It seems that the adhesive property of the oil, under given conditions, acts with predilection or affinity for bright unoxidized pulverized sulphurets, as against similarly pulverized rock constituents. (I am not prepared to substitute the word "metallic" for "mineral," as the patentee does.)

With a given mineralization in an ore—the required quantity of oil and its viscosity determined (by previous experiments on the basis of Nos. 1 and 2) to bring about a good concentration in a given quantity of water at a given temperature—the concentrates grow impurer if the quantity of oil is increased, since then rocky particles are taken up mechanically simultaneously with the mineral. The rocky particles drop out again on allowing time for clearing and settling. As the latter cannot be done on a large scale, the right quantity of oil is an essential feature to start with. These are practically the underlying principles of the Elmore process.

In a rough outline the mixture of pulverized ore and water is fed into the end of a drum, which is caused to revolve slowly on rollers by means of a worm. Oil is added by a separate pipe, made preferably telescopic to admit of it being discharged at different distances from the end. At each end there is a circular opening, and within the drum annular helical ribs extend from end to end. The spaces between these ribs are divided into cells by a number of equidistant blades, to effect a thorough intermingling of the oil with the pulp and water, without being broken up. All three are carried to the opposite end of the cylinder or drum from the one where they entered, whence they are discharged through a number of circumferential holes into the subsidence vessel, where the water and sand or pulp are allowed to subside, the buoyant oil carrying the mineral ingredients floating on top. The oil is admitted at the same end as the feed. There are two or three drums, one underneath the other, the second treating the tailings of the first, and so on as the case may require. The feeding of the pulp, as well as of the ore and oil, is done in the upper cylinder. It is of importance to determine the point at which, in the length of the drum, the oil is to be admitted. If admitted at the beginning of the cylinder, the entering oil would probably take up at once so much of the mineral as would make it sink in the feed water, and prevent its floating. The point of entry of the oil depends on the amount of mineral in the ore, and must be determined in each instance.

At Glasdir, where the ore impregnation is on the average very fine copper and iron pyrites in an altered slate, I ascertained that practice had established a use of five times the weight of the ore as the correct amount of the water.

The oil used in the mill is the residuum of distillation after gasoline, benzolene and illuminating oil have been removed.

The right amount of oil to be added for the Glasdir ore Messrs. Elmore determined to be about equal weights, or one ton of oil to one ton of ore. This amount varies with every ore. The oil, owing to its viscosity, will not flow readily, and small rotary pumps are introduced, acting like meters, propelling it forward. I found it impossible to determine the loss of oil by measurement. The storage tank contained more oil after the test than before, probably due to the retained water and air. Messrs. Elmore determined the loss of oil, based on the experience of a run of over 700 tons, including what is retained in the concentrates, the tailings and what is lost by waste, to be two gallons per ton of ore treated. In my tests I found the amount of oil retained by the concentrates and tailings to be about one and a quarter gallons per ton. As the test was probably more carefully made than the 700-ton run, I think it safer to assume the experience of Messrs. Elmore, that is, a loss of two gallons per ton of ore with the Glasdir ore.

The mixture discharged through the holes from the drum flows, as I mentioned before, into the subsidence vessel. Additional oil may be added to this vessel, at some distance down, by means of a separate pipe, to aid in floating the mixture.

From the subsidence vessel, in which the water and tailings are drained at the bottom, the oil carrying the mineral is pumped to a hydro-extractor having a solid basket with a projecting flange at the top. The hydro is found to give good results, running from 750 to 800 revolutions per minute. During the action of the machine the mineral and water pack in vertical walls, and the oil floating on the water rises vertically on the wall and creeps over the flange, or lid, of the solid basket and drops into the space between the basket and the enclosing monitor, and from there goes to temporary storage tanks, whence it is pumped again to reservoir or stock tank. The separated water is let out through an opening at the bottom, covered with a cone cover, after the machine comes to rest. The mineral is packed solid along the inner periphery of the basket. The final draining of the oil and water is accomplished in a smaller hydro-extractor with a perforated basket, or periphery, to which the mineral is transferred. The oil and water escape through the meshes, and concentrates carrying about 4% of oil and 4% of water remain behind.

I have tested the proficiency of the process on the very low-grade copper ore from the Glasdir mine, carrying about, on an average, 1.12% copper, 0.049 ounce of gold per ton of 2240 pounds, and 0.8 ounce of silver per ton of 2240 pounds. Seven distinct and separate runs were made on this ore by the inventor under my supervision, treating in all forty-three tons of rock. We obtained an average saving of 69% of the gold, 65% of the silver and 70% of the copper, with a rate of concentration of about fourteen to one. This is certainly a good saving when we consider the low-grade character of the material operated upon.

The percentage of yield of the metals is not the final net yield. It is subject to the usual smelters' charges and reductions for treatment on concentrates produced.

If the viscosity of the oil requires to be increased, the inventor adds from 2% to 3% of mineral butter, a later distillation product of residuum oil. If owing to climatic conditions the oil has to be thinned, a previous distillation product has to be added to the residuum oil. The temperature of the oil and water at the Glasdir works is kept between 54° and 57°, though it is possible that wider margins may be permissible.

It is very difficult to estimate the cost of the process, but, roughly speaking, it can be taken at that of crushing and grinding ores to 30-mesh fine, and the usual cost of concentrating such ore, plus two gallons of oil per ton of ore, plus the royalty the owners may charge. All extra cost of oil loss (price at Barmouth, Wales, $8\frac{1}{8}$d per gallon) and royalty to be paid has to be covered by the difference in yield between wet concentration and this process. I am convinced this process has individual applicability, but it would be a mistake to assume that it can be applied to any and all ores; its field is limited. How the oil will act on any of the copper ores besides the before cited copper pyrites I am not in a position to say. Each ore will have to be tested, in representative large lots, before it would be safe and prudent to draw the conclusion that it can be treated by the Elmore process.

---

*Condensed from paper read at Mining Institute.

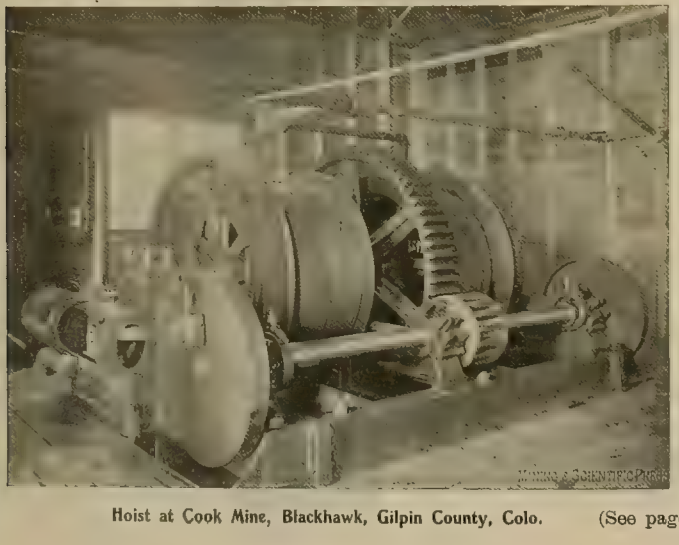
Central California Electric Co.

One mile north of Auburn, Cal., the main or Bear river canal of the Yuba Water Co. has a fall of about 200 feet within a distance of half a mile. Previous to the summer of 1898 the water flowed down Auburn ravine, but has since been diverted to the canal. At this point of junction a power house has been erected. A reservoir, capable of holding a day's supply, was built at the head of the ravine. The pipe connecting the reservoir and the power house is of riveted sheet steel varying in thickness from No. 12 to No. 6 at the receiver end. It is altogether 3100 feet in length, the first 20 feet being 54 inches diameter, which narrows to 200 feet of 40-inch and finally to 36-inch, which size is maintained throughout the remainder of its length. With the exception of about 200 feet the pipe is buried at least 1 foot under the surface.

The electrical equipment was furnished by the Westinghouse Electric & Manufacturing Co. The generator at Auburn is of the revolving armature type, 500 kilowatt capacity, 550 volts and sixty cycles at 300 revolutions per minute. The generator is set on four blocks of granite which stand on the natural bedrock, well grouted with cement. The cables from the generator run under the main floor to the switchboard and thence to the transformers which are behind it. The transformers, four in number, are 125 kilowatt capacity each, and transform from 550 volts two-phase, to 15,000 three-phase. High tension fuses are in a framework under the arresters. At one side of the building near the main water wheel, but on the station floor proper, is a $7\frac{1}{2}$ kilowatt exciter, direct connected to a 12 H. P. Pelton water motor. These are mounted upon the same base.

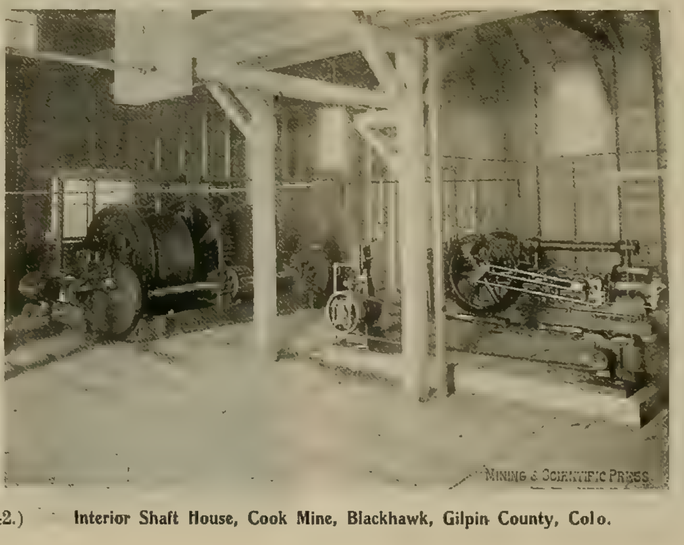
The regulation is done entirely by using the deflecting hoods, which throw the water directly into the tail race. There is no attempt at saving water as the flow in the canal must be maintained at all times. A by-pass is provided to keep up the supply of water in the canal when the machines are not running. The main pipe is tapped near the rear of the building with an 8-inch gate valve, with a discharge pipe into the tail race; this, as well as the main pipe in the building, is imbedded in concrete to prevent any vibration or displacement. At the rear of the building a 12-inch gate valve in the main pipe discharges into the ravine.

The main transmission line consists of three No. 4 hard drawn copper wires supported on Locke three petticoat glass insulators on locust pins, the latter being boiled in paraffine before using. The poles are 30-foot sawed redwood. The line runs directly to the Newcastle generating station, terminating in a marble plugboard with two panels and four sets of three plugs each. The Newcastle and Auburn plants are arranged to run in parallel, the current being transmitted to Sacramento, 29 miles distant from Newcastle, 34 miles from Auburn. The synchronising lamps at Auburn are connected in, one on the transformer, and one on the generator side of one of the main switches. In order to synchronise the two plants, current from the plant which is running is allowed to flow to the other station, stepping down through the transformers. The generator is then started, and the switches thrown in in the ordinary manner. When the two stations are running together all regulation is done at Newcastle, the station at Auburn carrying a prescribed load, and increasing or decreasing 100 H. P. at a time as the total load may require and at the direction of the man in charge of the Newcastle station. It is found that if the machines at Auburn be underexcited the machines at Newcastle may be overexcited to compensate.



Hoist at Cook Mine, Blackhawk, Gilpin County, Colo.

(See page 42.)



Interior Shaft House, Cook Mine, Blackhawk, Gilpin County, Colo.

MINING SUMMARY.

ALASKA.

(Special Correspondence).—There are now forty-five sailing and steam ships at anchor, besides numerous tugs and lighters; lightering is a slow business. Passengers of the Santa Ana were unfortunate in having their baggage burned at sea before reaching Dutch Harbor, and in being quarantined, with the Ohio, at Egg island, for smallpox. There are 30,000 people here, most of whom are tented in and around the city—an orderly, quiet place considering all things, although there is some stealing of boats in place of horses, and other minor offenses, some jumping of town lots ending in shooting scrapes and lives taken. The U. S. Commissioner is doing his best to attend to the police business, but finds far more than he can dispose of. If there is excitement over the outlook, it is certainly of a subdued nature. There are any number of claims for sale or lease, owned by the older residents who wish to return to the States, and many hundreds of new comers are already returning, some without going out of town, who either lack courage or think discretion the better part of valor. The departures will increase from now on. Many Dawsonites arriving "over the ice" this spring say they have left a better country than this and are returning, but none of the new arrivals have had sufficient opportunity to base their opinion on personal experience. The first from Dawson via the river and St. Michaels arrived here June 10. There are several steam and gasoline pumping plants and all manner of machinery for saving gold being landed along the beach, principally between Snake and Penny rivers, on ground which was worked over with rockers last year, but is now expected to pay with a sluice head of water. The various degrees and phases of inexperience of the operators of some of these plants will account, in part at least, for the discouraging results obtained in some cases. Some who are rocking on the beach are making from 1 to 2 ozs. a day, but the large majority are only making grub. Some lucky ones discovered about 800 yards of remarkably rich beach at Topkok and took out big money; four men are reported to have taken out $35,000 each in a week, but say they got practically all in sight. Pumping plants will be located there. Preparations are being pushed for work on creek claims, and by the middle of next month mining for this season will be in full swing. Prices are going down daily. Lumber is now $95 and coal $60; square meals, $2; two eggs fried and ham, $1; bread, 25 cents a loaf; bunks for the night $1 to $4, there being far too few places for the crowds the ships are landing to sleep in, people's tents and outfits being among the freight, which is landed slowly. Boats are at a premium. Ordinary whipsawed lumber Yukon river row boats, 20 feet long, brought $200 each a week ago, but now sell readily for $100 each. Boat building is a leading industry. The post office arrangements are wholly inadequate. One has to wait an hour in a line of fifty for his turn at the general delivery window, if his name begins from A to L, but if fortunate to have a name beginning from M to Z, he gets his mail quicker. Freighting in boats holding, say, two tons, along the beach, is $4 to $8 an hour; two horses and wagon, $10 an hour. Here are some advertisements around town: "$1000 will buy one of the best lays in the country, if taken at once." "Mining claims for sale." "Lot 30x90 feet, facing Front and Beach, $4000." "For sale, twenty head mules and horses." "For sale, tundra claim; 25 cents a pan has been taken out; price, $7000."(!) "For sale, wagon, team and harness, all in good shape, $900." "For sale, ten tons of hay, oats and corn, $12 per ton." "For sale, a complete sluicing outfit—pumps, engine, etc.—a snap." Building is going on rapidly, as lumber arrives. Wages, carpenters, $1.50 an hour; longshoremen, $1 an hour.

Nome, June 29.

The St. Paul from Cape Nome, June 27th, arrived in San Francisco July 10th. She brought $1,500,000, of which about $100,000 came from Nome, the rest from the Klondike. All the passengers tell the same story. Dr. Z. T. Mallaby thinks there will be worse than the bubonic plague there soon. "There are about 15 miles of tents along the beach, and it is as much as a man's life is worth for an outsider to venture among them. There is absolutely no sanitation, and when the swamp begins to dry up the men will die like flies in summer from typhoid fever. Dawson in its worst days could not compare with Nome, and the thought of the wretchedness that will prevail there next winter is enough to make a man shudder. There are at least 30,000 people up there, and how 20,000 of them are going to live is a mystery. The stories about $4 an hour being paid for labor are false; $1 an hour is the limit, and men are clambering over each other to get that. Nome is rich. I don't think there is any question about that, but no one has done any prospecting, as every man is defending his claim with a shotgun."

Twenty cases of smallpox to July 2 are officially reported at Cape Nome.

ARIZONA.

COCHISE COUNTY.

Near Bisbee the Lowell & Arizona will erect a 300-ton smelter. The shaft will be sunk 1000 feet.

GRAHAM COUNTY.

The Arizona Copper Co. at Clifton reports its copper production for May was 651 short tons.

The Shannon Copper Co. are investigating the mine before reduction works are decided on.

The smelting plant and concentrator of the Detroit Copper Co., at Morenci, recently destroyed by fire, will be replaced at once; the Morenci & Southern Railroad will soon be completed to the camp. Heretofore all material has been hauled from Clifton by team.

MOJAVE COUNTY.

The main shaft of the Tennessee mine is being sunk another 100 feet. The mill will resume when the shaft reaches the 500 level.

PINAL COUNTY.

The plant of the St. Louis Gold Extraction Co. at Mammoth, recently closed down by a temporary injunction, is expected to soon resume operations. The company proposes to put up $20,000 in cash in lieu of the $20,000 bond required of them by the court before entering an order dissolving the temporary injunction.

YAVAPAI COUNTY.

(Special Correspondence).—Walker is on Lynx creek, of old-time placer fame, but, of late, quartz mines with promising prospects are prominent.

At the Penn M. Co.'s property thirty tons of ore are run through a 5 foot Huntington mill and concentrated; three four-horse teams haul the concentrates to Prescott, 12 miles.

A. J. Doran is working the Accidental, on which he has built a 5-stamp mill.

Preparations are being made to start up the Kennedy mill.

Dr. Lewis is developing the Honolulu.

E. S. Howard will be manager of the Oriental Co.'s mill, on Big Bug.

Walker, July 6.

On the 6th inst. fire destroyed the greater portion of the mining camp of McCabe, 20 miles from Prescott.

The Mountainside M. & M. Co. has been organized at Clinton, Iowa, to operate gold mines near Stanton.

At Groom creek Supt. Mackin is in charge of the Silver King. Supt. McPherson has completed a 10-stamp mill for the Empire.

CALIFORNIA.

AMADOR COUNTY.

Dispatch: The water is out of the old shaft at the Oneida mine; the bottom now is 11 feet below the 1350-foot level. The time occupied in clearing the old shaft, with its hundreds of feet of drifts of water was less than ten months. The mill will soon be ready to run.——At the Peerless mine Supt. Osborne reports the shaft down 325 feet; 5 feet of good rock in the bottom.

CALAVERAS COUNTY.

(Special Correspondence).—The Melones tunnel is now in a distance of 3400 feet; face in soft talc, requiring timbering. The average progress per week to date from March, 1899, has been 53.12 feet.

Robinsons July 11.

(Special Correspondence).—The California & Ophir mine here has been bonded to San Francisco men. A shaft is being sunk; depth now over 90 feet. Wm. Miller, formerly foreman Utica mine, is interested in the bond and has charge of the development work. The rock shows free gold and prospects well. They have encountered a great deal of water.

Carson, July 10.

A new boiler is being erected at the Bruner mine, near Angels, so as to permit of further development.

Prospect: The Ghost mine is being unwatered.——The San Justo, on Carson Creek, will soon begin crushing rock. Supt. Flint proposes to make the mine a profitable producer.

EL DORADO COUNTY.

The El Dorado W. & D. G. M. Co. is preparing to work its property.

Nugget: Drew, Cohn & Donnelly are turning the South Fork of the American river at Salmon Falls, under the supervision of J. Wild.——Reese & Roelke have bought a two-thirds interest in the Harrison quartz mine, Kelsey district.——The 5-stamp mill at the Wagner mine on Traverse creek is in operation.——Twenty-five men are now employed at the Kimbal G. M. Co.'s gravel mine near Placerville. One hundred tons of gravel are put through the mill each twenty-four hours.

INYO COUNTY.

Supt. Matthews of the Utah & Inyo M. Co. will begin marketing ore next month. He is raising nothing that shows less than 30% lead, with fair values in silver.

KERN COUNTY.

Bakersfield Californian: J. B. Treadwell has three wells pumping at McKittrick, averaging 300 barrels per day; larger pumps will be put in. In the Kern river fields Mr. Treadwell has thirteen wells finished and three others under way. Those now completed will probably yield at the rate of 1000 barrels daily until the "head" is pumped off.

LASSEN COUNTY.

At Hayden Hill there has been placed an attachment on the Golden Eagle mine.

LOS ANGELES COUNTY.

The Westlake Oil Co. has twenty-six wells pumping and expects soon to have two more on the pump. In wells Nos. 27 and 28 the drills have struck oil sand and are still drilling.

The Primrose Crude Oil Co., drilling in the northwestern section of Los Angeles, is using a rotary jig.

Mining Review: The American Oil & Asphalt Refining Co. is enlarging its Los Angeles refinery from a capacity of 250 barrels of crude oil per day to 1000 barrels.

NEVADA COUNTY.

The Red Cross mine at Omega is to have the engine and boiler from the Sunflower mine near Pike City, Sierra county.

The Brunswick Con. G. M. Co. has levied an assessment of 7 cents per share, delinquent August 20.

At the Pennsylvania mine a new station is being put in at the 700-foot level.

PLACER COUNTY.

Heber Holman, former Supt. Best & Belcher, Gould & Curry and Utah Con. mines, is developing mining property near Colfax.

PLUMAS COUNTY.

Supt. Gray of the Rich Bar M. Co. is about to begin sinking the shaft.

SAN BENITO COUNTY.

Eighteen Japanese going to work at the New Idria quicksilver mines were met by four miners, who said that if the Japanese were to get the same wages as the white men—$1.75 to $2.50 a day—they could go to work. The Japanese were under contract to work for $1.25 a day, and the miners turned them back.

SAN BERNARDINO COUNTY.

The S. P. Co.'s raising of the freight rate on raw borax from $6 to $28 a ton, which caused shutdown of the refining works at Alameda point, is said to have been rescinded and the former rate restored. The matter was editorially noted last week. It is stated that the big advance in freight rates on the crude product was made by the railroad company after it was learned that the borax was being put through a process at the mines which took out 25% of the weight by evaporation. The saving of freight was about one-fourth. The raise resulted in shutting down the works at Alameda, the freight business of the borax company going to the Santa Fe, as it was cheaper to ship direct to the refinery in New York.

The Santa Fe Ry. Co. will build tanks for storing oil to be used in all the engines operated between Needles and Point Richmond, to hold 250,000 gallons of oil, at Barstow and Mojave.

SHASTA COUNTY.

The assessment of the Iron Mountain mine for the current year is $1,750,000.

The Harrison Gulch mine is assessed to the Midas G. M. Co. at $100,000.

The Balaklala M. Co. has made final entry in the U. S. Land Office for a patent to the thirteen claims of the Balaklala group, making final payment of $1025.

Democrat: At the Arps group of mines at Copper City the new tunnel is in 400 feet.——The National mine in Churntown district has been temporarily closed down.——Twenty stamps are dropping at the Midas mine, in Harrison Gulch district.——The tunnel in the Crystal Pool copper mine, Stillwater district, near Pit river, is in 40 feet and parallels the big ledge. Some good sulphide ore is shown and the wall rock carries gold and silver.

SIERRA COUNTY.

At Brandy City Manager J. Arnott of the Monterey M. Co. has men driving the main tunnel to reach the pay channel.

SISKIYOU COUNTY.

From the Dewey mine, Gazelle district, ore is hauled to the railroad, a carload per day. Freight to the Keswick smelter is $2.40 per ton. The ledge has been developed by a tunnel 425 feet. Supt. Boyle has thirty men at work.

E. D. Baker has bought the Black Bluff mine, Fool's Paradise, for $10,000. The shaft is now down 40 feet and a contract has been let for a 200-foot tunnel. He will put in a small stamp mill.

E. D. Baker, working his Cherry Hill quartz mine at Cherry Creek, has $5300, the result of twenty-four days' run of the mill. He has good ore in sight.

TRINITY COUNTY.

Fillius & King have a bond on a copper prospect on Eel river. The ore assays 9% to 13% copper and an average of $4 gold. They will put men to work Aug. 1.

Supt. Dobler of the Brown Bear mine at Deadwood expects to have the new 10-stamp mill at the lower tunnel finished and in operation by September 10.

TUOLUMNE COUNTY.

(Special Correspondence).—Mr. Poundstone has charge of the Densmore mine, near Columbia, and is running a lower tunnel for Messrs. Hayward et al., who own the property, to develop more ore.

The Norwegian mine at Tuttletown has struck another rich bunch of ore and is looking well.

At the Bown mine Supt. Rule is doing development work on the east vein, where they have a good body of ore. Work on the west vein has been temporarily abandoned.

Columbia, July 11.

At Big Oak Flat the shaft at the Four Oaks is at 200 feet; crosscutting is being done to tap the vein.

Supt. J. McCallum, at the Kanaka, has his mill in operation. At 600 feet a crosscut has developed a body of ore.

The Dutch M. & M. Co. has levied an assessment of 15 cents per share, delinquent July 30.

The Mazeppa G. M. Co. has levied an assessment of 3 cents per share, delinquent August 7.

Independent: The Sunnyside mine, Summersville, is sold by H. Smith to Baker Bros.——The Draper mine shaft is clear of water.——At the Siberian mine, near Columbia, a mill is talked of. F. Reinville has charge of the work.——The Treasure group, near Columbia, is being operated by the Federal Exploration Co. of New York. W. H. Frye has charge.——The new water ditch for the Horse Shoe Bend property will be 8 feet wide by 4 feet deep, calculated to carry 10,000 miner's inches.——The Free Lance, Berger's ranch, is operating five stamps.

VENTURA COUNTY.

At Los Angeles on the 9th inst., Judge Ross in the U. S. Circuit Court gave a decision in the case of the Olive L. & D. Co. against W. H. Olmstead et al. The suit was brought to quiet title to oil bearing lands in this county. The plaintiffs had secured an order requiring defendants to show cause why they should not be permanently enjoined from boring for oil on said lands. The decree is entered in favor of the complainant. The case is important in that it upholds the rights of those who hold lands through locations obtained by the use of scrip, which lands are known as lieu lands. The Court affirms that the settling upon lands as agricultural claims is sufficient to hold it, even though others should come along and oust the settler by putting up monuments and laying claim to the land as a mineral claim. Thousands of acres of land held by settlers as agricultural land in central and southern California has been relocated and is now being held by mineral claim locators as oil lands. It was almost a foregone conclusion that Judge Ross would decide as he has. His decision in the case of the Nevada Sierra Oil Co. vs. Home Oil Co. last December showed what his decision in this last case would be. In both decisions he followed the letter though not the spirit of the law, and it is doubtful if his decision would be overruled were the case taken to the appellate court. This whole question of scrip and law of title to oil lands was clearly and ably set forth and discussed in the issues of April 7, 14 and 21, 1900, the best exposition of this important subject that has appeared.

COLORADO.

(Special Correspondence).—The Colorado & Southern, Colorado Midland and the Rio Grande Western railways are now operated as one system, each road, however, maintaining its separate organization. The Colorado Midland line runs from Colorado Springs via Leadville to Grand Junction; the Colorado & Southern reaches out from Denver to the mining districts of Gilpin, Clear Creek, Boulder, Park, Summit, Lake and Gunnison counties, to Colorado Springs, Pueblo and Trinidad. It reaches Cripple Creek over the Midland and Midland Terminal. It is believed a line will be constructed, connecting the South Park branch of the Southern with the Midland, to make a shorter line between Denver and Cripple Creek and between Denver and Leadville. The Rio Grande Western, whose main line runs from Grand Junction, Colo., to Ogden, Utah, handles the western business not only of the Colorado & Southern–Midland lines, but that of the Denver &

Rio Grande, the lines of the latter system reaching such districts as Cripple Creek, Leadville, Aspen, the San Juan, Gunnison, Creede and Trinidad. In general, the two systems rival each other in the Arkansas valley, Cripple Creek, Gunnison, Aspen and the Trinidad section; and while Boulder, Gilpin, Clear Creek, the South Park and the Blue River regions are strictly the territory of the Southern–Midland combination, the Denver & Rio Grande is supreme in San Luis valley, Creede, the San Juan and the lower course of the Gunnison. The resources of Rio Blanco and Routt counties are attracting much attention, great as they are known to be in mineral and grazing wealth, and it is not difficult to foresee activity in railroad building that will connect that well-watered section of mountain and valley with Denver.

Denver, July 4.

BOULDER COUNTY.

Thirty-five men are employed at the B. & M. mine, at Ward. High-grade ore from the 400-level is shipped to Denver. A new 100 H. P. boiler is just installed in connection with two others, with capacity of 85 and 35 H. P., respectively.

Samuel Knott is now superintending work on the Nancy group at Wall Street.

CUSTER COUNTY.

(Special Correspondence).—The Geyser mine, at Silver Cliff, whose shaft is 2650 feet deep, was closed down on the 5th inst., an assignment having been made to W. J. Elmendorf. Current debts for labor, fuel, supplies, etc., amount to $25,000. A reorganization is looked for, and it is believed the idleness will be only temporary. It is claimed nearly $2,000,000 have been expended on the Geyser. It is also claimed that good ore has been found at various depths.

Silver Cliff, July 8.

DOLORES COUNTY.

(Special Correspondence).—The Atlantic Cable group, at Rico, owned by T. Walter Beam, and under bond to the New Jersey Zinc Co., is attracting much attention by reason of the discovery thereon of a contact deposit of zinc-lead-copper ore, with some gold and silver, which is shown to be 40 feet thick where the work is being done. The ledge is almost horizontal and is between lime and porphyry. This and other development give Rico a lively character.

Rico, July 3.

EAGLE COUNTY.

Near Fulford the Mendota mine is being developed by the Golden Rule T. & M. Co. The vein is 12 feet wide, the pay streak 4 feet thick. The ore assays from $10 to $27 per ton gold. Within the dolomite is a porphyry dyke. Under this porphyry and on the top of a lime floor, or foot wall, is a vein of white quartz and clay from 2 to 10 feet thick, carrying fine ore.

FREMONT COUNTY.

The Rocky Mt. Smelting Co.'s plant at Florence will be ready on September 15. The main furnace building is to be of steel, 235 feet long and 75 feet wide; the ore from the time it enters the buildings until it leaves the furnaces will be handled automatically.

GILPIN COUNTY.

(Special Correspondence). — The 80-stamp mill of the Boston & Denver M. & M. Co., erected at Blackhawk by the Hendrie & Bolthoff Mfg. & Supply Co., is completed and in operation. It is near the top of the Gregory incline and at the terminus of the car tramway which connects the mill with the 400-foot level of the Cook mine, by means of tunnels. The tunnel entrance is on a level with the crushing floor of the mill. The ore, as it is delivered from the cars, passes over grizzlies, of which there are four, the fine ore sifting through the latter and passing direct to the stamps. The coarse, passing over the grizzlies, is reduced to 2½-inch sizes by four Blake crushers, run by a 60 H. P. engine, for this special purpose, which is set on the third floor. The crushing floor is 42x66 feet, below which is the distributing floor, with four bins, from which the ore is distributed to sixteen bins, ranged along above the battery floor, there being one feeder bin to each 5-stamp battery. The ore feeds from bins to batteries through Bolthoff automatic feeders. The line shaft, 6 inches in diameter and 184 feet long, is connected by belt with the driving pulley of the engine. The cam shafting is divided into eight sections, each section connecting with the master shaft by belt and pulley and operating ten stamps. By this arrangement any section of ten stamps may start or stop independently of the others. Besides, patent fingers are provided, which work by eccentrics, by which any stamp may be hung up. The battery posts are 12x24 inches and 22 feet long. The stamps are 1000-pounders, dropping about ninety-five per minute. The cams are of the Bolthoff patent, each having, in addition to the regular type of key, a gib key which passes through the cam, over the shaft, pressing down upon the latter, making the fastening more secure. (See engraving on front page.)

Below each 5-stamp battery is an amalgamating plate of soft copper, superplated with 2½ ozs. of silver to the square foot. Each plate is 5x18 feet. The material passes from the sixteen plates to twenty-four Woodbury concentrators, ranged in two rows on the lower floor, material from every two plates discharging upon three tables. The concentrates will be delivered into cars for shipment by belt conveyors, there being one conveyor to each three tables. It is estimated the capacity of the mill will be 300 to 350 tons of ore per twenty-four hours, and will require two crews of six men each.

The power to run the stamps and concentrators is a Standard Sioux Corliss engine, 250 H. P., with cylinder 20 inches diameter and 42-inch stroke. The fly-wheel is 15 feet diameter and weighs three and a half tons; the driving pulley is 10 feet diameter by 30-inch face. The engine is provided with latest pattern of valve gearing, water relief and oiling devices. The power is derived from four boilers of 100 H. P. each.

Blackhawk, June 19.

At Central the Gettysburg mine is reported to have, at a depth of 50 feet, a vein of smelting ore 16 inches wide—$50 a ton—"yellow copper," "white iron" and "peacock."

The ore shipments of smelting rock and mill concentrates from the county for June amounted to 225 cars, or 4590 tons.

LAKE COUNTY.

(Special Correspondence).—The Starr placer grounds, comprising 35 acres along California gulch, are reported sold to C. B. Kountze and associates of Denver. This is considered very valuable ground.

Much interest at Leadville centers in the mineral ground lying immediately under the business portion of the town. Recent developments in the Home and other down-town groups make it certain that the ground under Harrison avenue—the main business street of the town—has great mineral value; but this ground belongs to the numerous lot owners, because title passed to them originally without reserving mineral rights. Efforts are being made by various companies to acquire by purchase or lease sufficient contiguous ground from the lot owners to warrant starting mining operations, but the task is proving slow and difficult. It results, however, in giving many persons a snug sum for the underground segments of their lots which they never counted on.

The original workings in Leadville district were in the placer grounds of California gulch in 1860. From that date to 1878 they produced millions of dollars in gold; and since the discovery of the silver-lead-carbonate contacts, which made the camp famous, these placers have been continuously worked in a small way. A number of men are working them this season.

Leadville, July 5.

At Leadville on the 4th were broken some drilling records. Andregg & Chamberlain of Victor drilled 39$\frac{17}{32}$ inches in Gunnison granite in fifteen minutes; Richard Conley of Victor, single-handed, 21½ inches.

The Miner thinks that a zinc smelter that could save the zinc and silver values would be a big dividend earner in Leadville. There are quantities of ore carrying from 5 to 15 ozs. in silver with percentages of 10% to 50% zinc, most of which at the present time cannot be treated to advantage on account of the heavy penalties imposed in the ordinary lead smelters and the loss in values of zinc. The Miner thinks that could the zinc and silver values both be saved it would increase the output of that camp close to 25% in value.

LA PLATA COUNTY.

The Gold King Con. M. Co. incorporated under the laws of Maine, capital $6,000,000; will acquire twenty-eight mining properties in southwestern Colorado.

OURAY COUNTY.

(Special Correspondence).—More activity on Red mountain than for several years is reported. It is expected the railroad tracks will reach this locality from the Ouray side soon. The Silver Ledge, Bobtail, Vanderbilt, National and Robinson are shipping regularly, and the Mono has ore on dump ready for shipment.

Ouray, July 8.

ROUTT COUNTY.

(Special Correspondence).—It is given out that a shipment of copper ore will be made from the Farwell district, which is claimed to be rich enough to stand a wagon haul of 100 miles to the nearest railroad point, thence by rail to the smelter.

Hahn's Peak, July 4.

SAGUACHE COUNTY.

(Special Correspondence).—The Bassick mine at Silver Cliff is shipping about 100 tons of concentrates per month to the smelters.

Silver Cliff, July 7.

Near Crestone the Cleveland–Boston group is sold by Coleman & Quinn to A. Emanuel of Cleveland, O., for $30,000. The Cleveland is down 220 feet and shows hematite that runs $100 per ton. The new owners will put on a steam hoist and sink 200 feet deeper.

At the San Isabel, north of Crestone, work on the mines and mill has resumed.

SAN JUAN COUNTY.

The last shipment of 400 pounds from the Sylvanite mine, taken from different parts of that property, gave returns of 28½ ozs. gold and 36 ozs. silver for the highest lot, the lowest giving 22 ozs. gold.

TELLER COUNTY.

(Special Correspondence). — The Bull Hill Con. M. Co. is the name of a new corporation promoted by the Woods Investment Co., to take over about eighty acres of mineral ground on Bull hill, in the neighborhood of the Wild Horse mine, also owned by the Woods people. It is given out that the recently acquired tract was purchased from various parties by the Woods Co. at a cost of about half a million dollars.

Victor, July 9.

For the first half of 1900 Cripple Creek produced gold to the value of $12,413,070. Of this, incorporated companies paid $3,500,000 in dividends.

The Gold Coin mine during June produced 3600 tons of ore, the greater part of a smelting grade. The average value of the ore for 1899 was $46.50.

The monthly tonnage of the Elkton is about 1100 tons, of an average value of $90 per ton.

A small "rush" is reported from Cripple Creek district to a new find 10 miles north of Victor and 8 from Pike's peak, at graders' camp No. 5. It consists of a vein 2 inches in width containing fluorspar and talc.

IDAHO.

ADA COUNTY.

Mgr. Anderson, in the Viola mine, Black Hornet district, has a ledge of high grade ore on the 400-foot level that he thinks justifies "the installation of a large plant." His address is Boise, Idaho.

IDAHO COUNTY.

The Little Giant mine at Warren is sold to Walter Hovey Hill, trustee, for $100,000. A company is being formed to develop the property.

LATAH COUNTY.

The Muscovite mica mine has a carload of mica at Troy awaiting shipment. A tunnel is being run to tap the vein 300 feet below the present workings.

SHOSHONE COUNTY.

J. P. Keane has a contract for 7000 feet of tunnel on the Empire State property, at Government Gulch. It is now in 500 feet. It is 8x8 feet in the clear, with a flume underneath, for the water, 10 inches deep by 3 feet wide.

WASHINGTON COUNTY.

At Weiser the Thunder Mountain Con. G. M. Co., Ltd., has decided to suspend operations. One of the obstacles was that a payment of $9000 was due the owners.

MISSOURI.

BARRY COUNTY.

A. H. Mayne, formerly of the Daisy, Mercur, Utah, has acquired 9000 acres of zinc-bearing ground in this county, involving an outlay of nearly $200,000.

MONTANA.

BEAVERHEAD COUNTY.

D. T. Haskett, working tailings at the Hecla, Glendale, is operating a mill there at a profit.

BROADWATER COUNTY.

The Iron Age, at Winston, employs twenty men and ships six cars per month of pyritic iron ore to the East Helena smelter. The ore carries gold.

DEER LODGE COUNTY.

The Amalgamated Copper Co. has refused the request of the Butte Miners' Union for an eight-hour day, and each side is waiting.

On the Big Blackfoot, 40 miles north of Drummond, the Montana Copper M. Co. is driving three tunnels. On the Bryan a tunnel is being driven 750 feet; on the Copper World 500 feet and on the Porto Rico 325 feet.

At the Anaconda are to be six new 150 H. P. tubular boilers, which, with the six 200 H. P. marine boilers, will connect with the single steel stack recently completed.

FERGUS COUNTY.

Near Lewiston, H. T. Kendall, Supt. Moccasin mines, is building a cyanide plant, capacity 114 tons daily.

JEFFERSON COUNTY.

The Queen mine at Elkhorn is in operation.

J. O. Briscoe has charge of the Minah property near Wickes.

MADISON COUNTY.

W. Dickerson, manager German Bar M. Co., says the dredgers are satisfactory and fuel is hard to get. He pays $4 a cord.

SILVER BOW COUNTY.

E. Wright has sold to the Butte Con. M. Co. the Plumber quartz claim, near the old Boston & Montana smelter, for $15,000.

NEVADA.

ELKO COUNTY.

During the year ending July 9th the earnings of the Dexter M. Co. at Tuscarora amounted to $237,526.86, of which $41,189.57 was net.

LINCOLN COUNTY.

Fay, two miles from Deer Lodge, is Nevada's newest mining camp.

The Horse Shoe mine gives employment to 100 men. Work on the new mill will start August 1.

The DeLamar mine paid a county bullion tax of $4920.20 for the three months ending June 30.

STOREY COUNTY.

The electric power line will be completed to Virginia City August 1. The sub-station near the C. & C. shaft is nearly completed. The new Gould & Curry mill is under way.

The Con. Cal. & V. M. Co. directors have an agreement with the Selby Smelting and Lead Works to ship the latter all the first-class ore the mine can produce, up to 500 tons per month, valued by assay not less than $35 per ton, to Selby, Vallejo Junction, to be sampled and sold. The directors will have all ores assaying below $35 per ton treated at the Kinkead mill.

NEW MEXICO.

BERNALILLO COUNTY.

Manager Wynkoop of the Cochiti R. & D. Co., Woodbury, tells the New Mexican his belief that lightning caused the fire which destroyed the Woodbury mill. The plant cost $52,000, was insured in a Denver agency for $10,000. Mr. Wynkoop says a new plant will be put up; he will put in the cyanide leaching system straight and the combination of pan amalgamation and cyanide used in the old mill. The new mill will cost nearly $100,000 and will daily treat 100 tons of ore from the Iron King mine.

GRANT COUNTY.

The smelting plant of the Silver City Reduction Works is handling 150 tons per day and employing seventy-five men.

The Wilson M. & M. Co. has incorporated at Santa Fe, capital $30,000, to work property at Stein's Pass.

New Mexican: About 200 men are employed by the Santa Fe G. & C. Co. at San Pedro. The new 200-ton smelter will start by October 1, when 500 men will be given employment.——The Central mine is being reopened by Newbery & Terry. —— Within a radius of 25 miles from Cerillos 2000 men are employed in gold, silver, lead and copper properties ——The Cerillos smelter is running satisfactorily.

OREGON.

GRANT COUNTY.

Near Granite, H. S. McCallum, manager Bald Mountain G. M. Co., has paid to R. C. Haywood $20,000—second payment on purchase price of the Bald Mountain mine.

JOSEPHINE COUNTY.

The Humason 5-stamp custom quartz mill at Gold Hill is at work.

LANE COUNTY.

At Blue River the Lucky Boy 10-stamp mill has been going day and night since it was started last December. The company will add ten more stamps to the mill.

SOUTH DAKOTA.

LAWRENCE COUNTY.

The Homestake M. Co. is repairing the Father DeSmet and Caledonia stamp mills at Central City. The water ditch from the Spearfish river will be completed November 1, at a cost of nearly $1,000,000. It is figured that this water supply will be sufficient for the running of the two old mills now being repaired, together with the four mills now in operation. With the Caledonia and DeSmet mills in operation there will be a total of about 900 stamps at work. It is expected that the company will have the 1000-ton cyanide plant completed within three months. The company now has 2300 men at work. The Review says the Ellison hoisting plant has been completed at a cost of about $250,000.

UTAH.

SALT LAKE COUNTY.

The Highland Boy smelter, since the

plant was started up in June, 1899, has shipped 111 carloads copper pigs, approximately 6,600,000 pounds. G. K. Fischer will have the capacity of the present smelter doubled by 1901.

SUMMIT COUNTY.

Record: J. McGregor of the Crescent contemplates starting a tunnel in Nigger hollow, to be driven into the hill 2 miles to strike the ore bodies at about 2700 feet. ——Supt. Hickey of the Comstock Co. will sink a three-compartment shaft 300 feet before crosscutting.

TOOELE COUNTY.

Manager Bothwell of the Sacramento at Mercur milled 3600 tons in June with forty-two men. His expenses were $3500.

F. G. Janney, Supt. Golden Gate mill at Mercur, is daily crushing 700 tons.

WASHINGTON.

FERRY COUNTY.

At Republic there is a dividend payer. There are two mines that can produce 100 tons of ore per day—the Mountain Lion and Republic; by the close of the year it is expected that the Black Tail, San Poil, Tom Thumb, Quilp and Chico will be in the list. The payroll of the camp is about $50,000 per month. The Republic employs 159 men, the Mountain Lion 75, the Quilp and Tom Thumb 29 each.

OKANOGAN COUNTY.

F. D. Howe, consulting engineer Okanogan Free Gold mines, near Oro, says the mill is not running, and will not be started until such time as the mine is in a state of development that will insure a continuous supply of ore.

STEVENS COUNTY.

At Nelson, in the Reservation M. & M. Co.'s property, Manager Atchison during the past two months has put in a 40 H. P. hoist and a 10-drill compressor.

FOREIGN.

BRITISH COLUMBIA.

At the B. C. mine, in Summit Camp, there are eighty men employed; fifteen are ore sorters. Shipping is at the rate of fifty tons daily.

H. R. Bellamy of Nelson will put in a dredge of 2000 yards daily capacity on the Jameson Creek property. It will cost $45,000.

At the Anderson Lake mines, Lillooet district, the 10-stamp mill is running day and night. The lowest grade ore is now being treated at a profit. It is expected to add ten other stamps to the mill. Mr. Newsom of San Francisco has been in charge.

Many Italians are being brought in to work in mines on Red mountain, Rossland.

Work has begun on a crosscut tunnel at the Slocan Star, surveyed a length of 2100 feet.

The last Chinese miner has now left the Extension and Alexandra collieries of the Dunsmuir Co. There is a commensurate influx of white workers and their families.

The report of the directors of the Golden River Quesnelle, Limited, claims the practical ruination of the company's property by the action of the Cariboo hydraulic people in depositing their tailings and debris from their working into the bed of the river. The company's solicitors have drafted a case for the opinion of counsel. The funds of the company will not permit of any legal action being begun.

Supt. Spaulding, of the Cannon Ball mines, on the west side of Christina lake, Rossland, has a hoist and pumping plant on and men sinking. The ledge is 12 feet wide, carrying gold, copper and galena.

Kaslo Kootenaian: It is a year since the eight-hour law went into operation; the mines are beginning to resume their old rate of shipping. Kaslo is the chief town of the Ainsworth mining division, but many of the big Slocan mines also ship through this port. According to figures obtained from the customs house, there are 200 mines under development roundabout. Of these, 90 are foreign shippers and 30 are paying or have paid dividends. The amount of dividends paid to date by the Slocan and Ainsworth mines which ship through here totals $7,800,000.

Phœnix reports the ore bins of the Old Ironsides, Knob Hill and Victoria mines full with 8000 tons of ore, waiting to be transported to the Granby smelter at Grand Forks as soon as the C. P. R. R. can handle it.

The I X L gives returns of shipments to the Northport, Wash., smelter: Shipment in net tonnage, deducting moisture, 21.41 tons, 20.42 tons averaging $76.25 per ton gave net return, deducting smelter charges and freight, $1557.10, and .99 ton at $2193.21—$2164.70.

Manager Connaught of the Lode Star M. Co., Duncan City, says if railroad facilities were at hand the mine could ship 100 tons per day.

At Greenwood forty men are building the smelter of the B. C. Copper Co. October 1 it will be blown in. Ore bins will hold 400 tons; they are 150x30 feet. The sampler will be a 600-ton: the smokestack will be steel, 75 feet high.

Reports from Horsefly, Cariboo, say that R. H. Campbell of the Miocene Co. is nearly to the gravel in the drift he is running at a depth of 550 feet.

Nelson sends returns of the Athabasca mill run for June: $27,594.72; 29 days and 9 hours; 475 tons of ore were milled; value of bullion recovered, $21,675; concentrates, $5919.73; $58.09 per ton was recovered; 80.6% extracted by amalgamation. The mine is situated on Morning mountain, 2 miles south of Nelson; it has a 10-stamp mill.

CANADA.

At Port Arthur an electric power plant to generate 600,000 H. P. is to be erected, to utilize the falls of the Kaministiqua river, near that place and Port Williams. It is proposed to invest $5,000,000 in the works.

MEXICO.

A company is organized in Louisville, Ky., to work a group of copper claims 30 miles from Dolores, southwestern Chihuahua; E. R. Simpkins is manager.

A strike is reported from the Corretas district, 60 miles from Casas Grandes. A 5-foot ledge of copper has been uncovered.

One hundred and fifty pack mules recently arrived in Casas Grandes loaded with silver ore from the Pilares district, Sonora. The ore can be loaded on wagons at Oaxaca, Sonora, but the last shipment was carried through to Casas Grandes on mules.

Chihuahua Enterprise: If negotiations now being carried on are successful, Torreon will have two large smelters. One of these is to be started by Torreon, Saltillo and Monterey parties with a capital of $2,000,000. The establishment of this smelter at Torreon has been talked of for some weeks, and now comes another proposition by R. S. Towne, president Compania Metalurgista Mexicana, to erect a smelter at a cost of $5,000,000.

Six miles from Nacosari, Sonora, the new smelter is completed at a total cost of $3,000,000. The railroad from the mines to the smelter is hauling ore for reduction; there is enough on the ground to keep the furnaces busy for two months. Men are preparing to fire up.

THE KLONDIKE.

The report of R. G. McConnell shows production as follows:

1897	$ 2,500,000
1898	10,000,000
1899	16,000,000
Total	$28,500,000

It is unlikely, Mr. McConnell says, that the rapid increase in production of the last two years will be continued, as serious inroads have already been made on the rich portions of El Dorado and Bonanza creeks, and to a less extent on Hunker and Dominion creeks, but the amounts remaining with the long stretches of medium and low grade gravels still untouched on all the creeks ensure high production for a number of years. Bonanza creek is the most important gold-bearing creek in the Klondike district. The gravels, however, have not proved uniform in value, and stretches occur which have proved too barren to work under present conditions. The richest portion extends from Victoria gulch down stream for about 2 miles. A number of claims in this stretch, he says, will yield over half a million dollars each. Mr. McConnell expresses his opinion that the placer gold, like the accompanying gravels, is of local origin, and derived from the quartz veins and silicified schists of the district. The large nuggets nearly always enclose fragments of quartz, and quartz pebbles specked with gold are occasionally found. A boulder found on No. 4, Bonanza creek, weighting 60 ozs., contained 20 ozs. of gold. Evidence of the local origin of the gold is also afforded by the markedly angular and unworn character of the grains and nuggets found in the gulches and along the upper parts of the productive creeks. The prospecting of the past two seasons has resulted in the staking of a number of quartz claims, but very little development work has been done. Prospecting can only be carried on at present over a small portion of the district, as the country rocks are nearly everywhere concealed beneath a heavy blanket of moss. Hence free milling gold mining is as yet a thing of the future in the Yukon, and only exceptionally high-grade deposits will there pay, under necessary costly conditions of life and work.

Books Received.

ENCYCLOPEDIA OF MEXICAN MINING LAW, a 200-page book, giving a well-arranged resume of the leading points in the mining law of our sister republic. In view of the interest in Mexican mines, this little volume is of timely value. It is published by Richard E. Chism, City of Mexico; price, $2.50.

Personal.

WM. P. BLAKE, geologist of Arizona, is in New Haven, Conn.

T. W. WOODBRIDGE is chemist at the Vindicator mine, Victor, Colo.

LEO VON ROSENBERG, a New York mining man, is in San Francisco.

CAPT. DELAMAR has returned from Europe to Salt Lake City, Utah.

W. G. NEBEKER of Salt Lake, Utah, is examining California mining property.

H. M. PEASE has resigned the superintendency of the Mazeppa mine, Tuolumne county, Cal.

L. G. LINN, representing Pittsburg capital, is operating a mine near Idaho Springs, Colo.

G. F. SIMMONS of British Columbia is in southern Chihuahua, Mexico, investigating copper property.

J. RALSTON BELL, formerly Supt. Grand Victory mine, Placerville, Cal., is in Grand Encampment, Wyo.

JOHN HEWITT has resigned his position as superintendent of the Gagnon, Mont., mine. William Word succeeds him.

C. RHODES, Mgr. New Zealand M. Co., Ltd., who has been looking at California smelting operations, has gone for similar purpose to Argentine, Kansas.

VICTOR M. CLEMENT is locally credited with intent to examine the Johnny mine, Stateline, Utah, and say whether it is worth the large price at which it is valued.

F. SWINDLER, superintendent De La Mar mine and mill, De La Mar, Nev., has been tendered a similar position at the Cochiti mine, Bland, N. M., and will probably accept.

B. C. CONDIT has resigned the superintendency of the Standard Electric Co., in Calaveras county, Cal., to accept the general superintendency of the Truckee River G. E. Co. He is succeeded by D. Frye.

W. B. DEVEREUX, M. E., of New York, one of the directors of the Melones, Cal., M. Co., has returned to Glenwood Springs, Colo., after a week's visit at the Melones, arranging plans for completion of the dam in Stanislaus river and the 120-stamp mill.

J. F. KIDDER, California State Debris Commissioner, has appointed James F. Robinson of Grass Valley, Cal., secretary of the California Debris Commission. The position carries a salary of $125 a month and has been vacant since the former incumbency of R. L. Thomas.

HENRY W. TURNER of the U. S. Geological Survey, Washington, D. C., is in San Francisco. He has been in the high Sierras and will make further reconnoissance this summer in Mono and Inyo counties. Mr. Turner and his colleagues have given service of great economic value and their work inures to the immediate benefit of the mining world.

GEO. E. ROBERTS, Director U. S. Mint, thinks $300,000,000 a fair estimate of this year's gold yield, and that the world's gold output will not be long in reaching $400,000,000 per annum. Although South Africa remains at the head of the column, the United States, now that the Klondike and Cape Nome are both producing, is likely to follow but a little way behind. An estimate received by him at Washington, D. C., on the 1st inst., places the gold output of the Klondike of this year at $18,000,000. He expects about $10,000,000 from Cape Nome.

Commercial Paragraphs.

THE Keystone Driller Co., Beaver Falls, Pa., recently shipped two of its largest steam drilling machines to Tomsk, Siberia, for a gold mining company.

GEO. O. BRADLEY AND D. C. JACKLING are opening a machinery supply house at Spokane, Wash., in charge of C. R. Brough, formerly of Salt Lake City, Utah.

RECENT SHIPMENTS from Eureka, Nev., included 60,000 pounds of scrap iron to the Joshua Hendy Machine Co. and 44,000 pounds to the Judson Iron Works, San Francisco.

THE Western Machinery & Supply Co., 159–161 La Salle St., Chicago, Ill., supply screening machinery; their specialty is the vibratory screen and they furnish full free information to inquirers.

DR. A. R. LE DOUX of New York City has purchased the right to use the pneumatic cyanide process in the cyanide plant of the Great Northern M. & D. Co., at Gilt Edge, Mont., which is considered the largest cyanide mill in that State.

THE Burt Mfg. Co. of Akron, Ohio, last week made one of the largest shipments of the year to their London agency. The demand for Cross oil filters in England, where they are in competition with a dozen or so of English filters, is another indication of the popularity of American manufactured goods abroad.

THE Canton Steel Co. of Canton, Ohio, from January 1 to July 1, 1900, shipped to consumers and dealers in the mining sections of the West and Northwest approximately 1,000,000 pounds of steel, for use strictly in connection with the mining industry, which figures convey some idea of the large tonnage of steel required in mining operations.

ABOUT 100 Wilfley concentrators per month are turned out at the Wilfley shops in Denver, Colo., where about 120 men are employed in their manufacture. In the woodwork white pine is used for the bedding frame and California redwood for the decks. This shop supplies most of those which are sold in the United States and British Columbia, there being shops for their manufacture in London and Mexico City.

FRASER & CHALMERS, Chicago, report having received from the Anaconda Copper M. Co. orders for a large amount of machinery for their new concentrating plant, which will have a capacity of 4000 tons per day. This machinery includes twenty-four heavy-pattern 5-foot Huntington centrifugal roller quartz mills, twenty-four sets of 40x16-inch crushing rolls with forged steel shells, and twenty-four Blake crushers, sizes 24x12 inches and 15x9 inches.

THE Hendrie & Bolthoff Mfg. & Supply Co. of Denver, Colo., recently furnished a 20x48 Corliss, flat-rope hoist for the Vindicator mine, Cripple Creek district, which is being installed. A similar hoist will be furnished the Gold Coin Co., foundation for which is being laid. This company also report a new hoist of same style for the Portland G. M. Co. at Victor, and one of same size and type for the Elkton mine. This house is also furnishing a steel gallows-frame for the Elkton.

THE Colorado Iron Works, Denver, Colo., have manufactured and set up twenty-three smelting furnaces in various parts of the country within the past year, there having been about an equal number each of the lead and copper type. One of the latest orders was a U-pipe, hot-blast stove for the Mountain Copper Co., at Keswick, Cal. This company is now manufacturing Bartlett concentrators at the rate of fifty per month, and this capacity will be increased. Numerous changes have been made in this table within the last two years, and it is now considered a table adaptable to all classes of ore. It is substantially built, weighing 2600 pounds.

"**THE** Spanish war," says E. H. Osborne, secretary National Tube Works, "was the greatest advertisement that America and American manufacturers ever got. It was worth millions to us as an advertisement. Take the battleship Oregon alone. Could anybody doubt, after the unparalleled performance of that wonderful ship—15,000 miles without a nut having to be screwed up—that American artisans, inventors and manufacturers know their business? We made the tubes of the Oregon, and of the Olympia and the Monterey. It isn't a bit of wonder to me that Irving M. Scott of the Union Iron Works, the builder of these vessels, was seriously spoken of at Philadelphia as a possible Vice-Presidential nominee."

THE Mine & Smelter Supply Co. of Denver, Colo, are thoroughly testing a new power drill called the Durkee Lightning Drill, invented by L. Durkee of Denver, Colo. It is a mechanical drill, operated by an electrical motor through a flexible shaft. Well-known and thoroughly tried devices are used as far as possible in the drill. The chuck and rotating devices are the same as those used in ordinary air drills, as is also the guide shell with feeding device. Movement is imparted to the drill rod through a bell crank, the vertical leg of which drives a crosshead which is loose on the drill rod. The horizontal leg of the bell crank is slotted, and in this slot plays a brass on a crank pin. This crank pin is rotated at about 600 revolutions per minute, and is so placed in the slot of the bell crank that the upward motion of the pin draws the drill from the rock while the bearing is at the outer end of the bell crank or at the point farthest from the pivot. This causes the drill to be drawn from the rock at comparatively slow speed, but with greater power, as the pressure is applied at the long end of the lever. As the driving crank rotates farther, the drill rod is thrown toward the rock by the downward motion of the crank pin at a point nearer the pivot, which causes a very rapid movement of the drill, the movement being at its maximum velocity near the end of the stroke. The forward motion of the drill against the rock occupies about one-third the time that the backward motion requires. The crosshead on the rod gives motion to the drill rod through a strong buffer spring which bears against a collar on the drill rod. As the cross-head draws the drill backward it also operates through a second spring against a second collar on the rod. Buffer springs are also provided to relieve the machine when the drill does not strike the rock. The simplicity of the drill commends itself to the observer and tests thus far have been satisfactory.

Recently Declared Mining Dividends.

Silver King, Utah, 50 cents, $75,000. July 10
La Fortuna M. Co., Arizona, 10 cents .... July 15
Daly-West M. Co., Utah, 25 cents, $37,000 .... July 16
Portland, Colo., 6 cents, $180,000... July 16
Gold King M. Co., Colo., 3 cents, $28,105.50 .... July 20
Vindicator Con. G. M. Co., Colo., 5 cents, $55,000 .... July 25

List of U. S. Patents for Pacific Coast Inventors.

REPORTED BY DEWEY, STRONG & CO.,
PIONEER PATENT SOLICITORS
FOR PACIFIC COAST.

FOR THE WEEK ENDING JULY 3, 1900.

652,880.—GAME—J. W. Batdorf, Hollister, Cal.
653,057.—MAIL BAGS—C. Bateman, Gales Creek, Or.
652,882.—CART—Y. H. Boudreau, Modesto, Cal.
652,911.—CONVEYOR AND ELEVATOR—G. E. Bowers, S. F.
652,889.—SURGICAL PAD—Tillie Campbell, Oakland, Cal.
653.166.—BUNSEN BURNER—H. B. Cary, Los Angeles, Cal.
653,000.—BOILER BRACE—P. F. Dundon, S. F.
652,842.—CULTIVATOR—Grimm & Fullerton, Oakesdale, Wash.
652,895.—FUEL ECONOMIZER—J. H. Hobart, El Paso, Texas.
652,794.—COUPLING BOLT—E. L. Lowe, S. F.
653,198.—WEIGHING MACHINE—S. P. Mackey, Ridgefield, Wash.
652,853.—CULTIVATOR—W. F. Magill, Dufur, Or.
653,143.—HOSE COUPLING—J. C. Martin, Spokane, Wash.
653,109.—WINDMILL—Moore & Cook, Eureka, Cal.
652,900.—GOLD SAVING MACHINE—R. H. Postlethwaite, S. F.
653,040.—GAS ENGINE—T. B. Rouse, San Miguel, Cal.
652,926.—SOUND TRANSMITTER—C. Salmond, S. F.
653,157.—TROUSERS—W. G. Turner, French Camp, Cal.
652,871.—PLOW—A. V. Wilbur, Stockton, Cal.
653,052.—CULTIVATOR—F. A. Youngberg, Garfield, Wash.
32,893.—DESIGN—S. A. Andrews, Tacoma, Wash.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

SURGICAL PAD.—No. 652,889. Dated July 3, 1900. Tillie Campbell, M. D., Oakland, Cal. This invention relates to a pad which is especially designed for obstetrical and surgical operations. It consists of a base having a surrounding hollow rim, with means for supplying hot water to fill and warm the apparatus, a drainage canal connecting with the front, and longitudinally disposed seams with intermediate ridges which form independent drainage channels to conduct away any liquid to the drainage canal. This seems to answer the double purpose of preventing the central part from rising up like a cushion, and also to form drainage channels connecting with the single receiver and discharge tube. Exit passages discharge the water from the pad, and it may be gradually discharged, while a new supply is admitted from the fountain.

FUEL ECONOMIZER.—No. 652,895. Dated July 3, 1900. J. H. Hobart, El Paso, Texas; one-half assigned to E. R. Phillips of same place. The object of this invention is to provide a device which is especially adapted for economizing in the combustion of fuel, especially where used in conjunction with steam boilers of any description. The firebox of the boiler has an arch fitted in the upper part, with an internal chamber, and a wall built up from the lower part of the firebox forms the heat passage between itself and the arch above. Passages are made in the wall and connections from the firebox, with means for connecting the passages with the chamber of the arch, and means connecting said chamber with the heat passage between the arch and the wall. Transverse water pipes have their ends connected directly with the water legs of the firebox, and serve to support the arch.

REGULATING DEVICES FOR RIDING CARTS.—No. 652,882. Dated July 3, 1900. Y. H. Boudreau, Modesto, Cal. This invention is designed to relieve the disagreeable movements of two-wheeled carts, which are drawn by a single horse, and to prevent the jerk caused by sudden starting or stopping of the animal, and also to reduce the tilting of the cart body in going up or down hill. It comprises a bent or crank axle, upon the central portion of which the vehicle body is supported, the upwardly and outwardly turned ends forming the wheel spindles. Clips are fixed to the axles between the wheel spindles and the crank portion, and fulcrum pins extending through the upper parts of the clips support the shaft by which the vehicle is drawn. Rigid bars are clipped beneath the axle extending parallel to and beneath the shafts, and springs are clipped between the axle and these rigid bars, having their ends upturned to form elastic contacts with the lower part of the shafts on each side of the axle. Plates are hinged beneath the shafts and form connections between the shafts and the spring ends.

PORTABLE CONVEYOR AND ELEVATOR.—No. 652,911. Dated July 3, 1900. Geo. E. Bowers, San Francisco, Cal. The object of this invention is to provide a device which is designed for transporting and elevating earth from excavations or pits such as are made in the construction of buildings, whereby the earth to be removed is conveyed from any point in the excavation to the elevator, by which it is afterwards raised to the level of the street or other point of deposit. The mechanism is so contrived that by means of a horizontal carrier, which may be elevated or depressed, the earth can be transported to a point where it is received upon an inclined elevator, which conveys it to a sufficient height to be discharged through a chute into wagons or other places of deposit. This second elevator is also so mounted with relation to the first that it can be adjusted to accommodate itself to the movements of the horizontal elevator.

Latest Market Reports.

SAN FRANCISCO, July 12, 1900.

SILVER—Per oz., Troy: London, 28½d (standard ounce, 925 fine); New York, bar silver, 61⅝c (1000 fine); San Francisco, 61⅝c; Mexican dollars, 49c.

COPPER.—New York: Lake, 1 to 3 casks, 16.65 cash; carload lots, 16.25; Electrolytic, 1 to 3 casks, 16.50; carload lots, 16.12½; Casting, 1 to 3 casks, 16.37½; carload lots, 16.00. San Francisco: 17. Mill copper plates, 20c; bars, 22@23c.

LEAD.—New York, $4.12½; Salt Lake City, 4.00; St. Louis, $4.10; San Francisco $5.00, carload lots; 5½c 1000 to 4000 lbs.; pipe 6¾, sheet 7½, bar 6c. London, £17 11s 3d = 3.81c per ℔.

SPELTER.—New York, $4.25; St. Louis, $4.10; San Francisco, ton lots, 5½c; 100-lb lots, 6c.

ANTIMONY.—New York, 10c; San Francisco, 1000-lb lots, 12c; 300 to 500 lbs., 13@14c; 100-lb lots, 15@18c.

IRON.—Pittsburg, pig, No. 2, foundry, $19.50; gray forge, $18.00; San Francisco, bar, per lb., 3c.

STEEL.—Billets, Pittsburg, $27.50; bars, $30.50; San Francisco, bar, 11c to 18c per lb.

QUICKSILVER.—New York, $50.00; London, £9 10s; San Francisco, local, $49.50 Ꝑ flask of 76½ ℔s.; Export, $47.

MAGNESIUM.—New York, $3.00 Ꝑ ℔.; San Francisco, $4.00.

ZINC.—San Francisco, 5½c; slab, 6c; bar, 7¾c.

SOLDER.—Half-and-half, 100-℔. lots, 20¼c; San Francisco, Plumbers', 100-℔. lots, 17c.

BABBITT METAL.—San Francisco, No. 1, 10c.

TIN.—New York, pig, $30.00; San Francisco, ton lots, 31½c; 1000 ℔s., 32c; 500 ℔s., 33c; less, 34c; bar tin, Ꝑ ℔, 37c.

ASSAY LITHARGE.—San Francisco, 10c Ꝑ ℔.

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 30c to 35c.

PLATINUM.—San Francisco, crude, $17 Ꝑ oz.; New York, $18.25; manufactured, $19.50@22.00.

BISMUTH.—New York, Ꝑ ℔., $1.60 50-℔ lots; San Francisco, $2.50 to $2.75 ℔ lots.

NICKEL.—New York, 50@60c Ꝑ ℔.

TUNGSTEN.—New York, Ꝑ ℔., $1; San Francisco, $1.25.

FERRO-TUNGSTEN.—New York, 37%, 40c; San Francisco, 75c (60%).

FERRO-MANGANESE.—Pittsburg, 80%, $125.

CHEMICALS.—Cyanide of potassium, 98%-99%, jobbing, 33@35c Ꝑ ℔.; carloads, 31@32c; in 10-℔. tins, 40c; sulphuric acid, 66% B, 2c Ꝑ ℔.; soda ash, $1.60 Ꝑ 100 ℔s. 58%; hyposulphite of soda, 2¾@3c Ꝑ ℔.; blue vitriol, 5½@6c Ꝑ ℔.; borax, concentrated, 7@8c Ꝑ ℔.; chlorate of potash, 12@13c; roll sulphur, 6c; alum, $1.90@2.00; flour sulphur, French, 2¼@2½c; California refined, 1¾@2c; nitric acid, in carboys, 8c Ꝑ ℔.; caustic soda, in drums, 3@4c Ꝑ ℔.; Cal. s. soda, bbls., $1.00; sks, 95c Ꝑ 100 ℔s.; chloride of lime, spot, $2.35@2.50; nitrate of potash, in kegs, 8c; caustic potash, 10c in 40-℔. tins.

POWDER.—F. o. b. San Francisco: No. 1. 70% nitro-glycerine, per ℔., in carload lots, 15¼c; less than one ton, 17¼c. No. 1*, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1** 50%, carload lots, 11¾c; less than one ton, 13¾c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9½c; less than one ton, 11½c. No. 2** 30% carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9.

FUSE.—Triple tape, $4.35 per 1000 feet; double tape, $3.70; single tape, $3.45; Hemp, $2.55; Cement No. 2, $3.70; Cement No. 1, $2.95.

PHOSPHORUS.—F. o. b. New York or Philadelphia, 45@50c Ꝑ ℔.

CANDLES.—Granite 6s, 16 oz., 40s., 11¾c Ꝑ set; 14 oz., 40s., 10½c.

OILS.—Linseed, pure, boiled, bbl., 79c; cs., 84c; raw, bbl., 77c; cs., 82c. Deodorized Stove Gasoline, bulk, 16c; do., cs., 22c; 86° Gasoline, bulk, 21c; do., cs., 27c; 63° Naphtha or Benzine, deodorized, in bulk, per gal., 15½c; do., in cs., 21½c; Lard Oil, Extra Winter Strained, bbl., 60c; cs., 65c; No. 1 bbl., 49½c; cs., 54½c; Neatsfoot Oil, coopers' bbls., 60c; extra bbls., 55c; cs., 60c; No. 1 bbl., 52½c; cs., 57½c.

COAL.—San Francisco, coast, yard prices: Wellington, $8; Seattle, $7.00; Coos Bay, $5.50; Southfield, $7.50. Cargo lots, Eastern and foreign: Wallsend, $7.50; Brymbo, $7.50; Pennsylvania, hd., $14.00; Scotch, $8; Cumberland, $9; Cannel, $9.50; Welsh Anthracite, $12.00; Rock Springs, $8.50; Colorado Anthracite, $14.50. Coke, $16 per ton in bulk; $18 in sacks.

NAILS.—List prices per keg: No. 20d to 60d, wire, $3.70; cut, $3.70; 10d to 16d, wire, $3.75; cut, $3.75; 8d, wire, $3.80; cut, $3.80; 6d and 7d, wire, $3.90; cut, $3.90; 4d and 5d, wire, $4; cut, $4; 3d, wire, $4.15; cut, $4.15; 2d, wire, $4.40; cut, $4.40. Special rates on carload lots.

San Francisco Stock Board Sales.

SAN FRANCISCO, July 12, 1900.

9:30 A. M. SESSION.

200 Andes. 05c	300 Crown P't...08c
400 Belcher.....17c	200 G. & C.....25c
200 B. & B......25c	300 Justice......08c
100 C. C. & V..$1 50	200 Savage......20c
300 New York...04c	300 Silver Hill..65c

2:30 P. M. SESSION.

100 Ophir 72c	100 Occidental...15c
200 ....71c	600 Justice......08c
200 G. & C......26c	100 Union.. .....21c
800 Chollar 22c	200 Alta 08c
500 Crown P't...08c	100 Caledonia .$1 05
300 Y. Jacket ...14c	300 Silver Hill..66c
200 Belcher.....18c	100 Challenge...15c
100 Confidence..75c	700 New York...04c
300 Utah........12c	200 St. Louis....17c

WANTED.

A Rich Placer proposition, adapted to working by Railroad Steam Shovel, or Dry Land Excavator. Description, with price and terms, to receive attention must be accompanied by reliable reports and references.

Address: EDWARD N. BREITUNG,
MARQUETTE, MICH.

Quicksilver

——FOR SALE BY——
The Eureka Company,
OF SAN FRANCISCO.
ROOM 1, - - 320 SANSOME STREET,
SAN FRANCISCO.

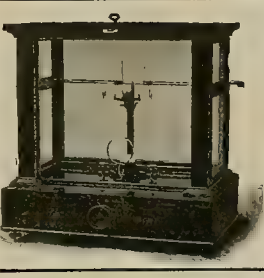
Quicksilver
For Sale in Lots to Suit.

REDINGTON & COMPANY, Wholesale Druggists, 23-25-27 Second Street, San Francisco.

SPIRAL SAND PUMPS.
For Pumping Sand, Slimes, Tailings and Crushed Ores.

The Cheapest and Most Durable Pump on the Market. Manufactured by J. H. Frenier & Son.

Represented by M. S. HAUSER,
12 Front Street, ... San Francisco, Cal.



SMITH & THOMPSON,
Manufacturers of Fine
ASSAY BALANCES.
Write for Catalogue.
2219 Stout St.,
Denver, Colo.

MICHIGAN COLLEGE OF MINES.
An Engineering School with unique location, giving it unusual facilities. Distinctive methods of instruction. Special courses. For catalogue giving occupation of graduates, address
F. W. MCNAIR, President, Houghton, Mich.

SITUATIONS WANTED.

Engineer and Metallurgist, graduate Freiberg, with years of experience in mining, smelting, exploration and ore treatment methods, with most exceptional references, seeks position. No objection to go anywhere. Speaks five languages. Fearless, energetic and temperate. Mexico, Alaska, or South America. Address MINERO, this office.

An Experienced, Aggressive Mining Engineer and Metallurgist, technical graduate, eighteen years' practical experience in the United States and Canada as manager and consulting engineer of mines and mills, is open to engagement as manager, superintendent or chemist. Thoroughly understands economic mining and reduction of gold and silver ores. Not afraid of a hard proposition. Can leave present position with month's notice. Correspondence solicited and references exchanged. Address KARL NEITZEL, Camp McKinney. B. C.

EXPERIENCED METALLURGIST DESIRES position in charge of a gold mill or cyanide plant. Thorough chemist and assayer. Understands handling machinery. Technical graduate. References. Address "Millman," Box A, this office.

WANTED—SITUATION AS MANAGER OF producing or developing property. Twelve years' experience in gold mining and milling, copper mining and smelting. Address C. H., care of Mining and Scientific Press.

MINE SUPERINTENDENT, TEN YEARS' experience in Michigan, Montana and Idaho, desires engagement as Supt. or manager of developing or producing property in this country or abroad. Best of reference. Address D. C., care this office.

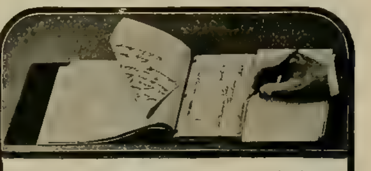
WANTED—SITUATION
by an experienced general clerk, for some good mining company. Address C. CHALUPECKY, 532 Geary street, San Francisco, Cal.

CYANIDING.
Have had charge of five mills and worked in every part of process from shoveling to laboratory work. Test ores and outline process for treating them. For three years treated SLIMES successfully. Wish a position after July 10. Have studied to excel. References as to character and ability.
Address K. C. N., Boise, Idaho, Box 3.

WANTED.

TO MINING EXPERTS.
WANTED.—A proposition containing magnetic pyrites (Fe_7 S_8 to Fe_{11} to S_{12}).
Address THOS. L. NEAL, Attorney, Lankershim Block, Los Angeles, Cal.

REFRACTORY ORES
WANTED.
1000 TONS or more which will assay $75.00 Gold per ton and over, delivered free of charge at San Francisco, Cal. Correspondence solicited.
C. J. TALLON,
308 MARKET STREET, SAN FRANCISCO, CAL.



LETTERS COPIED WHILE WRITING.
Keep a copy of all letters; **no press; no water; no brush; no work. Any ink; any pen; any paper.** Our Pen-Carbon never smuts; our clip holds paper firm. Write with no extra pressure, and our **Pen-Carbon Letter Book** produces a *perfect* copy.
Can be used anywhere. If your stationer does not keep it, write for *free* specimen of work. Agents wanted. PEN-CARBON MANIFOLD CO.,
Department 6. 145 Centre Street, New York

Hoskins' Patent Hydro Carbon Blow-Pipe and Assay Furnaces.

No dust. No ashes. Cheap, effective, economical, portable and automatic.
SEND FOR PRICE LIST TO
W. HOSKINS, 81 South Clark St., Room 55, CHICAGO, ILL.

DEWEY, STRONG & CO.,
PATENT AGENTS, 330 Market St., S. F., Cal.

FOR SALE.

FOR SALE --- Developed Zinc-Lead-Silver Property. Texas.

Two trunk lines. 700 acres. 8100 feet on vein. Splendid concentrating proposition. 1500 feet development. Mine average. Zinc, 17 66%; lead, 9 57%; silver, 7.35 ozs.; gold, .04 ozs Price, $30,000. Principals only. **H. E. RUNKLE. El Paso, Texas.**

Hydraulic Pipe FOR SALE CHEAP.

1500 feet of 10½-inch Casing weighing 27 lbs. to the foot, with Flanges, or Screws and Sockets; in lots to suit. Immediate delivery. Correspondence solicited.

C. J. TALLON,
308 Market Street, ... San Francisco, Cal

FOR SALE.

AIR COMPRESSORS.

6x8 and 10x12 Knowles, belted, straight line, high duty Air Compressors.

THE S. H. SUPPLY CO.
WRITE FOR CATALOGUE OF MINING MACHINERY AND SUPPLIES.
22nd and Larimer Sts., DENVER, COLO.

For Sale, or Will Bond With a Cash Payment,

A mother lode claim in Calaveras Co., joining Amador Co., 2000 feet long by 500 feet wide, United States mineral patent, title clear. Ledge of quartz from 6 to 8 feet on top of the ground. Mother lode runs through center of claim. Mokelumne Hill and Campo Seco Water Co.'s ditch close by. Can get big water pressure. Lots of good timber growing on the claim and could get plenty of wood for steam pressure. Also can be got the adjoining claim, which would make this one of the biggest and best mother lode propositions in this part of California. For further information, address

JOHN HOLLAND,
SUTTER CREEK,.... . ...CALIFORNIA.

INTERESTING TO MINERS!

FOR SALE.

Twelve Silvered Copper Plates, each 4 feet square, slightly used, ready for use, f. o. b. San Francisco.

1600 feet Steel Pipe, double riveted, 22 to 26-inch diameter, 10 to 12 gauge. Will stand pressure up to 300-foot head.

Also, one 3¾-inch Schuttler wagon and one road plow.

(Delivered at Libby, Montana.)

Second hand sawmill, complete with boiler and engine Kalispel, Montana.

A bargain can be had on any part or all of the above. Address S. T. F., Mining and Scientific Press office, 330 Market St., San Francisco, Cal.

Notice of Application for Dissolution.

In the Superior Court in and for the City and County of San Francisco, State of California.

In the Matter of the Voluntary Dissolution of the South Paloma Gold Mining Company, Limited. (a corporation.)

Notice is hereby given that the South Paloma Gold Mining Company, Limited, a corporation created and existing under the laws of the State of California, has presented to the Superior Court of the City and County of San Francisco, State of California, a petition praying for a judgment and decree declaring the said corporation dissolved according to law; and that said application will be heard on TUESDAY, the 31st day of July, 1900, at 10 o'clock of said day, or as soon thereafter as counsel can be heard, at the court room of said Superior Court, Department No. 3 thereof, at the New City Hall, in the city and county aforesaid.

Witness my hand and the seal of said Court the 25th day of June, A. D. 1900.

{SEAL.}

WM. A. DEANE,
Clerk.
By JOSEPH RIORDAN,
Deputy Clerk.

WRIGHT & LUKENS,
Attorneys for Petitioner,
222 Sansome Street.

Atlin Gold Fields,

British Columbia. Of particular interest to HYDRAULIC OPERATORS and experienced QUARTZ PROSPECTORS. American miners can pre-empt claims. For further particulars write BROWNLEE & LOWRY, Civil and Hydraulic Engineers and Land Surveyors, Atlin, British Columbia.

ALVIN PHILLIPS & CO.,

Chemists, Mining and Metallurgical Engineers,

1761 MARKET STREET,
DENVER, - COLO.

Complete Ore-Testing Works — capacity ten pounds to two tons. Modern Methods of Lixiviation, Cyanide and Chlorination. Concentration on Bartlett Table. Assaying and Bullion Refining Chemical Analyses of Oils, Coal, Water, and all solutions. WRITE FOR PRICES.

DEWEY, STRONG & CO.,

PATENT AGENTS, 330 Market St., S. F.

SAVE THE DROPS

A 50% INVESTMENT

is a pretty good thing—and yet there are hundreds of manufacturers who lose their waste oil from the bearings when a

CROSS OIL FILTER

would save them over 50% of their oil bills.

Sent on approval and freight paid both ways if not satisfactory. Catalogue 38.

THE BURT MFG. CO.,
Akron, Ohio, U. S. A.
Largest Mfrs. of Oil Filters in the World.

A BORE HOLE

is the cheapest, quickest, most direct, and most effective way to test lands for minerals, oil, gas, salt, sulphur, borax, water, etc.

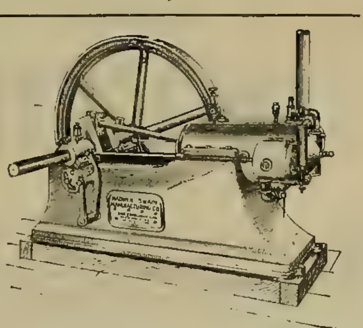
THE STAR DRILLING MACHINES

excel for these uses. They will drill a hole through anything to any depth from 250 to 2500 feet The only machines made that are absolutely without annoying springs. They are simple, powerful and efficient. Easy to handle at work or on the road. Used in every State and Territory and in many foreign countries.

We also make full line of drill tool-bits, reamers, sand pumps, spuds, etc., etc. Write for illustrated free catalogue.

Star Drilling Machine Co.,

Akron, Ohio.



Distillate Engines and Hoists.

Air Compressors.

HADWEN SWAIN MFG. CO.,
215-217 SPEAR ST., SAN FRANCISCO, CAL.
CATALOGUES MAILED.

HERMANN J. VAN DIEREN,

Assayer and Metallurgist,

1407 Seventeenth St., DENVER, COLO.

Stamp Mill and Reduction Works: 19th St. and Platte River.

Buyer of every description of Ores and Precious Stones. Rights for sale for process of treating refractory gold ores; also process for treating low grade copper ores. Write for particulars.

WE BUY very rich Ores, Dental Scraps, Tellurium Ores, Mill Wastes, Jewelers' Sweeps, Gold Retorts, Old Iron Retorts, Base Amalgam, Quicksilver, Amalgamated Plates, Gold and Silver, Old Slags.

A. M. DONALDSON & CO.,
ASSAYERS AND WASTE PRODUCT SMELTERS,
1661 Larimer St., Denver, Colo.
Write for Donaldson's Assayers' Slag Hammer.

BENJAMIN T. LLOYD, STOCKS, BONDS AND MINES.

Have immediate customers for well-developed Gold and Copper Properties.

P. O. Box 608, **SALT LAKE CITY, UTAH.**

MILL PLANS.

Cyanide, Concentration, Smelting, Sampling.
F. D BAKER. Mech. Eng., DENVER.

FRED C. MILES,

CISCO, PLACER CO., CAL.
COPPER AND GOLD PROSPECTS.
A GOING GOLD PROPERTY.

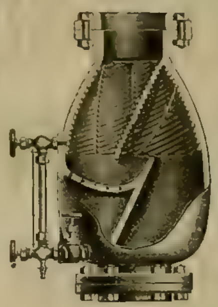
WEST COAST OF MEXICO.

WÖHLER, BARTNING Suc's, Mazatlan (Sinaloa), Mex.

Bankers, Importers, Exporters and Commission Merchants.

Representatives and Agents of the principal Mining Companies in the State of Sinaloa and the dependencies of the Pacific coast in the States of Durango, Chihuahua, Sonora, Lower California and Jalisco.

ORE BUYERS AND EXPORTERS. - MINING SUPPLIES.

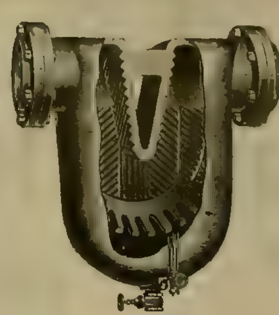


Vertical. Sizes 1½ to 12 in.

Ever Know an Engine Has Lungs?

The cylinder of an engine corresponds with lung action and in some ways is afflicted with lung trouble. For instance, too much moisture in the steam cylinder will cause more trouble than a damp atmosphere to a consumptive.

AUSTIN Separators



Horizontal. Sizes 1½ to 12 in.

Are the proper medicine. They eliminate all moisture and ensure the greatest efficiency to the engine. Shipped on 30 days' trial to responsible parties anywhere in the United States and freight paid both ways if not satisfactory.

SEND FOR OUR NEW CATALOGUE.

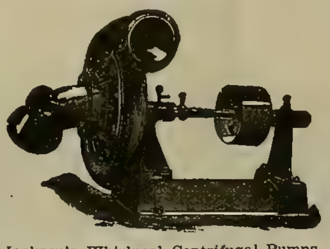
AUSTIN SEPARATOR CO.,

27 W. Woodbridge St., DETROIT, MICH., U. S. A.

ERICSSON SWEDISH TELEPHONES

Seem to possess almost human intelligence. They respond to every requirement in a smooth, positive fashion that shows what a perfect telephone can do. Besides this they have unequalled strength and durability. Their reputation as *"STANDARD OF THE WORLD"* is built on merit. Is the best too good for you?

ERICSSON TELEPHONE CO. *296 BROADWAY NEW YORK.*



Jackson's Whirlpool Centrifugal Pumps. Capacities from 50 gallons to 50,000 gallons per minute.

CAPE NOME

PUMPING MACHINERY.

BUILT LIGHT AND STRONG.

COMPLETE PLANT IN OPERATION AT OUR WORKS.

Centrifugal Pump and Steam or Oil Engine Direct Connected.
Sand Pumps, Rock and Gravel Pumps, Mining Machinery, etc.

BYRON JACKSON MACHINE WORKS,

625-631 SIXTH STREET, SAN FRANCISCO, CAL.

CAPE NOME MACHINERY.

THE KROGH MFG. CO.

— BUILDS —

CEMENT GRAVEL MILLS, THE "DRAKE" AMALGAMATOR, THE "KROGH' 2-STAMP MILL AND MINING MACHINERY OF ALL KINDS.

The Krogh Centrifugal Pumps are the Best for CAPE NOME SANDS.

Capacity from 1 to 100,000 gallons per minute.

Send for Illustrated Catalogue.

KROGH MANUFACTURING CO.,
BRANCH, 134-136 MAIN ST. 9-17 STEVENSON ST., SAN FRANCISCO, CAL.

SMOOTH-ON CASTINGS.

TRADE MARK

An iron cement for repairing leaks or fractures in steam or hydraulic work. When hard it will withstand a red heat, steam, water or oil, and expands and contracts with heat and cold the same as iron, insuring a tight joint at all temperatures. Difficult flange connections can easily be made with Smooth-On, as it adapts itself to the flanged faces whether parallel or not. Connections are easily taken apart. Unequaled for boiler patching, and repairing blemishes in iron castings. Write for catalogue and prices. Sole proprietors and manufacturers: Smooth-On Mfg. Co., Jersey City, N. J., U. S. A.

MESSRS. MADISON, BRUCE & SELLERS,

34-36 STEUART ST., SAN FRANCISCO, CAL.......................AGENTS FOR PACIFIC COAST.

UNION IRON WORKS,

★ ★ 222 Market Street, San Francisco, Cal. ★ ★

Manufacturers of All Classes of MINING MACHINERY.

COPPER AND LEAD-SILVER SMELTING PLANTS,

Latest Improved Water Jacket Furnaces,

CONVERTERS AND ROASTING FURNACES,

Hoisting and Pumping Machinery,

AIR COMPRESSORS,

Stamp Mills and Concentrating Plants,

HIGH GRADE ENGINES AND BOILERS.

STEAM LOCOMOBILE FREIGHTING TRAIN.

CAPACITY OF WAGONS 16 TONS EACH, or total freight carrying capacity of train 50 tons.

CAPACITY OF ENGINE, 50 H. P.

THESE WAGONS ARE ESPECIALLY DESIGNED FOR STEAM FREIGHTING.

CAPACITY OF TRAIN, 50 TONS.

"The Daniel Best" 50-Horse Power Traction Engine.

The most powerful and only Successful and Practicable Road Engine in the world. Eighty of them in use on this Coast. They are being Successfully and Profitably Employed in Hauling Logs, Lumber, Ore, Salt, Borax and other kinds of freight.

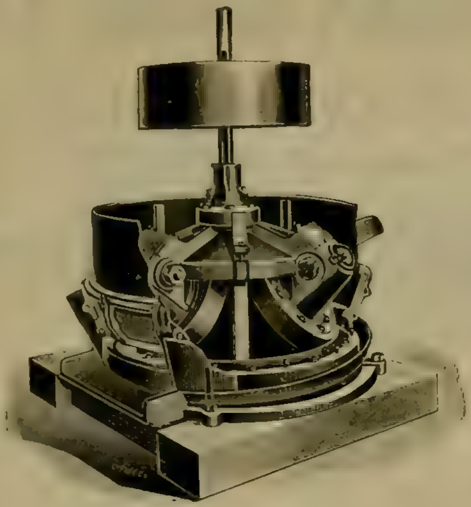
The work is being done **FIFTY PER CENT** Cheaper than it is possible to do with Animal Power. They can be operated over any ordinary road where it is practicable to use mules or horses, doing the same work. They can ascend grades as much as 10% to 20%, hauling their loads of 35 to 40 tons, depending upon the condition of the roads; loads may be increased to even greater amount on a firm and moderately level road.

Send for descriptive Circulars and Price List of Engines and Wagons. We solicit correspondence. No trouble to answer questions.

Estimates made for complete Steam Freighting Outfits. Address

THE BEST MANUFACTURING CO.,

San Leandro, Cal., U. S. A.



THE GRIFFIN
THREE ROLLER
ORE MILL.

The Griffin Three Roller Ore Mill is a simply constructed Mill, suitable for working all kinds of ores that require uniformly fine crushing by the wet process. This Mill is a modification of the well-known Chilian Mill, but the rollers run upon a crushing ring or die, which is inclined inwardly at an angle of about 30 degrees, the rollers themselves also being inclined to the central shaft of the Mill, thus utilizing the centrifugal force, as well as the weight of the rollers themselves as a crushing agent. The Griffin Three Roller Ore Mill is therefore a Mill of great strength, and has few wearing parts. We construct these Mills with extreme care, using only the best of raw materials, which are most carefully worked by men who are specialists as mill builders. We sell the Griffin Ore Mill on its determined merits, and will gladly supply full information regarding it to any one.

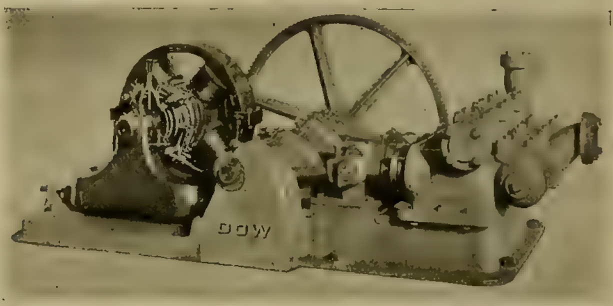
SEND FOR FREE ILLUSTRATED AND DESCRIPTIVE CATALOGUE TO

Bradley Pulverizer Co., Boston, Mass.

GEO. E. DOW PUMPING ENGINE CO.
(Successors to DOW STEAM PUMP WORKS.)
108-120 BEALE ST., - - SAN FRANCISCO, CAL.

——MANUFACTURERS OF——

DOW PUMPS
FOR MINING PURPOSES,
Operated by STEAM, AIR, ELECTRIC or WATER POWER.
VERTICAL SINKING PUMPS, BUCKET OR DOUBLE PLUNGER PATTERN.
DEEP MINE STATION PUMPS.
PUMPING MACHINERY FOR EVERY POSSIBLE DUTY.



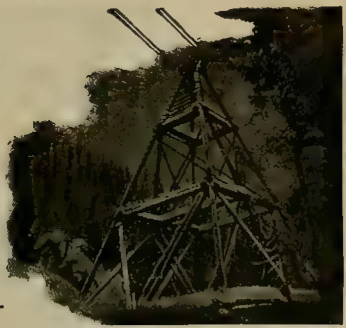
HOR. TRIPLEX MINE STATION PUMP WITH ELECTRIC MOTOR.

THE MINE AND SMELTER SUPPLY CO.,
DENVER, - - COLORADO.
Mining and Milling Machinery and Supplies.

We beg to call your attention to

THE FINLAYSON PATENT WIRE ROPE TRAMWAY—

the latest and best system of double-rope automatic aerial tramway in the market.
If interested in the most economical system of transporting ores from mine to mill and to shipping stations, send for our special tramway catalogue.

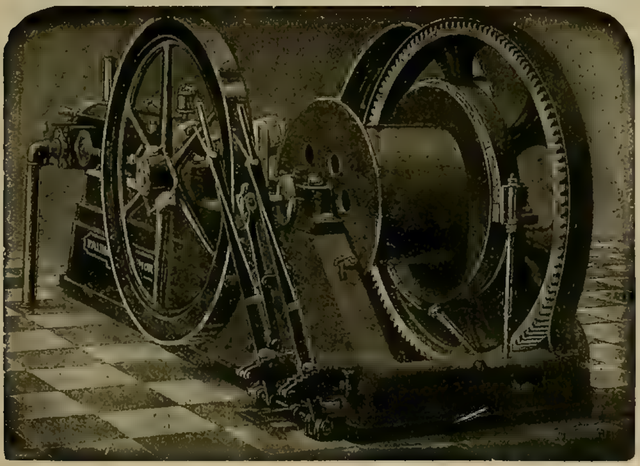


We carry a complete stock of Machinery and Supplies for immediate delivery.

Send for our special catalogues on Mining Machinery, Milling Machinery, Wilfley Concentrators, Tramways, Power Transmission Machinery, Machine Tools, Etc.

THE MINE AND SMELTER SUPPLY CO.,....................Denver, Colorado
THE MINE AND SMELTER SUPPLY CO.,...............Salt Lake City, Utah
THE MEXICO MINE AND SMELTER SUPPLY CO.,
No. 16 San Francisco St., City of Mexico.

BOILERS, ENGINES, STEAM HOISTERS, ELECTRIC HOISTERS, ROLLS, CRUSHERS, WILFLEY TABLES. CARS, CAGES, ORE BUCKETS, RAIL, PIPE, FITTINGS, BELTING, ETC., ETC.



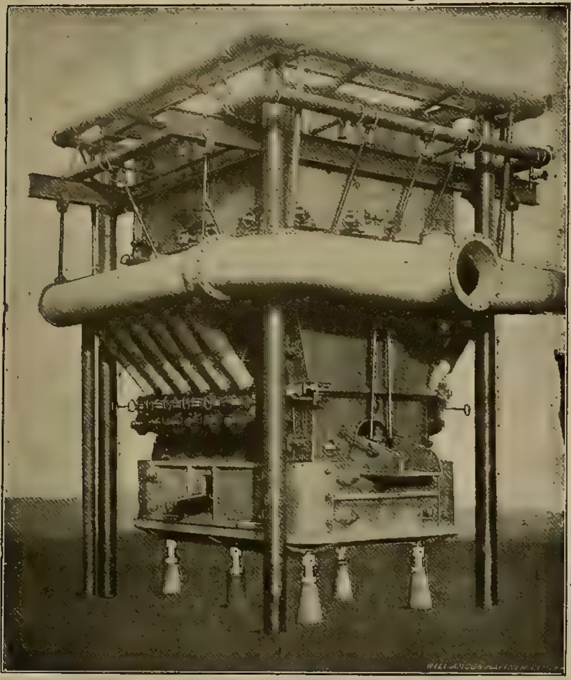
FAIRBANKS-MORSE
GASOLINE-DISTILLATE GEARED HOISTER.

An efficient and reliable combination of a Fairbanks-Morse Gasoline-Distillate Engine on the same base with a Friction Hoist. Modern and up to date. We publish a special catalogue describing our Hoister which we gladly mail prospective purchasers.

FAIRBANKS-MORSE GASOLINE-DISTILLATE ENGINES.
ALL SIZES UP TO AND INCLUDING 54 HORSE POWER.
For Pumping, Milling, Lighting, Air Compressors, Etc.

FOR CATALOGUES AND FULL INFORMATION, ADDRESS

FAIRBANKS, MORSE & CO.,
310 MARKET ST., SAN FRANCISCO, CAL.
301 N. LOS ANGELES ST., LOS ANGELES, CAL.
FIRST AND STARK STS. PORTLAND, OGN.
1600 SEVENTEENTH ST., DENVER, COL.
FRANKLIN AND MONROE STS., CHICAGO, ILL.



A MODERN COPPER SMELTER

THE COLORADO IRON WORKS CO.

ESTABLISHED 1860. DENVER, COLO.

—MANUFACTURERS OF—

Smelting Furnaces and Equipments

: : : FOR THE TREATMENT OF : : :

Gold, Silver, Lead and Copper Ores.

We build furnaces to drawings and specifications, and furnish drawings and full instructions for erecting.

We erect all furnaces at our works and carefully mark every piece before shipping. By this means, trouble in erecting at the smelting plant is entirely avoided.

We contract to build and equip smelting plants complete, of any required tonnage capacity above forty tons per day, at any desired location and put them into successful operation under guarantee. We contract to smelt a thousand tons of ore, more or less, before turning the plant over as completed under the guarantee

We have in the past built more Blast Furnaces for smelting the ores of the valuable and the precious metals—gold, silver, lead and copper—than any other manufacturing concern on the American continent, and in the past year of 1899 we built more such furnaces than all others combined.

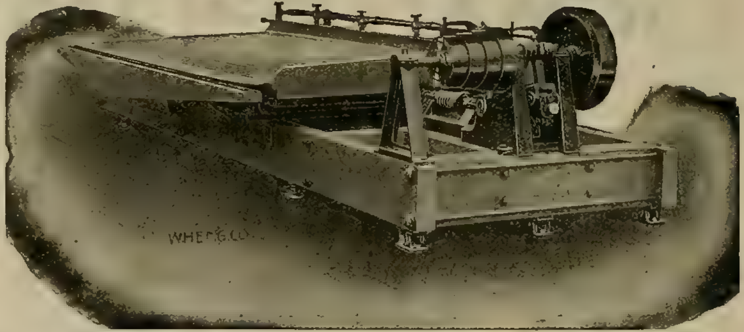
(SEE PAGE 57.)

THE : CAMMETT : CONCENTRATOR.

Designed with some Regard for the Laws of Concentration.

From **The Denver Evening Post**, March 2nd, 1900.

"Empire, Colo.: **The success achieved** by the **Cammett tables** in handling the ore from the Maud S. mine, **an ore especially difficult to concentrate** on account of the **great variety** of its **metallic contents**, has given the Bonaccord mill a reputation that will firmly establish it as a safe plant for general custom work."



Manufactured Under U. S. Patent No. 632,892; Dated Sept. 12, 1899.

Denver Engineering Works,---Shepard & Searing,---Sole Manufacturers,

30th and Blake Streets, - - - - DENVER, COLORADO.

—THE—

Pelton Water Wheel Company

Gives exclusive attention to the development and utilization of water powers by the most modern, economic and improved methods. An experience of more than fifteen years, involving both the theory and practice of hydraulic engineering as relates to power development in its widest range of application, is at the service of its customers.

Nine Thousand Wheels Now Running,

Averaging some 700,000 H. P.

ELECTRIC POWER TRANSMISSION.

Pelton wheels afford the most reliable and efficient power for such service and are running the majority of stations of this character in the United States, as well as most foreign countries. Highest efficiency and absolute regulation guaranteed under the most extreme variations of load.

The Pelton Water Wheel Company,

121 & 123 MAIN STREET, SAN FRANCISCO, CAL.

THE BUCYRUS COMPANY,

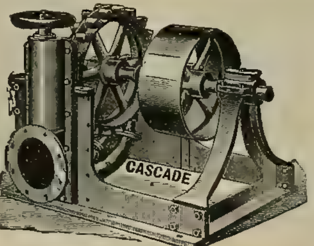
DESIGNERS AND BUILDERS OF

DREDGES, STEAM SHOVELS, EXCAVATING MACHINERY, WRECKING CARS, LOCOMOTIVE CRANES, PILE DRIVERS, CENTRIFUGAL PUMPS, WITH SIMPLE, COMPOUND OR TRIPLE EXPANSION ENGINES,

MACHINERY FOR PLACER MINING.

SOUTH MILWAUKEE, WISCONSIN.

TURBINE AND CASCADE WATER WHEEL



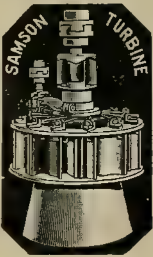
Adapted to all Heads from

3 Feet to 2000 Feet.

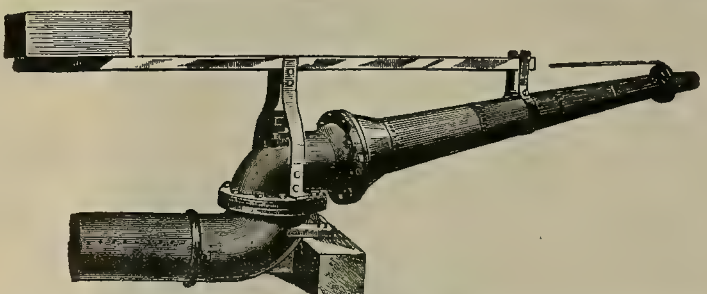
Our experience of 38 YEARS building Water Wheels enables us to suit every requirement of Water Power Plants. We guarantee satisfaction.

State your Head and requirements. Send for pamphlet.

JAMES LEFFEL & CO.
SPRINGFIELD, OHIO, U. S. A.



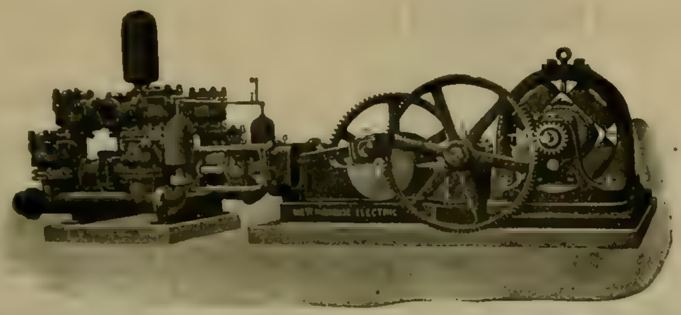
Double-Jointed Ball-Bearing Hydraulic Giants.



The above presents an improved **Double-Jointed Ball-Bearing Hydraulic Giant** which we build. The improvement consists of the introduction of a **Ball Bearing** by which the pressure of the water is reduced to a minimum and the direction of the nozzle changed at will with ease.

Catalogues and prices of our specialties of HYDRAULIC MINING MACHINERY furnished upon application. **JOSHUA HENDY MACHINE WORKS, 38 to 44 Fremont St., San Francisco Cal.**

DEWEY, STRONG & CO., Patent Solicitors, 330 Market St., San Francisco, Cal.



WESTINGHOUSE D. C. MOTOR OPERATING PUMP.

Westinghouse

Polyphase Induction **Motors**

Universally adopted for operating Mine Machinery.

Westinghouse Electric

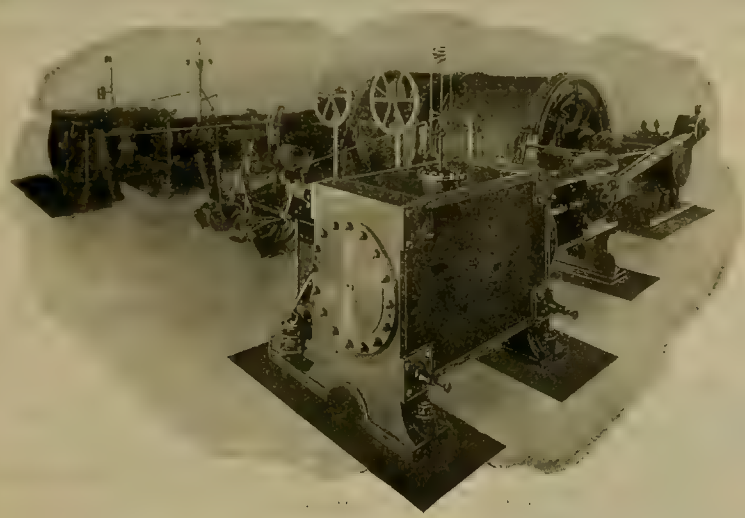
& Manufacturing Co.,

Mills Building, San Francisco.

Pittsburg, Pa.

All Principal Cities in U. S. and Canada.

65-A



HIGH CLASS FIRST MOTION

HOISTING ENGINES

Especially Designed

For Heavy Duty and Deep Mine Work.

Built with CORLISS OR SLIDE VALVE ENGINES and for either ROUND OR FLAT ROPE.

Our line of Hoisting Machinery is the most complete carried by any one concern in the United States. Write us of your wants.

THE HENDRIE & BOLTHOFF M'F'G & SUPPLY CO.,

DENVER, - - - - - - COLORADO.

No. 35.

CHAS. C. MOORE & CO.,

...ENGINEERS AND DEALERS IN...

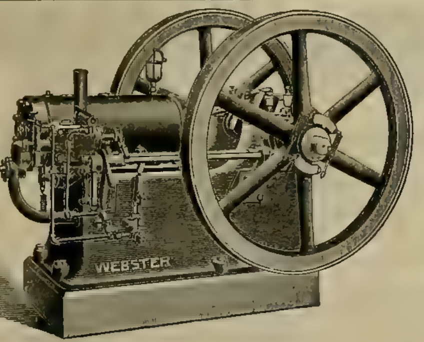
HAMILTON CORLISS ENGINES, N. Y. SAFETY AUTOMATIC ENGINES, BABCOCK & WILCOX BOILERS, McINTOSH & SEYMOUR ENGINES, GREEN'S ECONOMIZERS, HOPPES LIVE STEAM PURIFIERS, WHEELER CONDENSERS, BARNARD-WHEELER COOLING TOWERS, EDMISTON FEED WATER FILTERS, BUNDY STEAM TRAPS, SNOW STEAM PUMPS, QUIMBY SCREW PUMPS, GOUBERT FEED WATER HEATERS, STRATTON STEAM SEPARATORS, SPENCER DAMPER REGULATORS, HYATT ROLLER BEARINGS.

Contracts for Installation of Power Plants, Any Capacity.

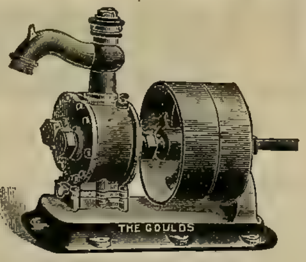
SEND FOR CATALOGUES AND FULL INFORMATION.

32 FIRST STREET, SAN FRANCISCO, CAL.

SEATTLE BRANCH..............313 FIRST AVE. SOUTH.
LOS ANGELES BRANCH........103 SOUTH BROADWAY.



WEBSTER GASOLINE ENGINES.



ROTARY PUMPS.

Send for Our Large Catalogue, Mailed Free.

We carry a full line of Gasoline Engines.

Pumps for all depths of wells—for Hand, Wind Mill use, Power Pumps, Electric Pumps. Irrigating Pumps of all capacities. Mining Pumps. Tanks. Iron Pipes. Pipe Fittings. Brass Goods. Tools, Etc. Send for Catalogue, sent free.

WOODIN & LITTLE,

312-314 MARKET STREET,..SAN FRANCISCO, CAL.

GENERAL ELECTRIC COMPANY,

SAN FRANCISCO, CAL., Claus Spreckels Building.

DENVER, COL., Kittredge Building.

PORTLAND, OR., Worcester Building.

SALT LAKE CITY, UTAH, Templeton Building.

— MANUFACTURES THE —

Standard Electric Mining Apparatus OF THE WORLD.

Mines Operated by Our Apparatus are Operated Economically, Safely and Satisfactorily.

SULPHURIC ACID

MANUFACTURED BY
THE WESTERN CHEMICAL CO
DENVER, COLO.

For Chlorination, Refining and other processes. Also Muriatic and Nitric Acids, Blue Vitriol, Copperas Commercial and C. P. Our chemically pure Acids and Ammonia are guaranteed perfect.

PIPE BARGAINS.

Suitable for Water Mains, Mining, Irrigation, Air, Oil etc, etc. New Spiral Welded Asphalted Steel Pipe with any style coupling desired.

460 ft. 6-in.	3,480 ft. 10-in.	1,828 ft. 14-in.	1,077 ft. 18-in.
50,000 " 8 "	2,428 " 12 "	520 " 16 "	1,623 " 24 "

All Sizes Wrought Pipe, Well Casing and Straight Riveted Pipe in Stock. Equipment of All Kinds for Mine, Railroad and Contractors' Outfits. Write for Prices and Particulars.

BOWES & CO., 23 Lake St., Chicago, Ill

The Best Yet!

That is what they say about our new Jack-head Plunger Pump. Especially adapted for pumping very muddy or gritty water.

No smooth cylinder to wear.

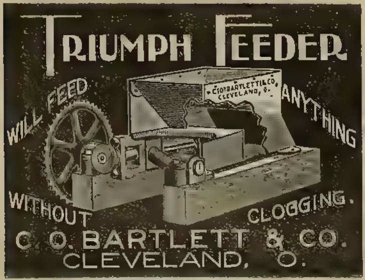
Seldom requires packing.

Forces water on the down stroke, consequently no balancing bob required.

Water column can be perfectly and inexpensively balanced.

Correspondence solicited. Tell us your conditions and we will quote you on size and kind of pump that will suit you best.

W. T. GARRATT & CO.,
Cor. Fremont and Natoma Sts.,
SAN FRANCISCO, CAL.


TRIUMPH FEEDER
WILL FEED ANYTHING
WITHOUT CLOGGING.
C. O. BARTLETT & CO.
CLEVELAND, O.

PRICE, $50.00.

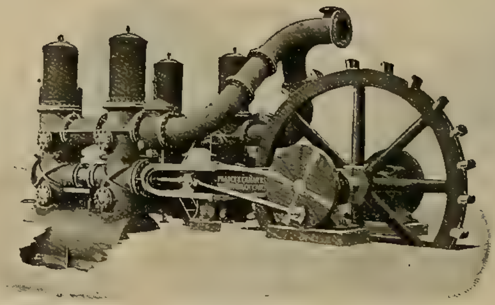
AIR COMPRESSORS,
Rock Drills,
Coal Cutters,
Lift Pump, Pohle
and Stone Channelers.
Catalogues.
The INGERSOLL-SERGEANT Drill Co.,
Havemeyer Building, NEW YORK.
San Francisco Agents, PARKE & LACY CO.,
203 Fremont Street.

DEWEY, STRONG & CO.
SCIENTIFIC PRESS PATENTS PATENT AGENCY
330 MARKET ST. S.F.

WRITE TO
FRASER & CHALMERS,
CHICAGO, ILL.,

If you are interested in

Rock Crushers,
Air Compressors or Pumping Engines,
Hoisting Engines,
Boilers, Etc.



NIAGARA FALLS POWER CO. RIEDLER PUMP.

Gold or Silver Mills,
Smelting Furnaces,
Concentrating Plant,
Screens, Jigs,
Frue Vanners,
Huntington Mills.

Specify the descriptive catalogue you require by giving the subject of your interest.

TO OBTAIN LOWEST NET PRICES examine these catalogues and write describing the machinery needed. A SPECIAL ESTIMATE will then be promptly sent you with points of valuable information and advice.

FRASER & CHALMERS, CHICAGO, ILL.

The Bleichert Wire Rope Tramway,
AND OTHER SYSTEMS OF AERIAL TRANSPORTATION,
MANUFACTURED BY
The Trenton Iron Co.,
TRENTON, N. J.

Engineers and Contractors, and sole licensees in North America for the Bleichert System.
Also, Wire Rope Equipments for Surface and Underground Haulage, etc.

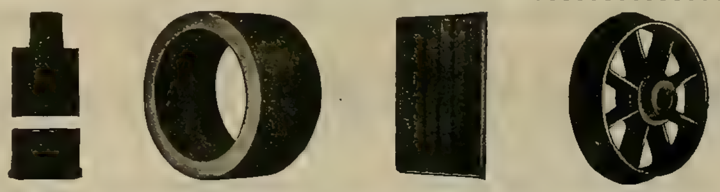
NEW YORK OFFICE—Cooper, Hewitt & Co., 17 Burling Slip.
CHICAGO OFFICE—1114 Monadnock Building.

For Particulars, Address
Newton M. Bell, Agent,
308 MARKET ST., SAN FRANCISCO.

A full stock of the Trenton Iron Co.'s Wire Ropes, made from "SPECIAL" Crucible and Plough Steel, carried in San Francisco.

Bleichert Tramway of the Cambria Steel Co., Johnstown, Pa., showing guard-bridge across Penna. R. R.

HARD TOUGH



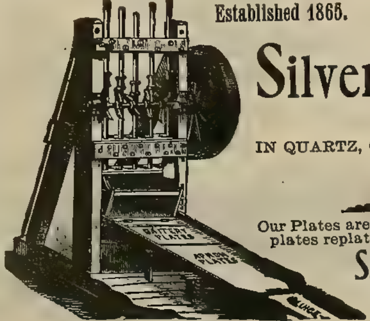
TAYLOR IRON AND STEEL COMPANY,
HIGH BRIDGE, NEW JERSEY, U. S. A.

Sole Licensees in America under the HADFIELD System and Patents for MANGANESE STEEL,

Best Metal Known for Roll Shells, Stamp Shoes and Dies, Crusher Plates and Side Liners, Toggles and Toggle Bearings, Gyratory Cones and Concaves, or Liners, Mine Car Wheels, Coal Crushing Rolls, Etc.

PACIFIC COAST PARTIES INTERESTED PLEASE ADDRESS PARKE & LACY CO., SAN FRANCISCO, CAL.

WRITE FOR INFORMATION AND PRICES.

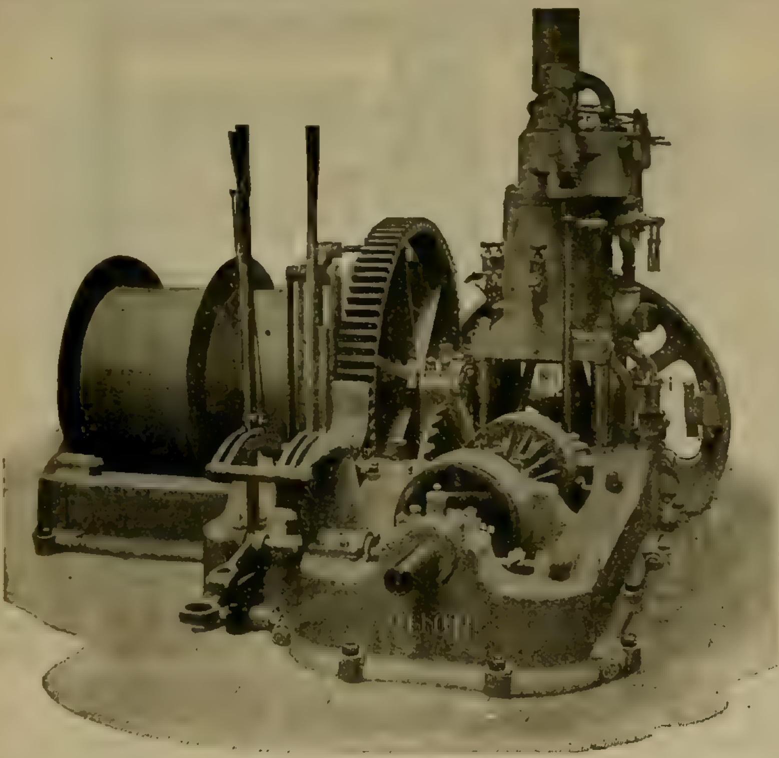


Established 1865. NOTICE TO GOLD MINERS. Incorporated 1890.

Silver-Plated Copper Amalgamated Plates
FOR SAVING GOLD
IN QUARTZ, GRAVEL OR BEACH MINING. MADE OF BEST SOFT LAKE SUPERIOR COPPER.
AT REDUCED PRICES.

Our Plates are guaranteed, and by actual experience are proved, the best in weight of Silver and durability. Old Mining plates replated, bought, or gold separated. THOUSANDS OF ORDERS FILLED.

SAN FRANCISCO NOVELTY AND PLATING WORKS,
SEND FOR CIRCULARS. Telephone Main 976. 68, 70, 72, 74 and 76 FIRST STREET,
COR. MISSION, SAN FRANCISCO, CAL.

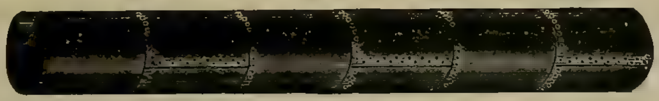


The above illustrates the "Union" 25 H. P. double cylinder divided drum mining hoist for double compartment shaft. Cages and cars balance each other, therefore power is only used to raise ore; cost of hoisting ore is therefore reduced to the minimum. Made in sections for mountain transportation.

THE UNION GAS ENGINE CO.
—BUILD THE—
"Union" Gas Engines,
Which use either MANUFACTURED or NATURAL GAS, ORDINARY STOVE GASOLINE (NAPHTHA or BENZINE), DISTILLATE or KEROSENE.
STATIONARY ENGINES for All Kinds of Work, Built in Sizes from 3 to 200 h. p.
"UNION" COMBINED HOISTS in Sizes from 2 to 40 h. p.
"UNION" COMBINED COMPRESSORS—20, 30, 40 h. p.
HOISTS and COMPRESSORS Can Be Built in Larger Sizes to Order.
"UNION" MARINE ENGINES, 4 to 200 h. p., of Single, Double and Four-Cylinder Types.
TEN YEARS' EXPERIENCE Building Gas and Oil Engines.
"UNION" ENGINES Are In Use All Over the United States.
"UNION" ENGINES Are Simple, Durable and Economical.
Office, 244 First Street. Works, Corner First and Clementina Streets. SAN FRANCISCO, CAL.

WHY NOT PUT IN YOUR OWN PLANT
FOR DEPOSITING SILVER ON YOUR AMALGAM PLATES
WE FURNISH DYNAMOS & COMPLETE EQUIPMENT FOR THIS WORK.
WRITE FOR PARTICULARS
THE HANSON & VAN WINKLE CO.
CHICAGO. NEWARK N.J. NEW YORK.

RIVETED IRON AND STEEL PIPE

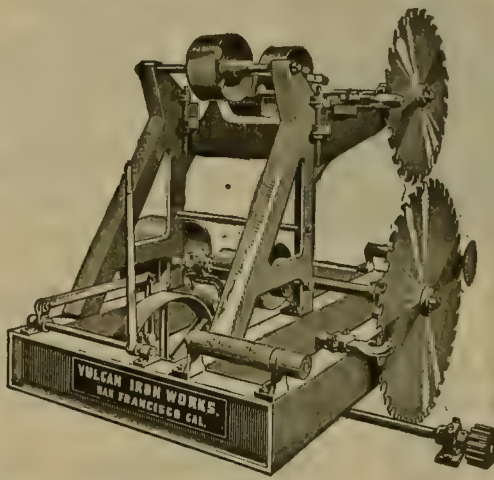


FOR HYDRAULIC MINES, IRRIGATION AND POWER PLANTS. Manufactured from the best grades of IRON or STEEL by MODERN MACHINERY.
AGENTS FOR THE Celebrated CANTON STEEL.
Schaw, Ingram, Batcher & Co., 539 Mission St., SAN FRANCISCO. 211 to 219 J St., SACRAMENTO.

RIVETED SHEET STEEL WATER PIPE
For Placers, Water Powers, Irrigation, Etc.
THE WEIGELE PIPE WORKS
2949-51 Larimer St. DENVER, COLO.

TO SECURE GOOD RESULTS BUY
JESSOP'S STEEL
FOR TOOLS, MINING DRILLS, ETC.
Chief American Office, 91 John St., New York, N. Y.
Wm. Jessop & Sons, Ltd. Manufactory, Sheffield, England.
I. WILLARD BEAM, Agent, 29 MAIN STREET, SAN FRANCISCO, CAL.

Portable Saw Mills.
No. 0 Single Circular. 4000-6000 feet per day.
No. 1 Single Circular. 8,000-10,000 ft. per day.
No. 2 Double Circular. 15,000-20,000 ft. per day.
No. 3 Double Circular. 20,000-25,000 ft. per day.
For Mining Companies
—OR—
Other Consumers of Lumber at Remote Points.
SEND FOR CATALOGUE.

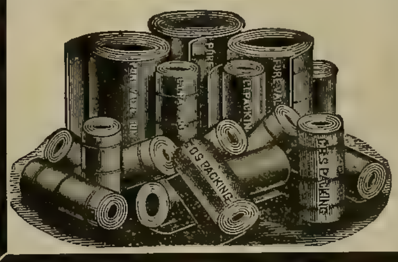


Manufactured by
VULCAN IRON WORKS, Office, 505 Mission Street, SAN FRANCISCO, CAL.

SCREENING MACHINERY FOR ALL PURPOSES.
VIBRATORY, SHAKING, REVOLVING, STATIONARY AND MECHANICAL HAND SCREENS FOR ALL MATERIALS.
SCREENS SPECIALLY ADAPTED FOR MINING PURPOSES.
COMPLETE PLANTS ERECTED.
SEND FOR DESCRIPTIVE MATTER.
WESTERN MACHINERY & SUPPLY CO., Engineers and General Machinists,
161 La Salle Street, CHICAGO.

THE WM. HAMILTON MANUFACTURING CO.,
LIMITED,
MINING MACHINERY,
PETERBOROUGH, ONTARIO,
CANADA.

We Carry in Stock a Complete Line of BELTING AND PACKING.



—AGENTS FOR—
Dow Steam Pumps,
Goulds Power Pumps,
Hercules Gasoline Hoists,
Giant Air Compressors,
Giant Rock Drills.
JOHN WIGMORE & SONS CO.,
117-123 S. LOS ANGELES ST.,
LOS ANGELES, CAL.

FLINT & LOMAX,
DENVER, COLO.
ELECTRICAL AND MECHANICAL ENGINEERS.
—DEALERS IN—
BOILERS, ENGINES, DYNAMOS, MOTORS, ICE MACHINERY, SHAFTING, HANGERS, BELTING, PULLEYS, and
ELECTRICAL SUPPLIES OF EVERY KIND.
OPERATING MACHINE, PATTERN, BLACKSMITH AND PLATING SHOPS. MAKERS OF SPECIAL APPARATUS TO ORDER.

Trommel Screens
THE ROBERT AITCHISON PERFORATED METAL CO.
303 TO 305 DEARBORN ST. CHICAGO, ILL.

DEWEY, STRONG & CO., Patent Solicitors, 330 Market St., San Francisco, Cal.

The "Stop for Repairs"
to Mining Machinery,

Especially if it is a conveying plant, is a considerable item of expense. Many of these expensive pauses are made to repair or adjust faulty belting. To economize in this respect, use the

LEVIATHAN
CONVEYOR BELT.

It is not only adapted to the heaviest service, but will run under any conditions in underground, drippings, extreme heat or cold.

IT WILL OUTLIVE ANY OTHER BELTING.

MAIN BELTING COMPANY,
1225-41 Carpenter Street, Philadelphia.
55-57 Market St., Chicago. 120 Pearl St., Boston.
SEND FOR PRICE LISTS AND SAMPLE.

Small Portable Saw Mills and
DRAG SAWING MACHINES
FOR RANCHES AND MINES.

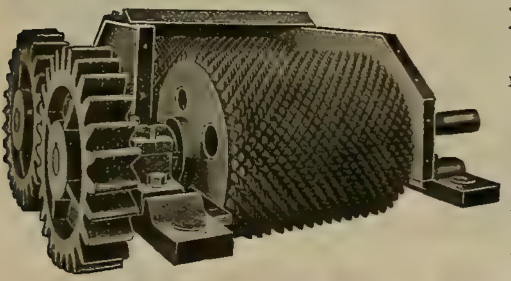
Woodworking Machinery.

LINK BELTING, SPROCKET WHEELS,
ELEVATOR BUCKETS & BOOTS,
TAKEUPS, FRICTION CLUTCH
PULLEYS, ETC.

ALL STYLES AND SIZES IN STOCK FOR IMMEDIATE DELIVERY.

JNO. D. EBY,
17 & 19 MAIN STREET, - SAN FRANCISCO, CAL.

LINK-BELT ELEVATORS
—AND—
CONVEYORS.



BREAKER ROLLS,
PICKING TABLES,
MALLEABLE IRON BUCKETS
SHAFTING, PULLEYS,
GEARING, CLUTCHES, Etc.
Catalogue Upon Application.

LINK-BELT MACHINERY CO.,
Engineers, Founders, Machinists,
CHICAGO, U. S. A.
DENVER, 1328 17th St.,
A. E. LINDBOOTH, Manager.

ROBINS BELT CONVEYORS
HANDLE
ORE, GRAVEL, TAILINGS, DREDGINGS.

Cut shows conveyor elevating and distributing coal in storage.

New Catalogue Now Ready.

ROBINS CONVEYING BELT CO.,
Park Row Building, NEW YORK.

ELEVATING
CONVEYING
MACHINERY
FOR
MILLS-POWER HOUSES-FACTORIES.

THE
JEFFREY MFG.,
CO.
COLUMBUS, OHIO.
·U·S·A·

OUR SPECIALTIES INCLUDE, STANDARD AND SPECIAL CHAINS—SPROCKET WHEELS—ELEVATOR BUCKETS—BOOTS—BOLTS—SCREENS—SPIRAL CONVEYORS—CABLE CONVEYORS—DUMP CARS—SKIP CARS—COAL AND ASHES HANDLING MACHINERY—COAL AND COKE CRUSHERS—DREDGES—RUBBER BELT CONVEYORS—COAL MINING MACHINERY—COAL WASHING MACHINERY—LABOR SAVING APPLIANCES ETC.
SEND FOR CATALOGUE.
COLUMBUS, NEW YORK, DENVER.

Western Branch, Equitable Bldg., Denver, Colo.

DEWEY, STRONG & CO.
SCIENTIFIC PRESS PATENTS PATENT AGENCY
330 MARKET ST. S.F.

THE ROESSLER & HASSLACHER CHEMICAL CO.,
100 William Street, New York.

THE ROESSLER & HASSLACHER CHEMICAL COMPANY
CHEMISTS
NEW YORK

CYANIDE

Peroxide of Sodium

Hyposulphite of Soda

Chloride of Lime

Sulphide of Iron

And Other Chemicals for Mining Purposes.

HEALD'S
BUSINESS COLLEGE.
24 Post Street, - - - San Francisco.

MINING AND CIVIL ENGINEERING DEPARTMENT: Mathematics, Draughting, Strength of Material, Chemistry, Assaying, Blow-Pipe Analysis, Geology, Mineralogy, Surveying, etc., under the direction of Prof. O. H. Packer, an engineer of national reputation.
ELECTRICAL DEPARTMENT: Theory and Practice; Construction,
BUSINESS: Bookkeeping, Shorthand, Typing, Modern Languages, etc.
Twenty teachers; individual instruction; can enter at any time; Catalogue and Journal free.

P & B Building Paper..

A perfect insulation for cold storage houses and refrigerators.
Unequaled in residence construction.
A protecion against heat, cold, dampness, dust, draught and vermin.
Demand it of your dealer — you need it in your buildings.
Paraffine Paint Co—116 Battery, San Francisco

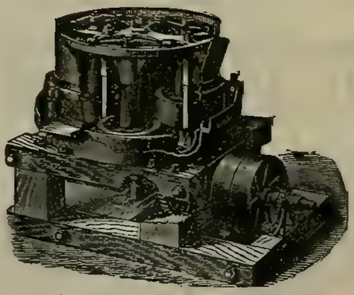
McFARLANE & CO.,
1734 FIFTEENTH ST., DENVER, COLO.
Mining and Milling Machinery.
STAMP AND CONCENTRATING MILLS BUILT
AND ERECTED.

STEAM AND ELECTRIC HOISTS, CRUSHERS, ROLLS, REVOLVING SCREENS, JIGS.
ORE CARS, CYANIDE TANKS, CORNISH PUMPS, CORLISS ENGINES.

STEEL RAILS, TRACK FIXTURES,
PRODUCT PENNSYLVANIA STEEL COMPANY.

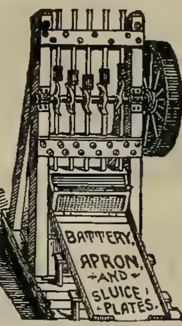
BAR, SHEET AND BOILER STEEL,
STRUCTURAL MATERIAL,
Cold Rolled Shafting.

GEORGE W. GIBBS COMPANY,
33-39 Fremont Street, 38-40 Beale Street,
CORRESPONDENCE SOLICITED. SAN FRANCISCO, CAL.



Centrifugal Roller Quartz Mill.

F. A. HUNTINGTON,
—Manufacturer of—
CENTRIFUGAL
Roller Quartz Mills.
CONCENTRATORS and ORE CRUSHERS.
Mining Machinery of Every Description.
Steam Engines, Shingle Machines.
Room 1, 3d Floor, Mills Building,
SAN FRANCISCO, CAL.

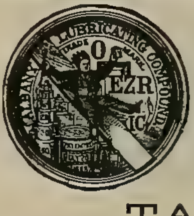


To Gold Miners!

Silver Plated Copper Amalgamating Plates
For Saving Gold in Quartz and Placer Mining.

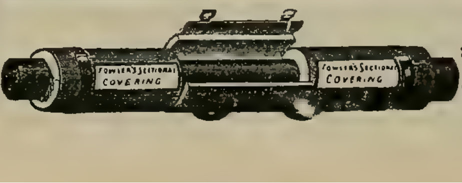
ONLY BEST COPPER AND REFINED SILVER USED. OLD MINING PLATES BOUGHT OR TAKEN IN EXCHANGE FOR NEW PLATES. GOLD EXTRACTED FROM OLD PLATES AT A MODERATE COST. OLD PLATES REPLATED. GOLD, SILVER, NICKEL, COPPER AND BRASS PLATING.

Denniston San Francisco Plating Works,
652 Mission Street, Cor. Annie, San Francisco, Cal.
E. G. DENNISTON, ... Proprietor.
—:Send for Circular.:—



MINING HOISTS.
Engines, Boilers,
Saw Mills, Hoe Saws,
Mill Supplies.

TATUM & BOWEN,
34-36 Fremont Street, San Francisco, Cal. 29-35 First Street, Portland, Or.



FOWLER'S AIR SPACE
and Asbestos Sectional Covering.
As a Non-Conductor, Unequaled.
Special Rates for Steam Boilers and Drums.
G. C. Fowler, 656-58 Howard St., S. F.

RISDON IRON WORKS,

SAN FRANCISCO, CALIFORNIA.

Cable: "Risdon's." Code: A. B. C. & Leiber's.

MANUFACTURERS OF

Gold Dredging Machinery

And COMPLETE EQUIPMENT for Placer Mines
OUR SPECIALTY.

We build **GOLD DREDGES COMPLETE IN RUNNING ORDER** to handle 2500 cubic yards per day at a cost of 3 cents per cubic yard.

We excavate 50 feet below water, 20 feet above water and handle boulders up to one ton weight.

Send for Dredging Catalogue No. 17.

—WE ALSO BUILD—

All kinds of Mining, Milling, Concentrating, Pumping, Air Compressing, Hydraulic, Water Wheel and Hoisting Machinery.

EVANS HYDRAULIC GRAVEL ELEVATORS.

We publish sixteen catalogues. Write for one in the line you are interested in.

RIVETED STEEL WATER PIPE

RISDON IRON WORKS BEALE & HOWARD STS.
MANUFACTURERS SAN FRANCISCO, CAL.

All sizes of Steel Water Pipe for City and Town Supply, Placer, Hydraulic and Quartz Mining. Cut, punched and rolled to be riveted at destination or made up complete.

We make a specialty of all kinds of Heavy Sheet Iron and Steel Work. Plans and Estimates furnished.

THE MARION STEAM SHOVEL CO.,

Steam Shovels
Dredges and
Traction Dredges

Suitable for all kinds of **Excavating Work**, making a specialty of

PLACER MINING MACHINES,

separate or self-contained, either as a dry land excavator or floating dredge.

The Marion Steam Shovel Co.
MARION, OHIO.

GEO. W. BARNHART, No. 4 Sutter St., San Francisco, Cal.

The Best MINE PUMPS in the World.

COMPOUND CONDENSING AND TRIPLE EXPANSION STATION PUMPS.

We carry in our Denver store a stock of Improved Pattern Sinkers and Duplex Station Pumps, with duplicate parts for repairs.

Write for Catalogue and Estimates.

Jeanesville Iron Works Co.,
JEANESVILLE, PA.

Western Office,
Columbia Hotel Building,
1328 17th St.
Denver, Colo.
Telephone 3298 A.
A. MIDDLEBROOK, Manager.

TANKS!

LUMBER AND HOUSE FINISH.
TANKS FOR WATER, WINE OR OIL.

Jig Frames, Jig Screens, Zinc Boxes,

and Tanks of Every Description for Mining Purposes.

WRITE FOR ESTIMATES ON YOUR WANTS.

THE EXCELSIOR REDWOOD CO.,
FOURTH AND CHANNEL STREETS,
SAN FRANCISCO, CAL.

C. A. HOOPER & CO., Agents,
204 Front Street, San Francisco, Cal.

SECOND-HAND MACHINERY

SPECIALTIES:
PULLEYS, SHAFTING,
BELTING, BOXES,
BOILERS, ENGINES,
HOISTERS,
STAMP MILLS,
RAILS, CABLE,
and all but little used.

THE S. S. MACHINERY CO.,
Sixth and Market Sts.,
Denver, Colo.

Write or Ask for Descriptive Circulars.

MACHINERY BARGAINS.

I have some splendid Air Compressors, Hoisting Engines, Rock Drills, Rock Crushers, Channeling Machines, Steam Pumps, Boilers, Steam Shovels, Locomotives and Relaying Rails, all in splendid condition. Send for printed list and specify your requirements. I can save you money. WILLIS SHAW, 627 New York Life Building, CHICAGO.

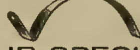
CARY SPRING WORKS,

240 & 242 WEST 29th STREET, NEW YORK, U. S. A.

Telephone, 3346—38th St.

WIRE SPRINGS
OF EVERY DESCRIPTION.

MANUFACTURERS OF
All kinds of ROUND AND FLAT WIRE, TEMPERED AND UNTEMPERED.
SPRINGS
For Machinery, Rolling Shutters, Motors, Etc.



MUSIC BOX AND FINE SPRINGS OUR SPECIALTY.

P. T. TAYLOR & CO.,

525 MISSION ST., SAN FRANCISCO, CAL.

GEAR WHEELS, GEAR CUTTING,
ALL DESCRIPTIONS UP TO 50 INCHES.
GEARS FOR AUTOMOBILES A SPECIALTY.
FULL INFORMATION BY MAIL.

PROFESSIONAL CARDS.

R. H. POSTLETHWAITE, M.I.E.E.
Hydraulic Mining Engineer.
River Dredging for Gold a Specialty.
1315 Leavenworth St........San Francisco, Cal.

THEO. F. VAN WAGENEN, E. M.
Consulting Mining and Hydraulic Engineer.
1508 Fillmore St., DENVER, COLO.

D. B. HUNTLEY,
Mining Engineer and Metallurgist,
De Lamar, Owyhee Co., Idaho.

BERNARD MACDONALD,
Consulting Mining Engineer.
General Manager British America Corporation, Ltd., Rossland, B. C.

DRAPER & McLEOD,
Assayers, Chemists, and Mining Engineers,
1736 CHAMPA STREET,
DENVER.................. ....COLORADO.

JOHN DWYER, Mining Engineer,
MEXICO.
Address 762-17th Street......East Oakland, Cal.

RICKARD & FROST,
ASSAYERS, 1752 Champa St., Denver, Colo. Formerly assayers at Argo smelter. **Specimen, Control and Umpire Work.** Prompt attention given to all mail and express samples.

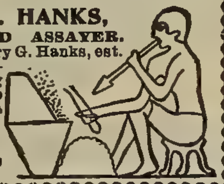
Established 1879.
CHAS. B. GIBSON,
Chemist, Metallurgist and Mining Engineer,
81 CLARK ST., CHICAGO, ILL.

E. H. BENJAMIN, Mining Engineer.
A. M. HUNT, Mechanical & Hydraulic Engineer.
WYNN MEREDITH, Electrical Engineer.
EXPERT EXAMINATIONS. ADVISORY REPORTS.
CONSTRUCTION SUPERVISION
331 Pine Street,...........San Francisco, Cal.
Telephone Main 1870. Cable Address "Edben."

JOHN W. GRAY,
Mining and Hydraulic Work.

Prospecting Operations and Exploration Work.
Examinations, Surveys, Development, Equipment of Mines, Gold-Bearing Gravels, and Water Supplies.
923 Linden St.,..................Oakland, Cal.
Cable "Espra." Correspondence invited.

ABBOT A. HANKS,
CHEMIST AND ASSAYER.
Successor to Henry G. Hanks, est. 1866. The supervision of sampling of ores shipped to San Francisco a specialty.
—531—
California Street,
San Francisco.



RICHARD A. PEREZ, E. M.
Assayer and Analytical Chemist,
120 North Main St., - Los Angeles, Cal.

S. W. TYLER,
Mining and Metallurgical Engineer,
6 Windsor Hotel Block.
Cable: Retyl, Denver. DENVER, COLORADO.

The SPOKANE BUREAU OF MINING,
N. E. LINSLEY, Manager.
SPOKANE, : : WASHINGTON.
Consulting Mining and Milling Engineer.
Will Examine and Report on Mines.

W. J. ADAMS, E. M.,
Mining Engineer and Metallurgist.
Graduate of Columbia School of Mines.
Author of "Hints on Amalgamation," etc., etc.
ROOM 14, 434 CALIFORNIA STREET,
SAN FRANCISCO, CAL.

CLARENCE HERSEY,
Assayer and Chemist,
(Established 1879.) LEADVILLE, COLO.
Gold, Silver and Lead..................$1.00.
Any two of above 75c; any one of above 50c.
Copper analysis...............................$1.00.
Platinum, Nickel or Tin, each..............$5.00.
Twenty-one years successful experience in the mining metropolis of Colorado.
Write for mailing envelopes and price list.

ALMARIN B. PAUL, M. E.,
ROOM 27, CROCKER BUILDING, SAN FRANCISCO.
Will act as AGENT for the sale of RELIABLE Mining Property. SPECIAL AGENT FOR
MacArthur-Forrest Cyanide Process
for California north of and including Mono, Madera and Merced counties; also for State of Nevada. Will act as agent for Eastern parties owning mining interests in California.

F. H, HARVEY,
GALT, CAL.,
Mining and Metallurgical Work in All Branches.
Assays, Chemical Analysis of Ores and experiments on rebellious ores for treatment by cyanide or other processes. Surveys and reports upon mining properties.

L. W. TATUM. Consulting Mining Engineer and Metallurgist.
Genl. Mgr. Providencia Mining & Milling Co.,
DOLORES HIDALGO Gto. MEXICO.
Is prepared to examine mines and mills and undertake the supervision of mine development or milling operations, making visits at stated intervals as case may require, **anywhere in Mexico.**
High Class References. Codes: Bedford McNeill, Moreing & Neal, A. B. C. 4th Ed. and Liebers.

Simonds & Wainwright,
Mining Engineers,
Assayers and Chemists,
159 Front Street,
NEW YORK.

DAVIDGE & DAVIDGE, Attorneys and Counsellors at Law, Corcoran Building, Washington, D. C. Practice in the Supreme Court of the United States, the Court of Claims, the Courts of the District of Columbia, and the General Land Office. Western Union Code.

Geo. W. Schneider, E. M.,
Mining Engineer,
U. S. Deputy Mineral Surveyor.
Mineral Properties examined and reported on.
Central City, Colorado.

A. F. WUENSCH, M. E.
Inspection and Valuation of Mines.
Ref. D. H. Moffat, Pres. 1st Nat'l Bank, Denver.
827 Equitable Bldg..................Denver, Colo.

WM. VAN SLOOTEN,
Consulting Mining Engineer and Metallurgist.
Cable address: "Yadoplata."
35 WALL STREET........... ....NEW YORK, N. Y.

R. J. WALTER,
1452 Blake St., DENVER, COLO.
Mining Engineer and Metallurgist.
Reports on mining properties.
Assay office and chemical laboratory. Established in Colorado 1879.

SAM'L A. RANK,
MINING ENGINEER,
U. S. DEPUTY MINERAL SURVEYOR.
Mine Examinations and Reports.
514 Cooper Building,
DENVER ....COLORADO.

EDWARD L. HAFF,
MINING ENGINEER,
U. S. DEPUTY MINERAL SURVEYOR.
Mine Examinations and Reports.
National Annex Block,
P. O. Box 21. CRIPPLE CREEK, COLO.

FRANK C. MANDELL,
MINING ENGINEER,
U. S. Deputy Mineral Surveyor for Idaho and Oregon.
Mine Examinations, Surveys and Reports.
HAILEY, IDAHO.

ERNEST H. SIMONDS,
Late Instructor in Assaying, University of California.
ASSAYS AND ANALYSES.
LABORATORY TESTS OF ORES.
Special Attention Given to the Instruction of Students.
521 Sacramento St., Cor. Leidesdorff, S. F., Cal.

School of Practical Mining, Civil,
Mechanical and Electrical Engineering.
Surveying, Architecture, Drawing, Assaying, Cyanide Process and Metallurgy.
933 Market St., S. F., Cal. OPEN ALL YEAR.
A. VAN DER NAILLEN, President
Assaying of Ores, $25; Bullion and Chlorination Assay, $25; Blowpipe Assay, $10. Full course of Assaying, $50. Established 1864.
☞ Send for Circular.

FRED H. BROWN,
Electrical Mining Expert.

Inventor of the Electro-Geodetic Mineral Locator. Patented March 20, 1900.

Will electrically survey mines and lands for mineral; furnish charts showing run of ore, extensions, pay streaks, and their approximate depth from surface.

References include scientific men, and miners for whom we have located rich mines.

Address, 1025 West 7th St.,
LOS ANGELES, CAL.

W. C. WYNKOOP, M. E.
Woodbury (Cochiti District),
New Mexico.
Economic Geology and Mine Examinations.

COBB & HESSELMEYER,
Designing and Consulting
MECHANICAL AND HYDRAULIC
ENGINEERS.
421 Market St., Cor. First St.,
Telephone BLACK 3882....San Francisco, Cal.

MINERS' ASSAY OFFICE.
(JNO. HARRIGAN)
10 Stevenson Street, - San Francisco, Cal.
Telephone Clay 972.
Assaying, Analyses, Sampling, Grinding and Pulverizing of all kinds.
Practical Working Tests of Ore by all Processes. Mining Machinery Bought and Sold. Check Assays. Instructions given in Assaying. All Work Guaranteed. **Mines Examined, Sampled and Reported on by M. P. BOAG, M. E. and Cyanide Expert.**

LOUIS FALKENAU,
STATE ASSAY OFFICE,
434 California St., near Montgomery.
Analysis of Ores, Metals, Soils, Waters, Industrial Products, Foods, Medicines, etc., etc.
Court Experting in all branches of Chemical Technology. Working Tests of Ores and Investigation of Metallurgical and Manufacturing Processes. Consultations on all questions of applied chemistry. Instructions given in assaying and all branches of chemistry.

Samples by Mail or Express Will Receive Prompt Attention.
ALBERT I. GOODELL,
ASSAYER AND CHEMIST,
1430 Stout Street.....................DENVER, COLO.

JAMES ANGUS SNEDAKER,
Mining Engineer,
721-722 Equitable Building, Denver, Colo., U. S. A.

J. W. RICHARDS,
(Late of Aspen, Colo.)
ASSAYER AND CHEMIST. 1754 Champa Street, DENVER, COLO.
Ore Shippers' Agent. Write for Terms.

Independent Assay Office.
ESTABLISHED 1888.
D. W. Reckhart, E. M., Proprietor.
Agent for Ore Shippers.
Assays and Chemical Analysis.
Mines Examined and Reported Upon.
BULLION WORK A SPECIALTY
P. O. Box 88. Office and Laboratory:
Cor. SAN FRANCISCO & CHIHUAHUA Sts.
EL PASO, TEXAS.

RELIABLE ASSAYS.

Gold...............	$ .50	Gold and Silver....	$ .75
Lead	.50	Gold, silver, copper	1 50

Samples by mail receive prompt attention.
Rich Ores and Bullion Bought.
OGDEN ASSAY CO.,
1429-16th St., Denver, Colo.

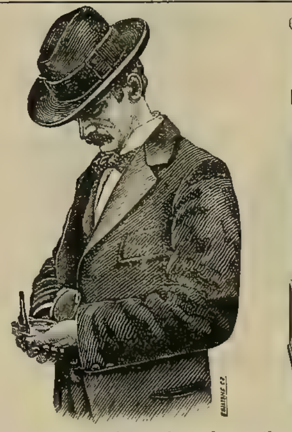
HENRY E. WOOD,
ASSAYER,
1734 Arapahoe St., DENVER, COLO.
Ore Tested in Carload Lots.
Write for Circular.

CHAS. BUTTERS & CO., Limited.
E. S. LEAVER, Manager.
Ore Testing Works,
Chemical and Metallurgical Laboratory,
Assay Office,
DOOLY BLOCK, - SALT LAKE CITY, UTAH.

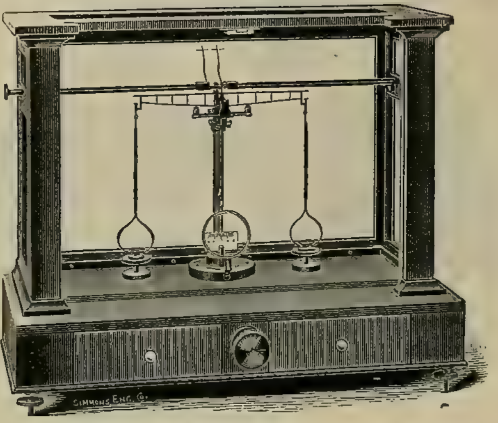
Telephone, MAIN 5104.
Cable Address, LUCKWARD.
—◆ESTABLISHED 1869.◆—
A. H. WARD.

C. A. LUCKHARDT CO.,
NEVADA METALLURGICAL WORKS,
71 & 73 STEVENSON STREET, - - - - SAN FRANCISCO, CAL.
Assaying, Analyses, Sampling.
PRACTICAL WORKING TESTS OF ORE BY ALL PROCESSES.
STAMP MILL AND CONCENTRATOR IN OPERATION ON PREMISES.

Thomas Price & Son,
Assay Office, Sampling Works
And Chemical Laboratory.
526 Sacramento Street, San Francisco, Cal.



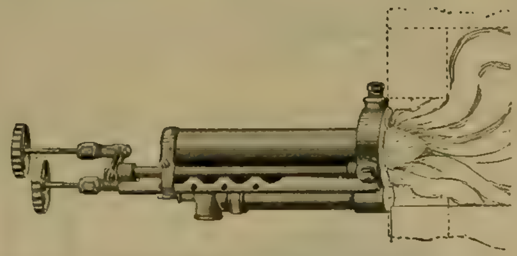
The above illustration shows the method of holding and sighting BRUNTON'S PAT. POCKET MINE TRANSIT, when taking courses or horizontal angles. The construction is such as to permit of simultaneous sighting and reading. No tripod or Jacob's staff is necessary, and an operator, after becoming accustomed to its uses, can take the Transit from his pocket, take a reading and replace the instrument before a sighting compass can be placed. The most accurate and relibale pocket instrument on the market. Send for illustrated Catalogue B to



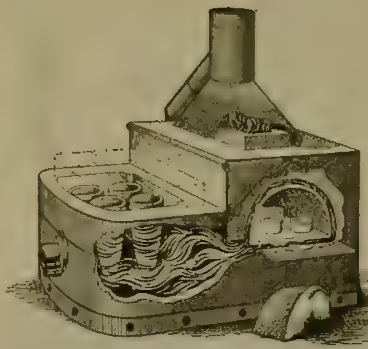
No. 1 Special Button Balance with 8-inch beam. Sensibility 1-200 Milligramme. For very accurate weighings. Among the well-known smelters using this balance are the following: GLOBE SMELTING & REFINING CO., Denver, Colo., U. S. A.; CANADIAN SMELTING WORKS, Trail, B. C.; MT. LYELL MINING & RAILWAY CO.'S Reduction Works, Penghana, Tasmania.

For full description of this and other balances send for Catalogue A to

WM. AINSWORTH & SONS,
(Successors to Wm. Ainsworth.) **DENVER, COLO., U. S. A.**
For sale by reputable dealers everywhere.



CARY HYDROCARBON BURNER.



CARY COMBINATION FURNACE.

TO ASSAYERS:

With the CARY BURNER AND COMBINATION FURNACE (PATENTED), shown above, it is possible to melt and cupel 144 assays in 12 hours with 5 gallons of gasoline.

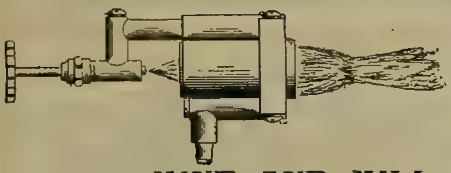
Gasoline is cheaper, quicker, cleaner and cooler to work with than any other fuel.

We make Blow Pipe Outfits in various sizes for use with these appliances. Write for a copy of our new catalogue, in which these and our other specialties are fully described.

F. W. BRAUN & CO.,
Manufacturers of Assayers' Appliances,
LOS ANGELES, CAL.

Taylor's Coal Oil and Gasoline Burner

(PATENTED)



A new heating burner for Assayers and Chemists, or for brazing, in which coal oil at 33 deg. to 45 deg., Beaume and 150 deg. fire test, or gasoline at 74 deg. test can be used for fuel. Adapted to crucible, muffle and brazing work. Price $6. For sale by

JOHN TAYLOR & CO.,
63 FIRST STREET,
SAN FRANCISCO, CAL.

MINE AND MILL SUPPLIES.

Importers and Manufacturers of Assayers' Materials, Chemicals and Acids, Etc.

CATALOGUE ON APPLICATION.

TRADE MARK.

(M'ARTHUR-FORREST PROCESS.)

CYANIDE PROCESS.

The MacArthur-Forrest Cyanide Process is the Best

For the Treatment of Refractory and Low Grade Gold and Silver Ores and Tailings. We are the Originators of the Cyanide Treatment, and have kept up with the times in all Improvements in Cyanide Methods.

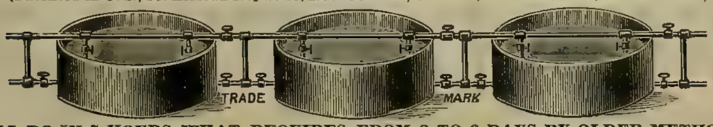
Successful Plants in Operation in all Western Mining States.

Samples Assayed and Fully Reported Upon. Properties Examined Designs Furnished. For Terms and Particulars, Address

The Gold and Silver Extraction Co. of America, Ltd.
GEO. A. ANDERSON, General Manager,
Testing Works: 1716 Blake Street, Denver, Colo. 208-210 McPhee Building, Denver, Colo.
ALMARIN B. PAUL, Agent, 27 Crocker Building, San Francisco, Cal.

"PNEUMATIC" CYANIDE PROCESS.

(Patented in U. S., So. African Republic, New Zealand, Victoria, New So. Wales, So. Australia.)



WILL DO IN 7 HOURS WHAT REQUIRES FROM 2 TO 6 DAYS BY OLDER METHODS.

SEND FOR PAMPHLET.

THE PNEUMATIC CYANIDE PROCESS CO., 306 Boston Bldg., Denver, Colo.

Are You Confronted With a Difficult Ore-Separating Problem?

THE WETHERILL MAGNETIC SEPARATING PROCESS

may prove the solution. Apply to Wetherill Separating Company, 52 Broadway, N. Y.

IMPROVED BONE ASH.

It is 100% better than Bone Ash now being used; will absorb more lead, will never crack or split in the Muffle, can be dropped before or after using without breaking. Cupels can be made and used at once; no drying required. Excessive heat has no effect on them. Will stand shipping any distance. It takes up none of the precious metals in cupeling. Cupels much quicker. Once used always used. Sold under a positive guarantee or money refunded. Now being used by all smelters and assayers who have tried it.

Price of Improved Bone Ash, $60.00 per ton; $3.50 per 100 lbs.; or manufactured Cupels, $1.50 per hundred.

CUMMINGS & SWEARS, Sole Mfrs.,
Telephone Clay 972. 10 STEVENSON ST., SAN FRANCISCO, CAL.

For Sale by Justinian Caire Co., Dealers in Assay Goods and Mining Supplies, 521-523 Market St.

PIONEER REDUCTION CO.

Established 1858. Nevada City, Cal.

Buyers of Gold, Silver and Copper Ores and Concentrates.

HIGHEST PRICES PAID FOR COPPER ORES.

WRITE FOR RATES.

ESTABLISHED 1866.

Controls and Check Assays

(A SPECIALTY.)

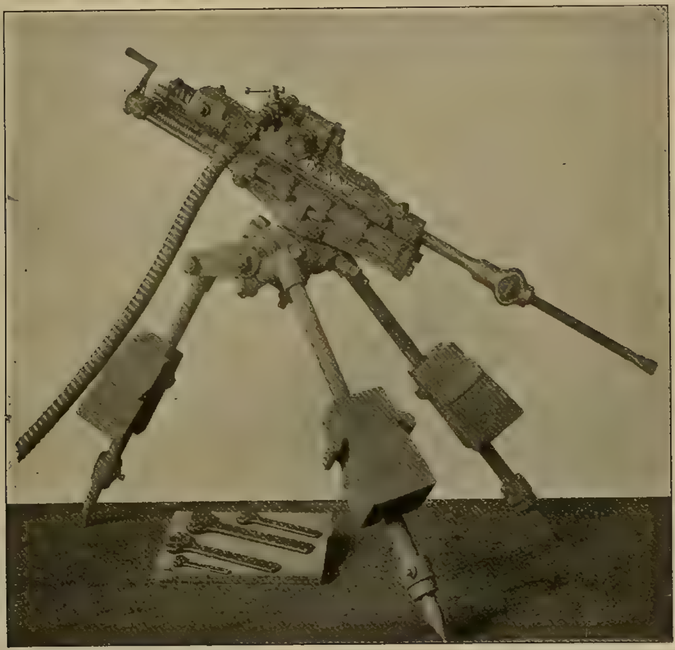
MARINER & HOSKINS,
ASSAYERS AND CHEMISTS,
Mining Engineers and Metallurgists.
81 South Clark Street.
Rooms 51-55,
CHICAGO, ILLINOIS.

SEND SAMPLES BY MAIL OR EXPRESS.
MAILING SACKS ON APPLICATION. : :

ST. LOUIS SAMPLING & TESTING WORKS,
1225 and 1227 Spruce St.,
ST. LOUIS, MO.

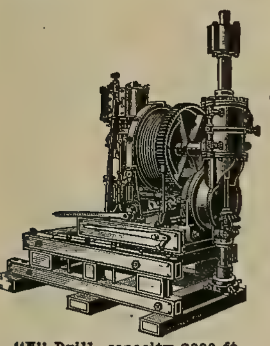
The Largest and Most Complete Ore Testing Works in Existence for Making all Kinds of Practical Working Tests of Ore, etc., to Determine the Most Suitable Method of Treatment.

PLANT FOR COAL WASHING, COKING AND STEAMING TESTS OF FUELS. ASSAYS, ANALYSES, CHEMICAL AND PHYSICAL INVESTIGATIONS OF ALL KINDS. MINERAL PROPERTIES, MINES AND METALLURGICAL PROCESSES EXAMINED AND REPORTED UPON. CORRESPONDENCE SOLICITED.



"GIANT" DRILLS AND COMPRESSORS
ARE THE BEST.
"GIANT" BABY DRILLS CHEAPEN MINING.
WRITE US FOR PARTICULARS.
THE COMPRESSED AIR MACHINERY CO., 11-13 First St., San Francisco, Cal.

SULLIVAN



"N" Drill, capacity 2000 ft.
Cable Address, Diamond, Chicago.
Codes: A. B. C., 4th Edition. Postal Directory. Western Union. Liebers.

Diamond Core Drills
FOR PROSPECTING. Catalogue 29.
The most extensive line of sizes and styles ever offered.
CONTRACTORS FOR PROSPECTING WITH DIAMOND DRILL.

ROCK DRILLS
FOR MINING. Catalogue 30.
Superior valve and ratchet motions. The highest possible grade.
Send for Our New Catalogues.

Sullivan Machinery Co.,
New York. Pittsburg. Claremont, N. H.
Main Office, CHICAGO....................54 to 60 N. CLINTON ST.
Western Office, DENVER.................332 SEVENTEENTH ST.
Pacific Agency, SAN FRANCISCO, HENSHAW, BULKLEY & CO.

Established 1837.
I. C. Yawger,
Successor to VICTOR BISHOP & CO.
IMPORTER OF CARBONS FOR DIAMOND DRILLS.
21 Maiden Lane, - NEW YORK

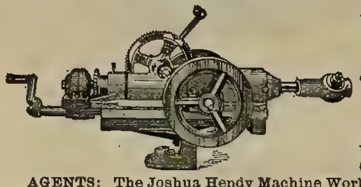
DIAMOND DRILLS
FOR PROSPECTING.
AMERICAN DIAMOND ROCK DRILL CO.
120 LIBERTY ST N.Y.

THEODOR LEXOW, 14 JOHN STREET, N. Y.
......Importer of......
CARBONS
(BLACK DIAMONDS)
For DIAMOND DRILLS and all Mechanical Purposes.
HENRY DEMMERT.

RAND ROCK DRILLS and Drill Mountings.

HIGHEST DEGREE OF PERFECTION ATTAINED. ∴ INDISPENSABLE IN MINING, TUNNELING & EXCAVATING.
AIR —AND— Gas COMPRESSORS.
STANDARD TYPES! SPECIAL PATTERNS! ALL SIZES!
RAND DRILL CO., 100 BROADWAY, New York, U. S. A.
San Francisco Office: 223 First St.
1328 Monadnock Blk., CHICAGO, ILL.

THE JACKSON HAND POWER ROCK DRILL.



Works in Any Rock, in Any Position.
Write for Circulars and References.
THE JACKSON DRILL & M'F'G CO.,
1756 Larimer Street, DENVER, COLO.
Sole Licensees for all Foreign Countries and Eastern United States: THORNTON N. MOTLEY COMPANY (INC.), 43 John St., New York.
AGENTS: The Joshua Hendy Machine Works, 38 Fremont St., San Francisco, Cal.; Chas. B. Boothe & Co., 126 So. Los Angeles St., Los Angeles, Cal.

FIRTH'S DRILL STEEL,
16 cents per pound.

The best drill steel on the market. Has no equal for hard rock drilling. Miners cannot afford to use an inferior steel when FIRTH'S can be bought at the above price.

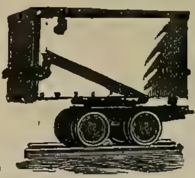
Abner Doble Company, Gen. Agts.,
Fremont and Howard Sts., SAN FRANCISCO, CAL.

THE Best None Too Good
When in Hard Rock.

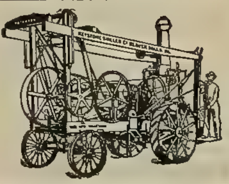
CANTON DRILL STEEL.

UNEQUALED IN ROCK-CUTTING QUALITIES. Ask Your Dealer for CANTON Brands.
—— FOR SALE IN CALIFORNIA BY ——
SCHAW, INGRAM, BATCHER & CO, Sacramento — San Francisco.
HARPER & REYNOLDS CO., Los Angeles.

WE HAVE MOVED TO LARGER QUARTERS.
TRUAX
CARS ALWAYS IN STOCK TO FILL RUSH ORDERS.
ORE CARS
WE MAKE CARS FOR YOUR CAGE AND SKIPS FOR YOUR INCLINE SHAFT.
SEND FOR PAMPHLET AND REFERENCES.



Truax Mfg. Co., 69 STEVENSON ST., S. F.



Prospecting Machinery.

Multitudes in use for testing for minerals. Sizes and equipments to suit any and all conditions. Unexcelled for Placer Testing, Oil Wells, Water Wells, testing for Lead and Zinc, Iron and Coal; goes through anything; brings up everything. Large sizes drill as much as 1500 feet. In use all over the world. Every purchaser pleased. Used on boats for testing river and lake beds. Water no hindrance. No skilled labor required.

KEYSTONE DRILLER CO., Beaver Falls, Pa., U. S. A.

BULLOCK DIAMOND DRILLS
If you are interested in prospecting send for our new Diamond Drill Catalogue (No. 33).
BULLOCK MINING MACHINERY
PORTABLE HOISTS—Send for our new Catalogue (No. 40). CHAMPION MINE VENTILATORS—Send for our new Catalogue (No. 35).
HOISTING AND HAULAGE PLANTS, ORE CARS, SKIPS, CAGES, ETC., ETC.

PARKE & LACY CO., Agent,
21 & 23 Fremont St., San Francisco, Cal.

M. C. BULLOCK MFG. CO.,
1172 West Lake St., Chicago, Ill., U. S. A.

SELBY SMELTING AND LEAD CO.,

REFINERS OF GOLD AND SILVER BARS, GOLD DUST, ETC.

Buyers of Gold, Silver, Lead and Copper Ores, Gold Concentrates, Lead Bullion, Cyanide Product, Etc.

ORE AND BULLION ASSAYERS.

Works at VALLEJO JUNCTION, CAL. Office, 416 MONTGOMERY ST., SAN FRANCISCO, CAL.

GATES IRON WORKS.

BREAKERS.
ROLLS.
STAMPS.
FURNACES.
SCREENS.
ELEVATORS.
HOISTS.

Concentration.

There are three general classes of concentrating machines, and many thousand varieties. We make one concentrator in each class and make them as perfect as they can be made. Our concentrators are, therefore, three in number, viz: The Jig; The Vanner; and

THE HALLETT STRATIFYING TABLE.

Our Number 16 Catalogue describes the Hallett.

MAIN OFFICE AND WORKS: 650 Elston Ave., CHICAGO.

REGRINDING MACHINERY.

BALLAST and MACADAM MACHINERY.

CEMENT MACHINERY.

THE COLORADO IRON WORKS CO.,

DENVER, COLORADO.

Manufacturers of HIGH CLASS

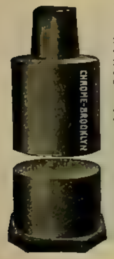
Ore Milling Equipments.

WE ARE THE ORIGINATORS
—OF THE—
Narrow Face, Large Diameter, High Speed
CRUSHING ROLLS.

ADAMANTINE SHOES AND DIES.

◆◆◆◆◆CHROME CAST STEEL.◆◆◆◆◆

CANDA Improved Self-Locking CAMS.

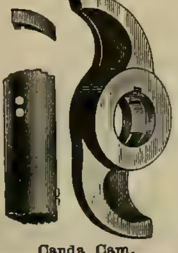


TAPPETS, BOSSES, ROLL SHELLS AND CRUSHER PLATES.

These castings are extensively used in all the mining States and Territories of North and South America. Guaranteed to prove better and cheaper than any others. Orders solicited subject to the above conditions. When ordering, send sketch with exact dimensions. Send for Illustrated Circular.

Manufactured by **CHROME STEEL WORKS,** Brooklyn, N. Y.

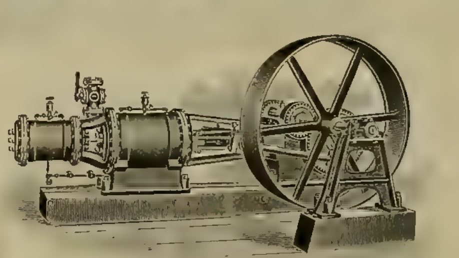
H. D. & H. W. MORRIS,
AGENTS,
Room 194 Crocker Building, San Francisco, Cal.



Canda Cam.

WHY NOT AIR DRILLS OR COMPRESSORS?

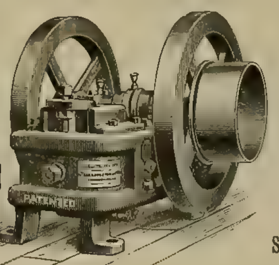
have our catalogues specifications and prices before you purchase



Our guarantees are strong; our customers are satisfied. We can satisfy YOU.

J. Geo. Leyner,
729 Seventeenth St.,
DENVER, COLO.

The ONLY **FINE CRUSHER** OF HARD ROCK.



Reduces to Gravel and Sand.

Does as fine work as Breaker and two sets of rolls.

SEND FOR CIRCULAR.

Roll Jaw Crusher.

STURTEVANT MILL CO.
113 CLAYTON ST.
BOSTON, MASS.

California Vigorit Powder Co.

—Manufacturers of—

Dynamite High Explosives and "Vigorit Low" Blasting Powder.

OFFICE: 208 CALIFORNIA STREET,
SAN FRANCISCO, CAL.

WORKS: POINT ISABEL,
CONTRA COSTA CO., CAL.

THE CAL. ANTI-CALORIC COMPANY,

Tel. Main 5752. Office, 217-219 Mission St., San Francisco, Cal.

Sole Manufacturers of ANTI-CALORIC SECTIONAL COVERINGS AND BLOCKS FOR BOILERS. ANTI-CALORIC PLASTER for Boilers, Domes, Pipes, Heaters, Etc., — the Best and Cheapest Insulating Plaster in the Market. Send for Samples and Prices. Factory, Potrero.

Founded by Mathew Carey, 1785.

HENRY CAREY BAIRD & CO.,

NDUSTRIAL PUBLISHERS, BOOKSELLERS & IMPORTERS,

810 Walnut St., Philadelphia, Pa., U. S. A.

☞ *Our New and Revised Catalogue of Practical and Scientific Books, 92 pages, 8vo; a Catalogue of Books on Steam and the Steam Engine, Machinery, etc.; a Catalogue of Books on Sanitary Science, Gas Fitting, Plumbing, etc., and our other Catalogues and Circulars, the whole covering every branch of Science applied to the Arts, sent free and free of postage to any one in any part of the world who will furnish his address.*

ASSESSMENT NOTICES.

MARIPOSA COMMERCIAL AND MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Mariposa County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 11th day of July, 1900, an assessment (No. 17) of Ten ($10) Dollars per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 320 Sansome street, room 24, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 14th day of August, 1900, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 4th day of September, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

JOSEPH H. MOOSER, Secretary.

Office—320 Sansome street, room 24, San Francisco, California.

SIERRA NEVADA SILVER MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Virginia Mining District, Storey County, State of Nevada.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 9th day of July, 1900, an assessment (No. 119) of fifteen cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Room 14, Nevada block, No. 309 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on Tuesday, the 14th day of August, 1900, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 3d day of September, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

E. L. PARKER, Secretary.

Office—Room 14, Nevada block, No. 309 Montgomery street, San Francisco, California.

MAMMOTH GARFIELD GOLD MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Shasta County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 5th day of June, 1900, an assessment of seventeen and one-half (17½) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Rooms 54 and 59, No. 120 Sutter St., San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 4th day of August, 1900, will be delinquent and advertised for sale at public auction; and unless payment be made before, will be sold on TUESDAY, the 2nd day of October, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

SAM W. CHEYNEY, Secretary.

Office—Rooms 54 and 59, No. 120 Sutter St., San Francisco, California.

EUREKA CONSOLIDATED DRIFT MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Placer County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 29th day of May, 1900, an assessment (No. 25) of one cent per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Room 31, No. 214 Pine street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 30th day of June, 1900, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on SATURDAY, the 21st day of July, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

GEO. W. DIXON, Secretary.

Office—Room 31, No. 214 Pine street, San Francisco, California.

POSTPONEMENT.

The date of the delinquency of the foregoing assessment (No. 25) has been postponed to MONDAY, the 16th day of July, 1900, and the day of sale from the 21st day of July, 1900, to TUESDAY, the 7th day of August, 1900.

By order of the Board of Directors.

GEO. W. DIXON, Secretary.

Office—Room 31, No. 214 Pine street, San Francisco, California.

NATIONAL CONS. MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Rich Gulch, Shasta County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 4th day of June, 1900, an assessment (No. 12) of five cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, 773 Mission St., San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 9th day of July, 1900, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on WEDNESDAY, the 1st day of August, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

GEO. W. FLEISSNER, Secretary.

Office—773 Mission St., San Francisco, California.

POSTPONEMENT.

The date of the delinquency of the foregoing assessment (No. 12) has been postponed to Thursday, the 26th day of July, 1900, and the day of sale from August 1st, 1900, to MONDAY, August 20th, 1900.

By order of the Board of Directors.

GEO. W. FLEISSNER, Secretary.

Office—773 Mission St., San Francisco, California.

AMERICAN AND FOREIGN
TRADE MARKS
SCIENTIFIC PRESS
PATENTS
PATENT AGENCY
CAVEATS
DEWEY, STRONG & CO. 330 MARKET ST.

DELINQUENT SALE NOTICE.

MAY DAY GOLD AND SILVER MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Calaveras County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 4) levied on the 19th day of April, 1900, the several amounts set opposite the names of the respective shareholders, as follows:

Name.	No. Cert.	No. Shares.	Amt.
J. P. E. Heintz	156	1,000	$100 00
Wm. A. Junker	71	500	50 00
Annie D. Weeks	133	500	50 00
C. G. Von Treutler	127	400	40 00
Duncan S Hayne	157	1,000	100 00
A. Feist	165	1,250	125 00
George Schoenwald	131	100	10 00
Thos. A. De Lay, Trustee	88	6,000	600 00

And in accordance with law, and an order from the Board of Directors, made on the 19th day of April, 1900, so many shares of each parcel of such stock as may be necessary, will be sold at public auction, at the office of the company, Heald's Business College, 24 Post street, San Francisco, California, on WEDNESDAY, the 25th day of July, 1900, at the hour of 1 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

E. P. HEALD, Secretary.

Office—Heald's Business College, 24 Post street, San Francisco, California.

DELINQUENT SALE NOTICE.

CALIFORNIA BORAX COMPANY.—Location of principal place of business, San Francisco, California; location of works, San Bernardino County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 3) levied on the 25th day of May, 1900, the several amounts set opposite the names of the respective shareholders, as follows:

Name.	No. Cert.	No. Shares.	Amt.
J. L. Tisdale	34	2	$4 00
J. L. Tisdale	35	2	4 00
H. P. Cartier	67	5	10 00
J. J. Gunn	85	4	8 00
Geo. H. Folsom, Trustee	101	20	40 00
Luther J. Holton, Trustee	107	10	20 00
F. E. Densmore	108	25	50 00

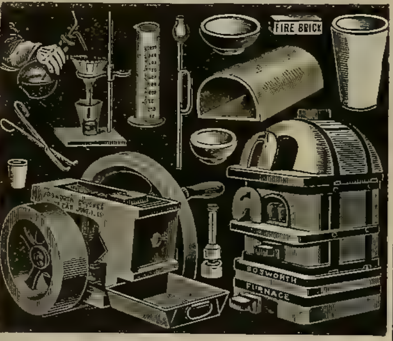
And in accordance with law, and an order from the Board of Directors, made on the 25th day of May, 1900, so many shares of each parcel of such stock as may be necessary, will be sold at public auction at No. 310 Pine street, rooms 35 and 36, San Francisco, California, on MONDAY, the 30th day of July, 1900, at the hour of 12 o'clock M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

J. W. PEW, Secretary.

Office—No. 310 Pine street, rooms 35 and 36, San Francisco, California.

THE DENVER FIRE CLAY CO.,

1742 to 1746 Champa St., DENVER, COLO.



Manufacturers, Importers and Dealers in

Chemicals, Apparatus and Assayers' Supplies, Fire Brick and Tile.

Sole Agents for the "AINSWORTH BALANCES."

WRITE FOR CATALOGUES.

THE LITTLE ALASKA GOLD WASHER.

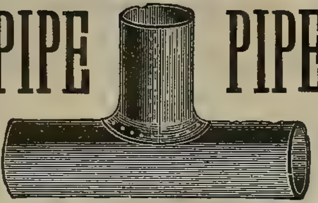
Price $6.

Saves the Gold.

Weighs only **7 1-2 Lbs.**

After several years' practical use in different fields, our washer has established its superiority over all placer or beach washers. It is just the washer for Cape Nome; it was used extensively in Alaska last year with every success. In working the operator does not have to wet his hands and can stand in an upright natural position. It is just the washer for the poor man who has not the money to put in expensive machinery. It will do the work of ten men with gold pans. It is just the washer for the prospector, being light and easy to pack. Don't fail to write us if in need of a washer; we can save you *time*, *labor* and *money*. RUSSELL & KINSEY, 1237 Magnolia Ave., Los Angeles, Cal.

PIPE PIPE



PIPE for Hydraulic Power and Irrigation.

OIL STORAGE TANKS.

GENERAL SHEET IRON WORK.

Lacy Manufacturing Co.,

LOS ANGELES.

INVENTORS, Take Notice!

L. PETERSON, MODEL MAKER,

544A MISSION STREET, bet. First and Second Sts., SAN FRANCISCO. Experimental machinery and all kinds of models. Tin and brasswork. All communications *strictly confidential.*

Dearborn Compounds for That Oil Getting Back Into Boilers.

DEARBORN DRUG & CHEMICAL WORKS,

MANUFACTURING AND ANALYTICAL CHEMISTS,

ANALYZERS OF EVERYTHING. OIL CHEMISTS. MAKERS OF BOILER COMPOUNDS WATER CHEMISTS.

Offices and Laboratories:

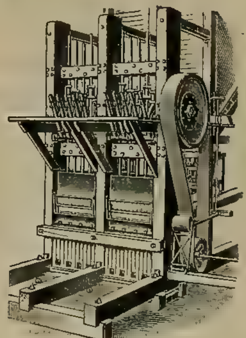
29, 30, 31, 32 and 33 Rialto Bldg. - - - CHICAGO, ILL.

THE EDWARD P. ALLIS COMPANY,

MILWAUKEE, WIS.

◆ MANUFACTURERS OF ◆

MINING, SMELTING, MILLING PLANTS.

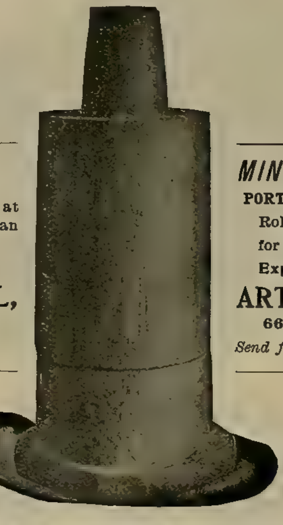


LEYNER DRILLS,
AIR COMPRESSORS,
CONCENTRATORS,
ORE FEEDERS,
REFINING FURNCES.

MINE PUMPS AND HOISTING ENGINES.

REYNOLDS CORLISS ENGINES.

WE SELL EVERYTHING USED IN CONNECTION WITH MINING AND MILLING.



SHOES and DIES

of **SUPERIOR** quality and at prices 20 to 30% lower than any other maker.

FURNISHED BY

ARTHUR KOPPEL,

66 Broad St., N. Y. City.

Write for Particulars.

MINING CARS of every description.

PORTABLE RAILWAYS,

Rolling Stock, Railway Outfits for Mines of every description.

Export Work a specialty.

ARTHUR KOPPEL,

66 Broad St, N. Y. City.

Send for Catalogue and Estimates.

Pacific Coast Agents, BAKER & HAMILTON, SAN FRANCISCO and SACRAMENTO.

GENERAL PHOTO-ENGRAVING CO.

[SUCCESSORS TO DEWEY ENGRAVING CO.]

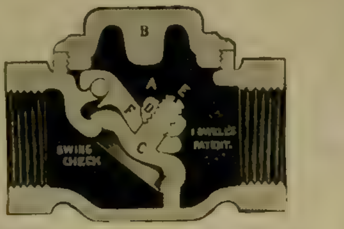
FINE ZINCOGRAPHS, HALF-TONES, AND DESIGNING.

ENGRAVINGS OF MACHINERY OUR SPECIALTY.

SEND FOR SAMPLES AND PRICES. NO. 536 CLAY STREET,
TELEPHONE BLACK 1466. SAN FRANCISCO, CAL

TELEPHONE MAIN 5303
Union PHOTO-ENGRAVING Co.
DESIGNING HALF-TONES ZINC ETCHING
523 MARKET ST
SAN FRANCISCO, CAL.

Powell's Patent Swing Check Valve.



SIMPLE, EFFECTIVE AND TIGHT.

Can quickly and easily be reground at any time. Works equally well in either a horizontal or vertical position. Try them. Jobbers on the Pacific coast can furnish them. Manufactured by

THE WM. POWELL CO.,
CINCINNATI, O.

"CRACK PROOF"

PURE RUBBER BOOTS
Are the CHEAPEST because
They Are the Most Durable.

Beware of Imitations.

GOLD SEAL, BADGER AND PIONEER
Belting, Packing and Hose.

RUBBER FACTORY IN SAN FRANCISCO.
Valves, Gaskets Etc., Made to Order.

GOODYEAR RUBBER CO.

R. H. PEASE, Vice-Pres't and Manager,
Nos. 573, 575, 577, 579 MARKET ST., San Francisco.
Nos. 73, 75 FIRST ST., Portland, Or.

If you are going to

CAPE NOME

Send for our Catalogue describing the

PNEUMATIC PROSPECTOR.

SIZE,
6x
11x
14 Inches.

WEIGHT,
ONLY
TEN
POUNDS.

—AND THE—

PNEUMATIC SEPARATOR.

Weight, 160 lbs.; capacity, 15 to 30 tons per day.

These machines save the gold WITHOUT THE USE OF WATER, enabling the miner to thoroughly prospect on the spot and successfully work the rich benches and gulches, when water is not convenient. The separation is accomplished by graduated air current. These machines are especially adapted for saving flour and beach gold. No quicksilver being used, the iron-coated beach gold of Cape Nome, so difficult to amalgamate, is saved with these machines as easily as though the gold was clean. Send for descriptive circulars.

P. P. CUPLIN,
Inventor and Manufacturer,
West Bend, Iowa, U. S. A.

THE MINES OF

Eastern Oregon

Which are now attracting so much attention are reached only by the lines of the

OREGON RAILROAD & NAVIGATION CO.

For Descriptive Pamphlets, Through Rates, Etc., Address

E. C. WARD, Gen. Agt.,
630 Market Street, San Francisco.

COLORADO'S GOLD

Output for 1899 is unequaled by any State in the Union. Cripple Creek, Leadville, and all the important mining towns are reached by

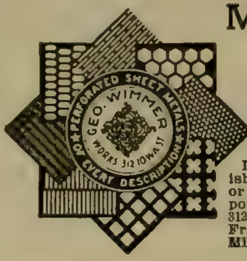
THE COLORADO & SOUTHERN RY...

For copies of our publications on the Swandyke and Pine Creek Gold Districts, or our pamphlet "Hints to Prospectors," address

T. E. FISHER, GEN. PASS. AGT.,
DENVER, COLO.

QUARTZ SCREENS

A specialty. Round, slot or burred slot holes. Genuine Russia Iron, Homogeneous Steel, Cast Steel or American planished Iron, Zinc, Copper or Brass Screens for all purposes. CALIFORNIA PERFORATING SCREEN CO., 145 and 147 Beale St., S. F.


PERFORATED SHEET METALS OF EVERY DESCRIPTION
GEO. WIMMER
WORKS 312 IOWA ST

Mining Screens

A SPECIALTY.

Diagonal Slot,
Straight "
Burred "
Round Holes.

In American planished or Russian iron or steel for all purposes. GEO. WIMMER, 312 Iowa Street, San Francisco. Telephone Mint 1337.

—EASTERN PRICES BEATEN.—

SAN FRANCISCO Pioneer Screen Works,

JOHN W. QUICK, Prop.

Improved Facilities! Finest Work! Lowest Prices!

Perforated Sheet Metals, Steel, Russia Iron, American Planish, Zinc, Copper and Brass Screens for All Uses.

MINING SCREENS A SPECIALTY.
221 and 223 First Street, San Francisco, Cal.

For Best Satisfaction and Lowest Prices

—IN—

PERFORATED METALS

—AND—

MINING SCREENS

PLACE YOUR ORDERS WITH

Fraser & Chalmers,

CHICAGO, ILL., U. S. A.

SEND FOR SAMPLES, MENTIONING THIS PAPER.

DENVER & RIO GRANDE R.R.
SCENIC LINE OF THE WORLD

The ∴ Mining Man's Favorite Route

BETWEEN

Denver, Colorado Springs, Pueblo and Florence, Cripple Creek, Leadville, Glenwood Springs, Aspen, Gunnison, Lake City, Creede, Durango, Silverton, Telluride and Ouray,

Reaching all the Mining, Milling, Cyaniding, Chlorinating and Smelting centers in Colorado and Utah, and all mining points in California, British Columbia and the Pacific Northwest by close connections and a perfect system of through car service.

Pullman Palace and Tourist Sleeping Cars between Denver and San Francisco and Los Angeles, and Pullman Palace and Tourist Sleeping Cars and Free Reclining Chair Cars between Denver and Portland. : : A Perfect Dining Car Service on All Through Trains. : :

For Illustrated Pamphlet, address

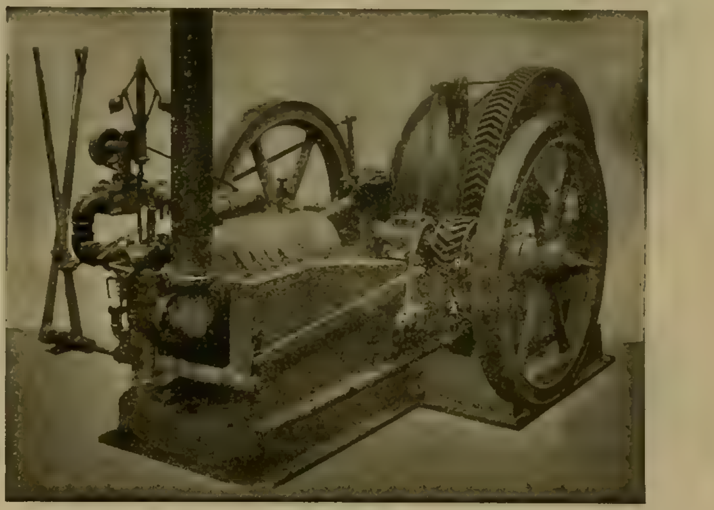
W. J. SHOTWELL,
G. A. D. & R. G. R. R.,
126 California St.,
San Francisco, Cal.

S. K. HOOPER,
G. P. & T. A.,
Denver,
Colo.

HARNESS —AND— SADDLES.

CATALOGUE FREE.
L. D. Stone & Co., San Francisco,
417 and 419 Market Street.
A. KEMPKEY & F. M. GILHAM,
Proprietors.

HERCULES HOISTS Are Sold the World Over.



Hercules Gasoline Hoist--Speed 385 Ft.; Load 2500 Lbs.

HERCULES GAS ENGINE WORKS,............141-143 FIRST STREET, SAN FRANCISCO, CAL.

A GASOLINE OR OIL "HOIST"

that does its work without any fuss or bother is the "Weber." Correctly designed and built, in sizes from 6 to 150 H. P., with Single or Double Drum, for Gasoline, Gas or Distillate. Unexcelled for mining, quarry, or ship use. State sizes wanted and for what use.

WEBER GAS & GASOLINE ENGINE CO.,
430 S. W. Boulevard,
Kansas City, Mo.
See our PUMPING PLANTS.

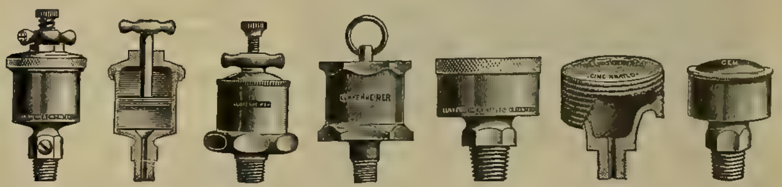
The Lunkenheimer Brass and Iron Specialties For STEAM, WATER, GAS, AIR, OILS, etc

Comprising an endless variety of Valves, Whistles, Lubricators, Oil and Grease Cups, etc., are unsurpassed where thorough, reliable service is the first requisite. A trial order demonstrates their fitness and invariably results in their adoption. Have you need for such goods? If so, specify "LUNKENHEIMER" make. Write for catalogue.

The Lunkenheimer Company BRANCHES, NEW YORK, LONDON. GENERAL OFFICES AND FACTORIES, Cincinnati, U. S. A.

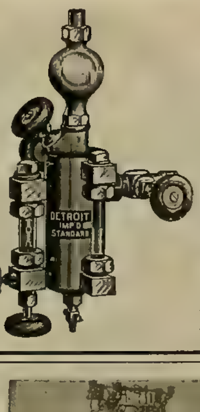
BRANCHES: NEW YORK, 26 Cortlandt St.; PHILADELPHIA, Bourse Bldg.; LONDON, S. E., 35 Gt. Dover St.; MEXICO CITY, Puente de San Francisco No. 6.

DO YOU USE GREASE?



Ideal. Marine. Jewel. Apollo. Tiger. Rex. Gem.

"The Lunkenheimer" cups will feed it. Endorsed by millions of satisfied users. In stock by dealers everywhere. Specify "The Lunkenheimer" and get the best.

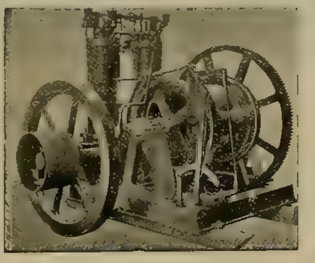


ALL ABOUT Sight Feed Lubricators.

Our new catalogue for 1900 is ready for distribution. It explains in detail the principles governing the operation of **Sight Feed Lubricators**, using sectional view to show the internal construction, and containing cuts of the different styles in parts before being assembled into the complete lubricators, thus enabling every one to understand their construction and operation thoroughly.

In addition it shows our full line of **Glass Oilers, Oil Pumps, Oiling Devices, Multiple Oilers, Valves, Etc.** It will be sent to any address on application.

DETROIT LUBRICATOR CO., DETROIT, MICH.



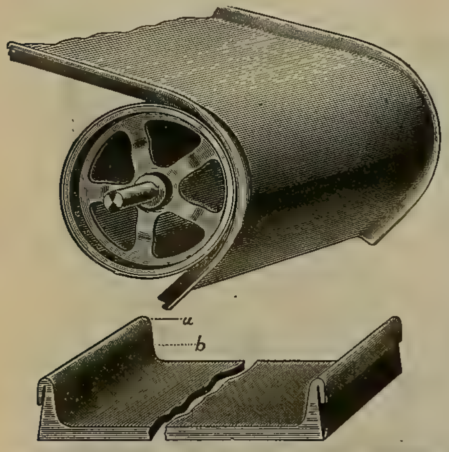
Mining Hoist.

THE GOLDEN GATE GAS ENGINE
Will raise more ore than any other **AT LESS COST.**
MANY IN USE, Giving Satisfaction.
Built for any Capacity and for any Purpose.
Pumping Water, Propelling Boats, Hoisting Ore, Machine Shop Power, Etc.

Send for Particulars and Catalogue.

ADAM SCHILLING & SONS,
213 & 215 Main St., San Francisco, Cal.

THE BROWNELL "PATENT LIP" FLANGE FRUE VANNER BELTS.



It has taken years of ceaseless testing and experimenting to produce the superior belt which we now offer, with elastic flanges and pliable body reinforced with specially woven duck. Every belt is manufactured by experienced workmen, and carefully tested on machines especially built for that purpose; consequently we are to-day manufacturing the best belts that mechanical ingenuity, combined with honesty of construction, can possibly produce.

SUPT. OFFICE WILDMAN GOLD MINING COMPANY,
SUTTER CREEK, AMADOR CO., CAL., Feb 22, 1897.

MR. JAS. S. BROWNELL, 132 Market St., San Francisco, Cal.—DEAR SIR: Replying to your favor of the 18th inst., will say that in the two mills operated by this company we have nineteen of your Patent Lip flange concentrator belts in use; some of them have been in constant use for the past two years and have given entire satisfaction. I know of no better flange for a side shake machine.

Yours truly, JOHN ROSS JR., Superintdenent.

MEXICAN MILL, EMPIRE, NEV., March 28, 1897.

MR. J. S. BROWNELL, San Francisco, Cal.—DEAR SIR: For some years we have used three different styles of belts on our Frue vanner at the Mexican mill, and for smooth working and endurance the Brownell Patent Lip flange belt has proved its superiority over all others, and I unhesitatingly recommend it to all who are using Frue machines.

Yours truly, EUGENE MAY, Foreman.

For any information regarding Frue Vanner or Belts, call on or address

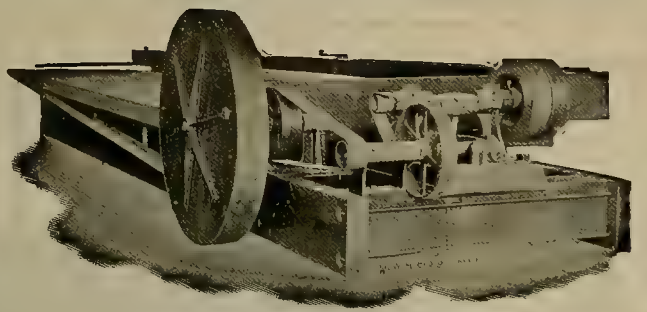
JAS. S. BROWNELL, Western Agent FRUE VANNING MACHINE CO.

(Successor to Adams & Carter.) 132 MARKET STREET, ROOM 15, SAN FRANCISCO.

Sole Pacific Coast Agents and Builders of the Celebrated

WILFLEY CONCENTRATOR.

Over 2000 in Use.



KEPT IN STOCK READY FOR SHIPMENT.

The Wilfley Table is fully covered by U. S. patents Nos. 580,338 and 590,675. Infringements will be prosecuted to the full extent of the law.

PRICE, $450, F. O. B., San Francisco.

THE WILFLEY CONCENTRATORS HAVE LARGE CAPACITY, EASY ADJUSTMENT, ARE SIMPLE IN CONSTRUCTION, AND NOT LIABLE TO WEAR.

WHITE, ROGERS & CO.,

Constructing Engineers and Contractors,

OFFICES, 306 PINE STREET, - - SAN FRANCISCO, CAL.

: : WE FURNISH AND ERECT : :

Modern Stamp Mills for Gold Ores,
Modern Stamp Mills for Silver Ores,
Dry Crushing and Roasting Stamp Mills,
Cyanide Tanks and Machinery,
Chlorination Works and Machinery,
Copper and Silver and Lead Smelters,
Complete Concentration Plants and Machinery,
Direct Connected Hoisting Engines,
Geared Hoisting Engines,
Friction Hoisting Engines,
Portable Hoisting Engines,
Electric Hoisters,
Wilfley Concentrators,
Machinery and Supplies of all kinds and for all Mining Purposes.

THE HALLIDIE ROPEWAY

For Transporting Ore, Fuel, Earth, Sugar Cane, etc., by Wire Ropes.

SIMPLE, ECONOMICAL, PRACTICAL, DURABLE.

LOADS MECHANICALLY. DUMPS AUTOMATICALLY.

WIRE TRAMWAYS (Single and Double Rope Systems),

Cableways, Transmission by Wire Ropes,
Incline Planes, Cable Grips,
Logging by Cables, Automatic Loaders,

PLOWING, SCRAPING AND TRANSPORTING by Wire Ropes,

DESIGNED, SUPPLIED AND ERECTED. Estimates Furnished.

Improved GRIP PULLEY.

Patents Nos. 483,442; 610,353.

EFFECTIVE, SIMPLE, AUTOMATIC.

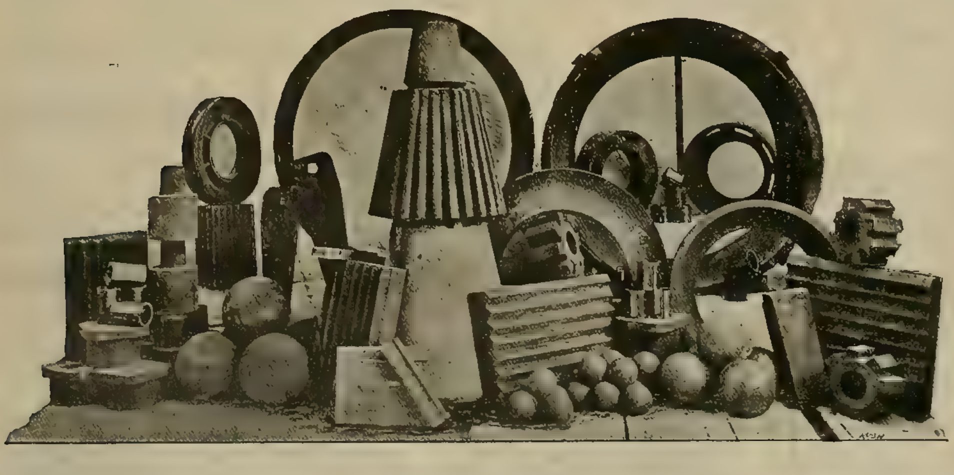
Saves Wear on Wire Rope and Cable.

Send for Illustrated Pamphlet.

Correspondence Solicited.

CALIFORNIA WIRE WORKS, - 9 Fremont St., San Francisco, Cal.

MANGANESE STEEL



THE BEST METAL KNOWN FOR

. . . . . .

Stamp Shoes and Dies,
Roll Shells,
Crusher Plates and Side Liners,
Toggles and Toggle Bearings,
Gyratory Cones and Concaves or Liners,
Mine Car Wheels,
Coal Crushing Rolls, Etc.

PARKE & LACY CO., 21 & 23 Fremont St., San Francisco, Cal.

AGENT FOR

KNOWLES PUMPS and PULSOMETER PUMPS,
INGERSOLL-SERGEANT ROCK DRILLS and AIR COMPRESSORS.

CATALOGUES FREE ON APPLICATION.

CALIFORNIA STATE LIBRARY

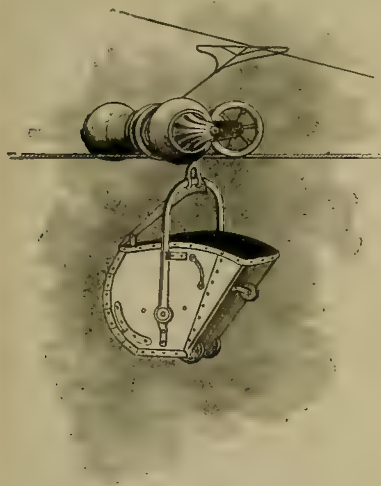
MINING AND SCIENTIFIC PRESS.
AND PACIFIC ELECTRICAL REVIEW.

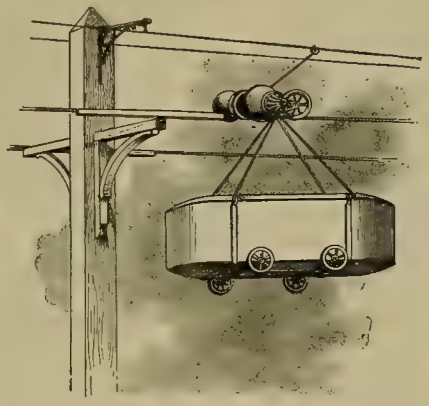
No. 2087.—VOLUME LXXXI. Number 3. SAN FRANCISCO, SATURDAY, JULY 21, 1900. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

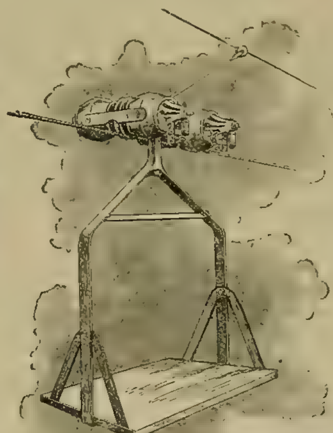
A New Phase of an Old Industry.

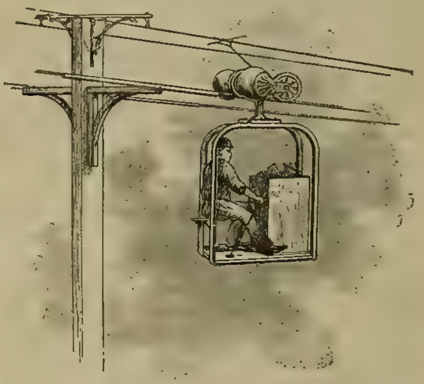
In preceding issues has been noted the advance in lighting, railways, power transmission, telegraphy, telephony and other forms of electric appliance. The subject of telpherage deserves passing notice.

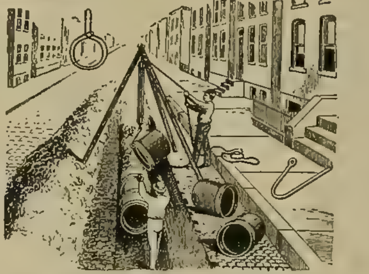
Telpherage is described as being automatic aerial transportation by the aid of electricity, especially that system in which carriages having independent motors are run on a stout wire conducting an electric current from which the motive power is derived. Telpherage is a name coined by the late Fleeming Jenkin to designate a system devised by him by which the transmission of vehicles by electricity to a distance is effected independently of any control exercised from the vehicle. It is an aerial electrical railway.

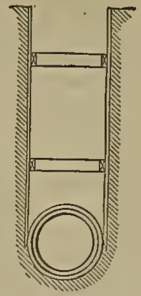

Telpher With Ore or Coal Bucket.


Mail Car Adapted for Transfer to Surface or Underground Dispatch.

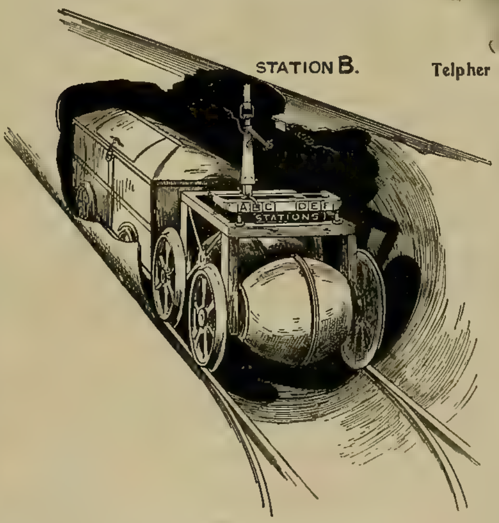

Telpher With Platform Car.


Mail Carrier With Attendant.

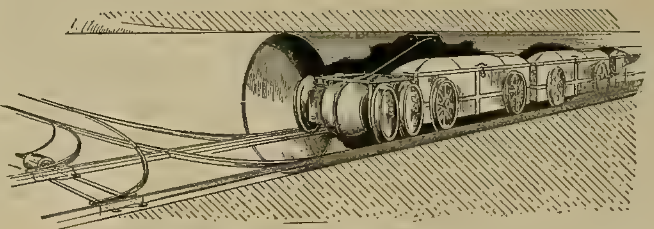

Lowering Short Sections of Pipe for Tubular Dispatch.


Section of Trench With Dispatch Tube.

Sheeting Deep Trench for 36-Inch Dispatch Tube.



Car Adjusted to Stop at Numbered Station.


Package Car in Transit; Electric Tubular Dispatch.

This, then, is a new phase of an old industry, the application of electricity to the existing principle of aerial wire ropeways, now becoming so deservedly common wherever mining or manufacturing is carried on in a large way. This is but one of the classes into which telpherage is divided. There are also systems of telpherage in which are what may be styled electric tube dispatch, either overhead, surface or underground; electric overhead tramrail, by rigidly supported girders; automatic narrow gauge railway.

The main object of telpherage is to provide automatic methods, by the use of electricity, for quick, economical transportation of mail, express, freight and other light material. In aerial telpherage it is not necessary to follow the contour of the country, and rapidity of operation which depends on the speed of the electric car is only limited within reason by the cost of construction, the length of the line from one station being only bounded by the commercial possibilities of electrical transmission. Curves are not considered a disadvantage any more than in the surface electric railways, and the direction of route may be changed as often as desired to avoid excessive grades and thereby cheapen the cost of construction.

Regarding this the Consolidated Telpherage Co. of New York City say that the cost of the line and rolling stock is small and the power required can be rented from any existing electric lighting or railway plant. The electric tube dispatch is another branch of telpherage and consists in sending merchandise, mail and express through tubes which are either underground or at the surface. These tubes are constructed of various substances, depending upon local conditions, in some cases watertight pipes of vitrified clay and like material, and in others tubes of structural iron, the diameter of the tubes varying according to the amount and character of material to be carried within a certain time. The cars run upon steel rails of special form in the tubes, and the cars and rails are of sufficient rigidity and strength to carry merchandise and second-class mail matter. The cars are so arranged as to be operated individually or in trains, depending upon the amount of merchandise required to be sent in a definite period.

The system is wholly automatic. The car is started by turning a switch, and within a short distance the speed can be accelerated up to 50 miles an hour if required, though such a speed, considering the loads which can be carried, would rarely ever be necessary, a speed from 20 to 35 miles per hour fulfilling most conditions of service. The system is so arranged that branch lines can feed into one main trunk line, and each car is so controlled that no two cars can come in collision. In case one car should be traveling the main track and another car should be approaching from a branch or side track to go upon the main track, the second car will stop and wait for the first car to pass on some distance ahead on the main track before starting. This is done automatically. Any car can be arranged to stop at any station upon its route, this being determined before the car leaves the starting station. Cars can also be adjusted so as to take either the left or right hand tracks and thus to make communication with any sub-station. The track can be made single or double, depending upon the number of tons to be transported daily. A complete block system prevents collisions.

The company mentioned claims to have worked the details of its system out completely and tried them in practical operation. In certain cases their success has been due to the development of the art in general and to the great advances made in electricity, for successful telpherage a few years ago would have been impossible. Existing conditions and requirements make the subject one of practical interest to mining men everywhere.

MINING AND SCIENTIFIC PRESS.
ESTABLISHED 1860.
Published Every Saturday at 330 Market St., San Francisco, Cal.

ANNUAL SUBSCRIPTION:
United States, Mexico and Canada....................$3 00
All Other Countries in the Postal Union.................... 4 00

Entered at the S. F. Postoffice as second-class mail matter.

J. F. HALLORAN....................Publisher.

Special Representatives:
EASTERN.
E. H. HAVEN....................150 Nassau St., New York City.
MIDDLE WEST.
CHAS. D. SPALDING....................153 La Salle St., Chicago, Ill.
INTER-MOUNTAIN.
W. A. SCOTT....................43 Jacobson Building, Denver, Colo.
SOUTHERN CALIFORNIA.
W. D. CURTIS....................223 W. Second St., Los Angeles, Cal.

San Francisco, July 21, 1900.

TABLE OF CONTENTS.

ILLUSTRATIONS.—Telpher with Ore or Coal Bucket; Sheeting Deep Trench for 36-inch Dispatch Tube; Mail Car Adapted for Transfer to Surface or Underground Dispatch; Car Adjusted to Stop at Numbered Station; Telpher with Platform Car; Mail Carrier with Attendant; Lowering Short Sections of Pipe for Tubular Dispatch; Package Car in Transit—Electric Tubular Dispatch; Section of Trench with Dispatch Tube, 61. Quicksilver Retort at Terlingua, Texas; Hydraulic Work on Grounds of Mecca Gold Placer M. Co., Breckenridge, Colo., 64. Views of Some of the Buildings for the Coming Pan-American Exposition, 65. Evans Slime Table; Spiral Sand Pump, 66. Latest Mining and Metallurgical Patents, 67. The Powell Filler, 68.
EDITORIAL.—Lead Tariff, Prices and Supply; Mining Decision in Cripple Creek, Colo., 62.
MINING SUMMARY.—69-70-71.
LATEST MARKET REPORTS.—72.
MISCELLANEOUS.—A New Phase of an Old Industry, 61. Concentrates, 63. The Terlingua Quicksilver Mining District, Brewster Co., Texas; New Steel Syndicate; World's Production of Copper, 64. The Pan-American Exposition; As Told in Colorado; Wet Steam, 65. The Evans Slime Table; Spiral Sand Pump; Cable Line to the Philippines; Congress of Mines and Metallurgy at Paris, 66. Latest Mining and Metallurgical Patents, 67. The Cripple Creek Volcano; The Powell Filler, 68. Personal; List of U. S. Patents for Pacific Coast Inventors; Recently Declared Mining Dividends; Commercial Paragraphs, 71.

Lead Tariff, Prices and Supply.

The ups and downs of the lead market are so frequent and confusing as to make it difficult of understanding, recent fluctuations showing a difference in current rates of nearly $20 per ton. Much has been said on this important subject, and the multitude of the interests it involves justifies continued mention. A statement of previous and existing facts from an independent standpoint is of present interest. Every one directly or indirectly interested in this subject is presumably acquainted with most of the general facts in connection with the present situation. Probably no part of the metal mining productive world presents so complex an appearance as the present condition of the lead market in the United States, where the trusts, the tariff and the law of supply and demand are the principal factors in the price, each trending back many years, anticipating and creating present conditions.

In 1861 the Morrill tariff bill admitted gold and silver into this country free, the desire then being to get specie to meet Government obligations. A shipload of silver-lead ore arriving occasioned a Treasury Department ruling that, under that tariff, if the value of the silver or gold combined in the ores exceeded the value of the lead therein the whole product should come in free. This west half of America was sparsely settled in those days; mines of any kind were few outside of California, and lead miners fewer still; but in the early '70s lead became a prominent production east of the Sierras, and an ore-producing association was organized in Utah, which, among other things, fought against free lead. They protested and petitioned Congress for an import duty in about the same fashion that the California Miners' Association has fought for a Mineral Lands bill, and their representatives at Washington found many of their protests and letters pigeon-holed, but they kept the fight up and finally got notification from the Treasury Department that they should be granted a hearing—the first of the kind—which was given them in May, 1889. The smelter men of Kansas City and other places wanted the Mexican lead ores to come in free, which was good business from their standpoint, though injurious to the lead producers of the West from their standpoint. The latter won their point, and the Government ruled that thereafter the lead in the ores should be taxed, and appointed an officer to be stationed at El Paso to sample the lead ores from Mexico on the border. The Utah lead producers started to get out lead at a better price, and the smelters started to fill cars nearly full with heavy lead ores, and to pile upon the top of the ores very rich silver ores with a little lead, get that ore sampled, the cars run across the Rio Grande, the rich ores saved and sent back, the heavy lead ores unloaded, the former thus convoying the latter, until John Tiernan was sent by the Utah Lead Ore Producing Association to investigate, going as an ostensible buyer of hides, and after unearthing the subterfuge succeeded in having it stopped. The next movement on the part of the smelters was to secure a Government ruling that, from the samples assayed, 10% should be stricken off as a smelter loss, and 10% more as a loss in refining. The Utah Ore Producers' Association made demonstration, by their El Paso representative, that the total loss in the smelting did not exceed 4% and that the loss in the refining did not exceed 1%. After that was blocked the smelters got a ruling from the Treasury Department permitting ores to be run into bonded warehouses and held six months. How this worked, in their behalf, can be estimated from the fact that the chairman of the Bureau of Statistics for the United States Treasury Department, in 1898, made official report that twenty-one million pounds of lead had been entered that could not be accounted for. In 1898 the smelters secured another ruling which permitted them to account for only 90% of the ore received, and another ruling permitting lead ore to come in free in the slag, in that way "slag" coming in carrying 85% metallic lead. This was ruled out by the Treasury Department, but just two years ago the smelters secured another Government ruling permitting lead in copper matte, where the copper was worth more than the lead, to come in free. This the Utah Ore Producing Association fought to final appeal. None of the above applies to Pacific coast smelters.

All this is merely instanced as a matter of record, to illustrate that while a tariff is a very simple thing it is sometimes difficult to enforce it according to its spirit and intent. The duty on lead in the ore is 1½ cents per pound.

At $4 per 100 pounds there is not much profit in lead mining. There would be still less but for the tariff of $1.50 per 100 pounds. With that tariff off, lead would sell at about the same price in the United States as abroad, except for fluctuations due to variable local demand. It would sell at the present price less $1.50 per 100 pounds. At that price nearly every lead mine in Idaho, Montana, Utah and Colorado would be compelled to idleness. The shutting down of those mines would mean ruin to many.

It is probably an underestimate rather than an exaggeration to say that the tariff on lead has given to the miners of the one State of Utah in a year one million dollars more than they would have received without that tariff on the lead in the ores, and that that amount represents but a part of what the tariff is worth to them or to the miners of Montana, Idaho, Nevada, Colorado, or anywhere else where lead is mined in the States producing gold and silver, for much of this gold and silver comes as part of the product, the great production of lead increasing the amount of the latter. Utah is particularly mentioned as it produces about fifty thousand tons of lead annually, though Idaho, Montana and Colorado are almost equally interested, so that the cry against the tariff on lead in the ore is suicidal.

It will be seen that in one sense it would be to the interest of the smelters to have lead free, while it is equally manifest that if they can so manipulate the tariff on lead as to make it inure both ways to their advantage, it would be particularly gratifying in a pecuniary sense to them. The situation is a complex one. The smelters having failed in their effort to have the tariff so construed, the American Smelting & Refining Co. has been formed, which, as a business proposition, is precisely in the line of modern advance and is just what any other industry so situated would do. It is manifest that this latest consolidation of the lead manipulators has entire control of the price and can raise or depress it as best determined by their immediate or transient interests. All this is entirely from the unbiased and impartial standpoint of this paper, having nothing to do with private interests nor politics, the matter being discussed from a thoroughly independent standpoint.

The recent effort of the principal lead producers to aid in the maintenance of good prices for the raw product seems stultified by the fact that they appear to be necessarily co-operative with the American Smelting & Refining Co., who seem to have in every way the best of it, as probably it is only by increasing their export trade that the American Smelting & Refining Co. can get better prices at home and thus pay the producers more for their ore. The duty on lead being 2⅛ cents per pound precludes any importation and cuts little figure in the case. There is little justly bearing upon the subject in the statements made and the hurried conclusions drawn in some discussions of this subject regarding lower prices of lead in the foreign market as compared with the domestic markets, the fact being clear that were it not for the tariff on lead, even its present price in this country could not be maintained. In the light of the events of the past few weeks and the extraordinary fluctuations of the lead market, it is difficult to predicate how any co-operative efforts by part of the miners and the American Smelting & Refining Co. can be successful. This brings us to the discussion of the last factor in the situation, usually the most important, namely, the law of supply and demand, a law which does not have full force and effect in this case, being sumptuarily interfered with by the position capable of being maintained by the American Smelting & Refining Co., with whom, by reason of all these facts, rests the responsibility for results.

The producers have for some time been endeavoring to make a combination that would set some stable quotations, some figure that could be held to, and several meetings gave color to the belief that progress was being made in that direction. The difficulties in the way were so obvious throughout that little hope was generally entertained that the effort would result successfully. A sort of minor agreement was had with the American Smelting & Refining Co., conditioned on the ability to have general agreement, and about the 1st inst. it looked as though such general co-operation were possible, but the Missouri lead producers have declined to go into any combine, thus deferring what from the start did not look like a hopeful project. Of course, at long last the producers have the strength of the game—that is, were it to come to a final trial of strength between those who produce the ore and those who handle and sell it, if the former unanimously declined to furnish the product it would leave the latter without anything to do business with. The difficulty of making and maintaining a combination among the producers is manifest. The situation is an untoward one and affects all alike, though existing conditions on the Pacific coast do not include any smelter west of the Sierras in the monopoly of the trust. It looks as though there would be a fight and a desperate one, and that meanwhile lead has not reached its lowest point; when it does the purchasers will be heard from in more unanimous vigor than before. The present situation is this: the trust proposes to buy up surplus lead and export it, to keep the surplus down and the home price up, if the producers meanwhile will stand the loss. Missouri lead producers decline to become a party to such compact.

THE Secretary of the Interior, in a decision in a case involving the location of mineral claims in Cripple Creek, Colo., has overturned all former decisions in which it has been held that a deputy mineral surveyor could not locate claims for mineral lands, on the ground that he is a United States officer and that such location by him would be in violation of that section of the Revised Statutes which forbids "officers, clerks and employes" of the Land Department from making entries. W. H. Leffingwell made entries in December, 1897, for three groups of claims. After the entries were made the Land Department refused to issue patents and held the entries invalid, for the reason stated above. The decision was rendered in September, 1899. In this last opinion it is held that the section of the Revised Statutes heretofore quoted does not apply to mineral land surveyors, inasmuch as they are not employes of the Government within the meaning of the law, and they can make entries for mineral lands and receive patents therefor. This applies to mineral land surveyors everywhere.

THE progress and development of the mineral industry of this west half of America is phenomenal. It is not uncommon in this office to receive copies of a paper published in a new mining camp before the slow-going authorities at Washington have made announcement of the establishment of a postoffice there.

Concentrates.

A FINE ruby-colored alloy may be compounded of 22% gold with 78% aluminum.

THE Holloway-Longridge process will successfully extract gold from auriferous antimony ore.

A SIX-POUND lead lining in a chlorination tank, properly put in and fairly used, ought to last four years.

FABRICS of hornblende asbestos will resist acids; serpentine asbestos is susceptible of attack by weak acids.

THE melting point of aluminum is 660° Centigrade; of silver, 970°; of gold, 1062°; copper, 1095°; platinum, 1760°.

"THE lightest substance known" is the pith of the sunflower, specific gravity 0.028. The specific gravity of cork is 0.24.

IT would take 3,138.97 feet of 1-inch rope to wrap a pole 100 feet high, 1 foot diameter at the bottom, 6 inches diameter at the top.

THOS. A. EDISON says that he is to get $1,500,000 if his system for working the properties on the Ortiz, N. M., grant proves a success.

THE most effective grade of aluminum bronze has 11% aluminum, and develops a tensile strength of 78,000 pounds per square inch.

IF it take 12 H. P. to run a compressed air rock drill, with proper receiver capacity a six-drill machine should require no more than 50 H. P.

HENRY BESSEMER died March 15, 1898; his process of converting cast iron into cast steel ranks among the great inventions of the century.

WITH a pressure of forty pounds per square inch the discharge per minute from a straight 2-inch pipe, 40 feet long, would be about 300 gallons.

AN electric liquid forge was produced by G. D. Burton of Massachusetts about two years ago, but has not been a pronounced commercial success.

THE Illinois Steel Works would be the most likely customer for manganese. In the twelve years from 1888 to 1899, inclusive, California produced 6789 tons manganese, worth $60,766.

STEEL PLATES in tanks, etc., will rust rapidly when exposed to moisture impregnated with sulphur arising from soft coal. Frequent painting or varnishing is the best preventive.

1, 7, 3, 9, 5, 2, 8, 4, 10, 6 is a favorite form of drop in a 10-stamp mill. Any particular form used by a millman is capable of detailed and favorable explanation by him as to why it is used.

ELECTRIC PUMPS—that is, power pumps direct connected and driven by an electric motor—work successfully in innumerable instances, delivering from 500 to 20,000 gallons per hour.

UPON the completion of the Trans-siberian Railway it will be quite possible to "go around the world in a month," by securing special trains and making sure connections. There need not be over twelve changes.

COMPRESSED OR LIQUID OXYGEN is recommended as a restorative for victims of foul air in mines. It should be in an appropriate receptacle with reducing valve and mouthpiece, ready for immediate use when wanted.

STEEL containing 22% nickel expands more when heated than ordinary steel does, while steel with 37% nickel hardly expands at all. A variation of 15% of nickel in steel entirely changes the nature of the material.

THE weekly market quotations of lead in London are for long tons—2240 pounds—and for "soft Spanish lead," which is from 2½ to 5 shillings per ton less than the price of English lead, which latter is considered of better quality.

THE test of any form of mineral analysis is its comparative usefulness. Whatever is simple, quick, cheap and fairly accurate is good. Chemical analysis is probably the best basis for mineral identification, but not always practicable.

WM. THOMPSON, or Lord Kelvin, is doubtless the "foremost scientist of the age." He is 76 years old, and in nearly every department of applied science has made discoveries, created new things and aided general advance in organized knowledge.

SURVEYS of mining claims by U. S. Deputy Mineral Surveyors for the purpose of securing a U. S. patent therefor must close within 0.5 foot in 1000 feet. This requires an accuracy in the azimuth of the courses within two minutes of the true mendian.

CANVAS can be made mildew proof without injury to the fabric. Dissolve 1 pound zinc in 40 gallons water, add 1 pound sodium carbonate; when dissolved add 2 ounces tartaric acid. Soak the canvas in the solution for twenty-four hours, and dry without wringing.

A BOILER INSPECTOR can locate a crack by sound or feeling better than by sight. He taps with his hammer along the boiler shell, with his finger on the plate a few inches in advance of the hammer and his sensitive finger will feel the vibration of the plate if it be injured.

IT may be that S. J. Carrigan of Northfield, Minn., has discovered the existence of three hitherto unknown planets between our earth and the sun, "each of which is heading for us and sure to destroy this planet," but the fact is not generally known. It really, however, makes little difference. Probably if this planet were totally destroyed we could all get along just as well without it.

IF at atmospheric pressure the temperature of the boiling water is 212° F., at 80 pounds pressure it would be 322.5° F. The total heat in the steam at atmospheric pressure would be 1.147 heat units; at 80 pounds pressure, 1.182 heat units.

A GOOD substitute for German silver is an alloy of copper, 67.25%; manganese, 18.5%; zinc, 13%; aluminum, 1.25%. The color resembles German silver closely, the alloy is as strong and it has good casting qualities. Its electrical resistance is over three times that of German silver.

AN INK that can be used for writing on glass is prepared as follows: To 20 grammes of brown shellac dissolved in 150 cubic centimeters of lamp spirit add a solution of 35 grammes of borax in 250 cubic centimeters of distilled water. Add 1 gramme of methyl violet for coloring.

CRYOLITE is a double fluoride of aluminum and sodium. It is not of common occurrence. There is a large deposit in Greenland, and it has recently been reported to exist in commercial quantity on the south flank of Pike's Peak, Colorado. It is used in the manufacture of alum and alumina.

A STATEMENT in last Saturday's issue that celestine (strontium sulphate) is not found west of the Rockies needs correction. It is found at Glen Eyrie, in Colorado, and in the colemanite of Death Valley, San Bernardino county, Cal. Strontianite (carbonate of strontium) is found in Plumas county, Cal.

THE gold-dissolving power of a solution of potassium zinc cyanide increases with increased excess of oxygen, and with rise of temperature, and also by addition of caustic alkali, other conditions remaining the same, such increase in the latter case being greatest in solutions to which oxygen has first access.

A RUBBER STAMP on a tracing can be reproduced on a blue print. Make the impression of the stamp on the tracing linen, and while the ink is still moist dust it over with lamp black with a tuft of cotton. The ink takes up the pigment, actinically impenetrable, and the impression shows out in the blue print.

THE safety valve of a boiler may become coated with lime, even though the boiler does not foam, by small particles being lifted and blown through when the safety valve blows off. The space just above the water line in active service is filled with a sort of water mist, raised by the liberation of steam below the surface.

A BLAST FURNACE for lead smelting has been used for many years at Freiberg. The latest account received states that the furnace diameter is increased to 6½ feet and the number of tuyeres to twenty, with the result of output increased from 10% to 38%, a lessened fuel consumption and a reduction of blast pressure.

A SOLDERING FLUID that will not rust nor corrode may be made as follows: To four pounds hydrochloric acid add four pounds zinc shavings or cuttings. To the saturated solution add a small quantity of oxide to color, and filter through a piece of suitable cloth; then add one pound strong liquid ammonia; stir, and bottle.

GLASS has been used as a flux for cyanide slimes in both plumbago and clay-liner crucibles, in the proportion of 100 pounds roasted slimes (not acid treated), 50 pounds ground white glass and 50 pounds borax. M. T. Dixon says that this mixture in a clay-liner pot will give gold 860 fine if treated in a fairly quick furnace.

THE tensile strength of the steel from which a boiler is made is found by pulling a carefully measured bar in a machine which weighs the load required to break the bar. The tensile strength per square inch is found by dividing the total load required to break the bar by the area of its cross-section in square inches before breaking.

THE degree of cold on high Sierra peaks is a matter of record. A self-recording thermometer was left on the summit of Mt. Lyell, 13,041 feet high, during the winter of 1897–98, so placed as to be free from snow. The lowest temperature reached was 13.6° below zero. In the winter of 1898–99 the experiment was repeated, and the record when read the following summer showed 17.6° below.

COMPRESSED AIR has been applied to the pumping of water, the power supplied by a gas engine, which drives an air compressor, the discharge of which is led alternately to two closed vessels. During the time that the air is being forced into one of them the other is being filled with water, which is in turn forced out by changing over the flow of the compressed air, the change being made automatically.

FOUNDRYMEN in a big way find it economy to employ the services of a chemist to insure a uniform character of the iron used. Where large quantities are used the idea in many instances is to keep on hand a stock from which to supply a mixture which will not exceed .09 sulphur and not fall below 2.75 in silicon, nor below 3.25 for total carbon; phosphorus, say from .60 to 1.10; manganese, from .40 to 1.00.

CONSUL HUGHES sends the following from Coburg: "A. Reis of Antwerp has patented the following method for preventing incrustation in boilers: A mixture of sugar, tannin extract, silicate of potash or soda and boric acid is added to the boiler water to keep the salts in solution; when the water attains a density of about 15 to 25 Be, the boiler is blown off. The working periods range from a fortnight to three months, according to the quality of the water in use. Glycerine and alkaline sulphates are sometimes used in the mixture."

A CEMENT for stopping leaks in steam pipes was given in the issue of Feb. 10, 1900. A Lead, S. D., correspondent says a manganese cement is in some respects better. It is composed of four parts black manganic oxide, ten parts litharge, five parts red lead, five parts unburnt limestone and five parts yellow ocher. Pulverize, mix well, knead into dough, add a little boiled linseed oil and asbestos fiber.

EXTRALATERAL RIGHTS of lode locations were incorporated in the mining laws of the province of British Columbia for eight years and abandoned, the results tending to disprove the idea that the nature of the Pacific coast mineral deposits requires the grant of the extralateral right to mining locations. This extralateral right exists only in the United States and Bolivia, and is a heavy expense and incubus.

A TELESCOPE can be used with a photographer's camera to take a picture of an object far off, but the result is rarely satisfactory; to arrange for the picture the eye piece of the telescope and the lens of the camera should be taken out, and then fit the opening into camera where the lens was upon the end of the telescope where the eye piece was, thus making the object lens of the telescope the camera lens.

AN applicant at a U. S. land office to secure timber land must swear to a non-mineral affidavit. He must take oath that he knows the conditions of the land at that time by personal observation; that the land is not occupied by any person or persons; that there are no mining claims, lodes or mineral deposits, to his knowledge, on said land. Coal, salines and coal oil claims on a tract of land exclude it from entry as timber land.

IN addition to the "long ton," the "short ton" and the "metric ton" of metallic commerce is the "shipping ton" of pig iron, which contains 2268 pounds. That weight, though obsolescent, is still allowed by railroads as a weight in shipping iron. The shipper who forwards 100 tons of pig iron is entitled to load 226,800 pounds on his cars. The extra 28 pounds in the pig iron ton over the long ton is to allow for sand adhering to the metal.

TURQUOISE in this country comes mainly from New Mexico, whose mines were elaborately illustrated and described in the issue of March 6, 1897. Recently turquoise of value was reported from Mojave county, Arizona, and also from Lincoln county, Nevada, where stones of marketable value are reported to have been found in mica schist at the foot of Sugar Loaf peak, some of the specimens weighing from thirty to sixty carats.

STRONTIUM SULPHIDE is thus prepared: An intimate mixture of 285 g. of commercial strontium carbonate, 62 g. flowers of sulphur, 4 g. crystallized sodium carbonate, 2.5 g. salt, 0.4 g. bismuth subnitrate is placed in a crucible, covered with a layer of coarsely powdered starch, and submitted for five hours to a bright red heat, then allowed to cool very slowly for one hour. This results in a white, friable mass with phosphorescent power.

"A 10% GRADE" means a rise (or fall) of 10 units of length in a distance of 100 of the same units of length, the rise (or fall) being measured vertically, and the distance horizontally. If the unit of length is 1 foot, a 10% grade means a rise (or fall) of 10 feet in 100 feet; in the same way it may mean a rise (or fall) of 10 rods in 100 rods, or 10 miles in 100 miles. A 10% grade in feet to the mile would be a vertical rise (or fall) of 528 feet in each mile of horizontal distance.

IN a submarine electro-contact mine the firing pins on the case containing the explosive, instead of exploding the charge when brought in contact with an object, act as a switch by closing one opening in an electric circuit. Another switch is located in this same circuit at a station on shore, so that in order to fire the mine it is necessary to close the land switch at the same time that one of the pins has been driven in by the hull of a vessel. If this is not done, no explosion takes place.

THE electrical conductivity of aluminum is 63% that of copper. The weight of copper is 3.33 times that of an equal volume of aluminum. The Standard Electric Co. of San Francisco have been making extensive experiments as to the tensile strength and general availability of aluminum for long distance transmission, and can doubtless furnish practical data. The longest continuous copper wire in use, so far as "Concentrates" knows, is the telegraph line of the Canadian Pacific Railway Co. from Montreal to Vancouver—2,897 miles.

RAWHIDE ROPE has great flexibility and, having comparatively few strands, is able to stand internal and external friction, as there no small yarns to chafe and break. Its most frequent use is for dynamo drives and where small sheaves are necessary. Its great elasticity causes considerable whipping and it is difficult to make a splice hold. Its first cost is considerably more than that of manila. Under ordinary circumstances and conditions, at a speed of 2500 feet per minute 1-inch rope will satisfactorily transmit 12 H. P.; 1½-inch rope, 26 H. P., and 2 inch rope, 48 H. P. The durability of the rope must be kept in sight as well as the actual transmitting power. The average life of ropes of medium size is about four years, though small ropes under unfavorable conditions have to be renewed annually.

The Terlingua Quicksilver Mining District, Brewster Co., Texas.

Written for the MINING AND SCIENTIFIC PRESS
by H. W. TURNER.

The Terlingua district lies about 68 miles in an air line southwest of Marathon, which is the nearest point on the Southern Pacific Railroad. By the present wagon road it is about 85 miles from Marathon, but this road can be made about 10 miles shorter at small expense. The mines are on the mesa west of Terlingua creek and are in a Cretaceous formation, called by Prof. Robert T. Hill of the United States Geological Survey the Caprina limestone. All of the cinnabar deposits so far as exposed are in this limestone. Whether or not the deposits will be found in the beds underlying the limestone is at present a matter of pure speculation, which can be determined only by future mining operations. Since the thickness of the limestone by the Rio Grande about 11 miles south of the mines is 1500 feet or more, it is probably that thick at the mines, as it is the very top of the formation in which the ore is now found. Up to the present time nearly all of the ore has come from surface workings, or shallow shafts, and the size of the ore bodies in depth and the depth to which they will extend is another point to be determined by mining operations. It is certain, however, that the cinnabar comes from below—undoubtedly from a source beneath the limestone—and it is therefore more than probable that ore bodies will be found to a depth of more than 1000 feet, with a good chance of their extending still deeper.

Quicksilver Retort at Terlingua, Texas.

The cinnabar mines lie in a limited area about 2 miles wide by 4 miles long, but it is probable that the mineralized area is of greater extent—at least 3 miles wide by 5 miles long. The general trend of the main lodes is in an easterly and westerly direction. The quicksilver occurs in limited amount in the native form, but chiefly as the red sulphide of quicksilver or cinnabar. The limestone formation of the district contains numerous rusty brown veins. These, as above noted, usually trend in an easterly and westerly direction, but many of the smaller veins are extremely irregular and strike in all directions. These rusty brown veins are composed of calcite or crystallized carbonate of lime and oxide of iron, usually enclosing fragments of broken up limestone. Many of them show walls with striated and smooth surfaces, showing that movements have taken place along the walls, as is usually the case along mineralized lodes. In these veins or lodes the cinnabar occurs in stringers or pockets. Many of the veins show no trace of mercury, and even when cinnabar is present it often can not be seen on the weathered surface until the rock is broken, as it is black or otherwise discolored. The thorough prospecting of the veins is therefore a matter of time.

In addition to cinnabar, mercury occurs in the native form—notably in the McKinley lode—and as a white coating and as yellow-green crystals. Prof. S. L. Penfield has identified the white coating as calomel or mercury chloride ($Hg_2 Cl_2$), and the greenish crystals as an oxychloride of mercury, forming a new mineral species, for which I have suggested the name terlinguaite. In tunneling in on the vein of the Crœsus claim, a vertical cavity in the limestone was found, perhaps 50 feet in depth, lined by a dazzling white layer of saccharoidal crystalline gypsum, associated with some cinnabar. Calcite is present in nearly all of the brecciated lodes as veinlets, and it also lines cavities when it is often finely crystallized; occasionally seams of it are colored nearly black by manganese.

There can be no doubt that the so-called lodes are formed along fault zones. This is particularly evident with the larger lodes, where the brecciated character of the lode is plainly due to the grinding up of the rock between the walls during movements. Such brecciated fault zones form a ready avenue for solutions to rise from depths, and strengthens the assumption that the ore bodies would continue probably through the entire thickness of the Caprina limestone.

In the case of the small, irregular rusty veins, found at many points in the mineralized zone, it is quite likely that they will not extend with a definite dip to any great depth, although it is probable that these subsidiary irregular veins will be found at all depths through the limestone, but that they will be disconnected, or prove to be stringers from larger veins.

Prof W. P. Blake* has published the only satisfactory account of this new district. Prof. Blake noted pyrite in one of the lodes in addition to cinnabar and iron oxide, and interpreted the ferruginous breccia, forming portions of the lodes, as indicative of fissures along fault planes.

The difficulty in developing the district lies in the scarcity of wood and water. However, reservoirs can easily be built in the rocky ravines, the limestone being suitable for burning lime for cement, as well as for building dams. The chief firewood is mesquite.

About 1000 flasks of quicksilver have thus far been produced, this amount having been reduced in five retorts. One of the companies is now putting up a furnace, and the production next year will undoubtedly be large.

---

* Trans. A. I. M. E., Vol. XXV, 1895, p. 68.

◆

New Steel Syndicate.

The Crucible Steel Co. of America is the name of the new steel syndicate just organized at Pittsburg, Pa. It is the outgrowth of a consolidation scheme which was promoted by the Union Trust Co. of the city named. The capital stock issue is $50,000,000, being one-half preferred and one-half common stock. The new company proposes to take over the plants and assets of thirteen steel concerns at the aggregate purchase price of $19,000,000, the plants and equipment to be paid for in stock in the new concern, the material on hand to be paid for in cash. The following are the names of the steel concerns to be absorbed by the new syndicate: Park Steel Co., Pittsburg; Singer, Nimick & Co., Pittsburg; Howe, Brown & Co., Pittsburg; Crescent Steel Co., Pittsburg; La Belle Steele Co., Alleghany, Pa.; Anderson, Du Puy & Co., McKee's Rock, Pa.; Cumberland Steel & Tin Plate Co., Cumberland, Md.; Burgess Steel & Iron Works, Portsmouth, O.; Benjamin Atha and Illingworth, New Jersey; Spalding & Jennings Co., New Jersey; Sanderson Bros. Steel Co., Jersey City; Beaver Falls Steel Co., Pennsylvania; Aliquippa Steel Co., Pennsylvania. The new company was organized under the laws of New Jersey, but is to have its home office in Pittsburg.

The consolidated concerns belong in the main to that class of steel makers who are furnishers of drill and crucible tool steel and such stock as is usually used in shops that make mining machinery. Many of them do other classes of work, but the above constitutes a leading feature. This is mentioned by way of distinguishing them from such as the Carnegie and Bethlehem Works, which make a specialty of Harveyized armor plate, heavy shafting, structural work and ordnance material; and from the Illinois Steel Co. and the Colorado Fuel & Iron Co., whose great specialties are material for railway equipment and steel structures.

◆

World's Production of Copper.

The following from official and private statistics shows how completely North America surpasses other countries in the production of copper. It shows, also, that the production is hardly equal to the demand, for, in spite of increased prices, production in 1899 advanced only 9% over 1898:

	1898—Tons.	1899—Tons.
Algeria	50	......
Argentine Republic	125	65
Australasia	18,000	20,750
Austria-Hungary	1,540	1,505
Bolivia	2,050	2,500
Canada	8,040	6,732
Cape Colony	7,060	6,490
Chile	24,850	25,000
Germany	20,085	23,460
England	550	550
Italy	3,435	3,000
Japan	25,175	27,560
Mexico	15,668	19,335
Newfoundland	2,100	2,700
Norway	3,615	3,610
Peru	3,040	5,165
Russia	6,000	6,000
Spain and Portugal	53,225	53,720
Sweden	480	520
North America	239,241	265,156
Totals	434,329	473,818

◆

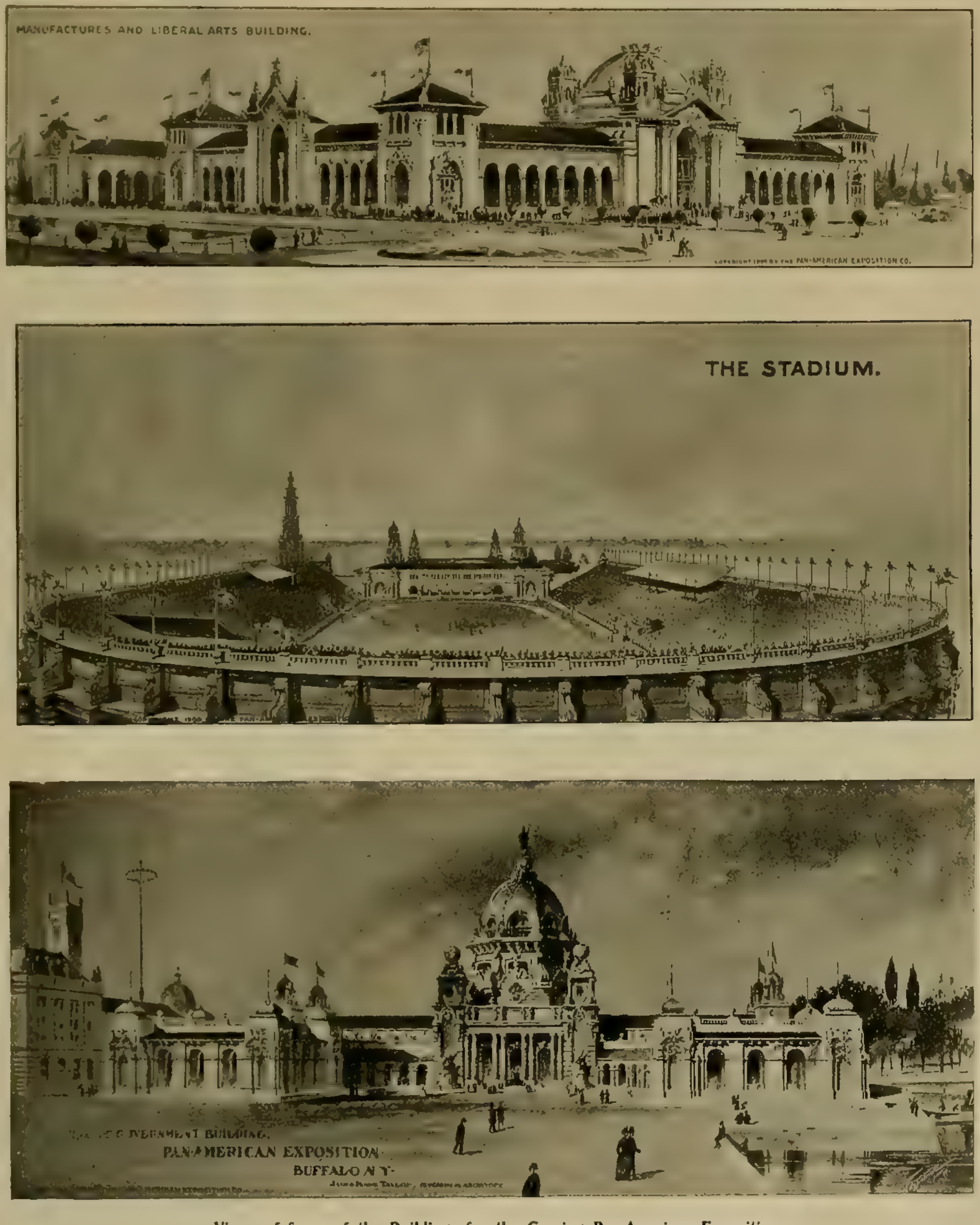
THE great denudation of the Colorado river, carving out of rock a series of canyons about 500 miles long, in one place more than a mile deep, with a multitude of tributary chasms and gorges, is held by some to be due to the slow rising of an ancient lake bed. At first the Colorado river and its tributaries, or some nameless ancestor of these, sweeping over the slowly rising surfaces, planed them down in most relentless fashion, and then began wearing out broad, shallow stream beds. But the country rose more rapidly, and the water had to cut deeper channels in

Hydraulic Work on Grounds of Mecca Gold Placer M. Co., Breckenridge, Colo.—(See page 70.)

the rocks in order to get out and away to sea. Owing in part to the wear of the water itself, but more to the ceaseless bombardment of the suspended sand which it bore from the up country, or picked up as it went along, and to the thump of pebbles and boulders which it swept on in flood-time, the river kept cutting down as the strata rose until finally, when what was left of the inland sea bottom was thrust up so that, towering far above its erstwhile rocky shore, it had to be called a plateau, the Colorado and its auxiliaries being at the bottom, a series of colossal canyons and gorges.

The Pan-American Exposition.

The greatest industrial display on this side of the world for some years will be the Pan-American Exposition to open in Buffalo, N. Y., in the early part of next year—the first of the twentieth century. As the name indicates, the ruling motive in the affair is the promotion of mutual feeling and interests throughout the countries of the American continents by joint participation in a grand display of the products of all honorable activities.


MANUFACTURES AND LIBERAL ARTS BUILDING.
COPYRIGHT 1900 BY THE PAN-AMERICAN EXPOSITION CO.
THE STADIUM.
GOVERNMENT BUILDING.
PAN-AMERICAN EXPOSITION
BUFFALO N Y

Views of Some of the Buildings for the Coming Pan-American Exposition.

The effort has received the full sanction of this Government, and it becomes, therefore, a national invitation from the United States to all other American States. There is every indication that the undertaking will be strikingly successful, and the preparations now rapidly advancing are upon a grand scale. The grounds cover 350 acres and the site is pronounced by landscape architects to be among the most beautiful in the world. There will be erected more than twenty large buildings and massive architectural works, besides the numerous State and foreign buildings, buildings for special exhibits, public comfort and other purposes. The buildings will all be abundantly filled with the most curious and interesting exhibits, representing the latest and best achievements of the civilization of the Western Hemisphere.

So vast is the number of valuable and interesting objects for exhibition in the possession of the United States Government that none but a building of great proportions could possibly contain them. Instead of one building, however, at the Pan-American, the Federal group will consist of three massive structures connected by colonnades. The main building of this splendid architectural triad will be 130 feet wide and 600 feet long. The others will each be 150 feet square.

The Stadium, or amphitheater, will have a quarter-mile track, and a sufficiently large space inside of this for any of the athletic games. There are provided seven exits, of sufficient breadth and height to admit, in case of need, the largest vehicles or floats, as it is proposed to use the Stadium for certain pageants, exhibits of automobiles in operation, etc.

The building devoted to Manufactures and Liberal Arts is one of the largest buildings of the Exposition, covering more than four acres. The western frontage is 350 feet and the northern is 500 feet. An important feature of the work is a spacious central court, 134x176 feet, containing a large room, where a fountain imparts an expression of life to the scene. The mining and manufacturing interests of this west half of America will doubtless be fittingly represented.

As Told in Colorado.

"I've got a sight for you that may interest you," said Lewis Emery, Jr., to the guest who had penetrated to room 412 at the Brown Hotel this morning.

"This is my son, Earle C. Emery," he added, as he unlocked one of the stout "grips" that stood on the table. "We are just getting back to our home in Bradford, Pa.; we are in the oil business there, but out in Calaveras county, Cal., we deal in this.".

As he spoke he undid one of a number of stiff buckskin sacks which he had taken from the valise and poured out on a piece of paper about a pint of gold nuggets ranging in size from the dimensions of a pea to those of a butter bean.

"We've got lots of this coming," said Mr. Emery, cheerfully, "but it will take some time and money to get it out. Our diggings are away above the sea level—2400 feet, in fact—and our sluicing water comes down to us from a height of 4000 feet, and it costs money. That is due to the debris bill that was passed through the influence of the farmers by the California Legislature. But still it pays, and there's a world of it to be done.

"Why, the diggings of 1849 and 1850 were as nothing in comparison. The California placers have hardly been touched, sir, hardly touched; but capital is going in there, and they will be touched, good and hard, too."—Denver, Colo., Post, July 10.

Wet Steam.*

WILLIAM H. EDGAR.

Wet steam is produced from two different causes in the boiler, priming and foaming. Priming is due to lack of delivery surface or lack of steam space and to the mechanical construction of the steam dome, especially the connections between the different domes in water tube boilers. But wherever such a mechanical defect might exist, the water you might say would spatter the steam if boiler water contained salts of soda.

Foaming is caused by saponification, due to the soda contained in the water, and as a rule whoever is using river water containing mud will have more or less soda in the form not only of a carbonate but of a sulphate. Well waters have tendency to foam after running a week or two. I believe that in ninety cases out of a hundred the moisture in steam is due to saponification or to the presence of soda. There might be a great excess of lime and magnesia in solution in feed water, but when the water is introduced into the boiler and brought into contact with that degree of heat, lime and magnesia is thrown out of solution into suspension, and consequently get no action whatever in the way of foaming. It does not increase the density of the water. It is not a part of the water. It is not in solution. Soda always remains in solution. Ninety per cent of the waters throughout the country used in the boilers contain considerable lime and also some soda, and nine plants out of ten are treated in one way or another with some one or the other salts of soda, and get the same action in all such cases received from the use of artesian well water and surface well water in certain places where the soil contains sulphate of soda and generally the carbonates.

It is essential to get as dry steam as possible, and one could get absolutely dry steam if he could use a straight mineral cylinder oil without requiring the admixture of any animal oil whatever. The animal oil is necessary only to take care of the water. The condensation washes off the mineral oil, necessitating the compounding with an animal oil to hold it, to give it the clinging, adhesive, film-cutting properties of a good cylinder oil.

On the Burlington road they condemned the oil and sent it back repeatedly month after month just during the last couple of years—in fact the last year—and could not buy anywhere else except of one company, and they had considerable difficulty in getting an oil to meet their requirements. They finally reached about 35% of tallow in the compounding. They were using soda ash in the boilers, and the more soda ash they used the more moisture they had in their steam, the more they saponified the water and the more moisture was carried over, and with this moisture came soda, and the more soda that came over the more it cut the animal oil, saponifying it, forming soap, and they had considerable difficulty before they found out really where the trouble lay.

I believe that throughout the country in different plants a great many good cylinder oils have been repeatedly condemned, and all due to the well water used carrying the water a little too high in the boiler or using some preparation of soda; and, of course, the higher you carried the water, and the more you agitated the water from a sudden opening, I suppose, of the valve in the delivery of steam, the more readily it would foam, and I believe that in all your practice in the engine room if you would watch your water level and the nature of your water, so as to know the amount of soda it might contain, it would enable you to take better care of the oil question.

Caustic soda in a saturated solution would contain 59% of caustic soda; a saturated solution of soda ash would contain 40% soda ash, when it would begin to cake; with salt you would have a 35½% saturated solution before it would cake. All sodium salts remain in solution until the solution is saturated, and then they cake and always cake at the hottest part of the boilers. It is quite common in Kansas and down in New Orleans and out in the Hawaiian Islands and along the sea coast where they use salty water to buckle the tubes and bag their sheets, due to salt. I believe that nine-tenths of the wet steam and cases of foaming are due to soda.

---

* Condensed from a paper read at the Northwestern Electrical Association Convention, June 26-28, 1900.

Cable Line to the Philippines.

Being in the Philippines to stay, and owning the Hawaiian Islands, the United States naturally needs telegraphic communication. Cable lines across the Pacific are being discussed. Advocates of a government line are figuring on two routes. The southern, by way of Honolulu from San Francisco to Manila and Guam, would, it is calculated, cost about as follows:

9285 knots cable, including 10% slack	$11,583,030
500 knots spare cable	623,750
Two cable ships ($200,000 each)	600,000
Two sets cable gear	250,000
Six stations	180,000
Duplex instruments, battery, etc	60,000
Spare instruments	30,000
Traveling expenses, freight, etc	100,000
Contingent fund	250,000
Duplicate cable	11,583,030
Total	$25,259,810

ANNUAL EXPENSE.

Interest at 3% on $25,259,810	$ 750,794
Maintenance and coal supply of two ships	250,000
Operating and traveling expenses	175,000
Repair and renewal fund	400,000
Total	$ 1,582,794

It is thought that the northern route by way of Alaska to the Philippines, and in addition thereto a separate line from California to Hawaii, could be laid for about $12,000,000, as indicated in the following table:

	SINGLE.		DUPLICATED.	
Route.	Miles.	Cost.	Miles.	Cost.
International cable, U. S. to Asia	4,883	$4,000,000	8,876	$6,000,000
Same, with cable to Hawaii	7,283	6,500,000	12,276	9,200,000
American, northern, to Philippines via Alaska, with branches to Japan and separate cable to Hawaii	9,335	9,000,000	12,735	12,000,000
American, southern, via Hawaii and Guam	7,750	13,500,000	14,250	25,000,000

This difference in cost is largely due to difference in length of the links. The arguments against such a route are to be found in the great natural difficulties to be encountered—ice, fog and great depths, but a cable on the northern route could be repaired at any time of the year on any link, except during temporary storms, and the cable ship could always find a harbor within 100 miles of any break. By the northern route the different stretches vary but slightly in distance, and are all comparatively short, none exceeding 850 miles, so that, in case of a break, one cable ship, if it were found impossible to make repairs, could easily relay one entire stretch, the cost of which would not amount to more than $600,000.

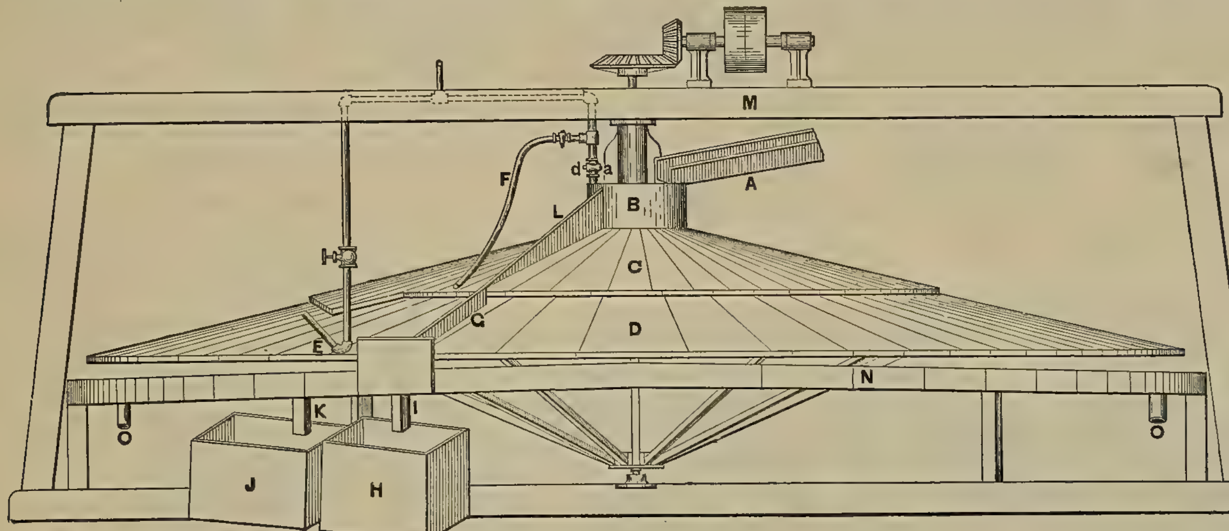
On the southern route, with its four great stretches of 2286, 1254, 2593 and 1496 miles, the cost of a break in great depth, in case repair were possible, would probably amount to several hundred thousand dollars, with the likelihood also of a necessity for the renewal of an entire stretch, which would cost from $2,000,000 to $3,000,000.

Another consideration is the supply of gutta percha, which has become so scarce and its price consequently so high that its use in construction of long distance cables has become very costly. Gutta percha costs $2 a pound; rubber can be had at $1.30. For long stretches of 2000 miles or more gutta percha, however, is requisite as insulating material, while for shorter stretches india rubber suffices.

The question of Pacific cable communication will be one of the foremost ones concerning the United States in the first years of the twentieth century.

The Evans Slime Table.

The Evans copper slime table and concentrator is a device herewith illustrated and described, as furnished by Fraser & Chalmers of Chicago. A is a launder to conduct the slimes from the catch pit or slime box to the distributor B, which has a partition a, to separate the clear water from the puddled water or slime water. The clear water is supplied by pipe d, to the distributor, and runs over one-half of the table D, while the slime water runs over the other half, being controlled by the division piece L. The sand and water being on one side of distributor B run through its perforated bottom, and are distributed equally over one-half of the stationary head C, and run on the rotating table D into the circular launder N, then through the waste pipes O O; the ores remain on the upper part of table D, and after concentration are shielded from the action of clear water by the cone-shaped head C. The proper grades of ores are, through the action of clear water, washed about half way down the rotating table D. They then come in contact with the diagonal perforated pipe E, and are rewashed by a succession of small jets from perforations of small pipe. The ore passing between the jets is carried around on the rotating table D until it comes in contact with a jet of water from pipe F and conducting board G. The jet F conducts the ore into hutch H, through pipe I. The middle or second grade ore is washed off table D by the perforated pipe E, and is deposited in hutch J, through pipe K, to be rewashed. The head C is suspended from frame M so that it can be readily adjusted relatively to the table as may be required. The arms and segments should be made of hard pine, about half seasoned. The sheeting or surface should be of soft pine, and must be green lumber and perfectly clear. The surface of table must be true and uniform, the width of the boards not to exceed 5 inches, tongued and grooved. The speed of machine is one revolution in eighty seconds; pitch or incline of table, 1¼ inches to 1 foot; pitch of head, 1¾ inches to 1 foot. The capacity of the machine is stated to be twenty-five to thirty tons per day of twenty-four hours.



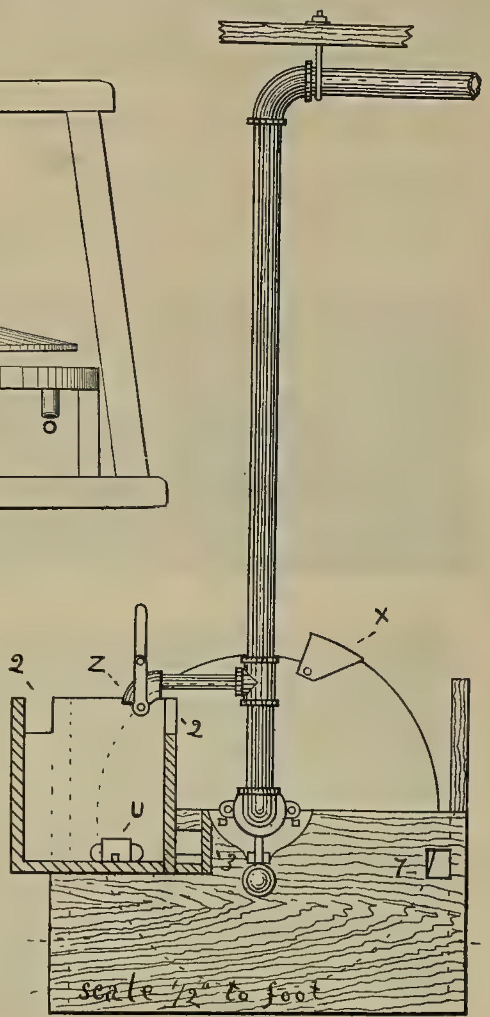
Evans Slime Table.

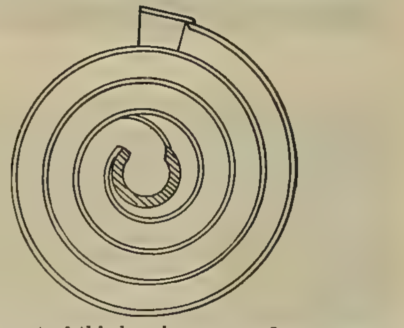
THE Congress of Mines and Metallurgy at Paris, France, during the latter part of last month, was inadequately represented by American delegates, though the prominence and utility of American methods were manifest in their mention by the several speakers. "Employment of Electricity in Mines" was the subject of an article by J. Libert, Director of Mines at Namur, Belgium. Wolfgang Wedelin of Berlin read a paper on "Electricity in the Mining Industry." "Mechanical Extraction of Coal" was described by various delegates, largely from American observation. Herrman Wedding of Berlin read a paper on "Magnetic Separation of Iron Ores," describing the Edison and Wetherill processes. M. Smits of Dusseldorf gave a further description of the Wetherill process. N. Pallati of Sardinia read a paper on the "Mechanical Preparation of Ores" in that country. M. Syznan-Krowsky of St. Petersburg submitted an article on "Russia's Mineral Resources," and Jas. Douglas of New York presented some statistical returns of the United States for 1899. There was some discussion as to the value of mathematics to mining engineers, and a resolution to hold the next meeting at Liege, Belgium, in 1903, was unanimously carried.

OFFICERS of the Colorado State Federation of Labor are arranging to lease from the State a large amount of coal and mineral land, on which mines will be opened on the co-operative plan.

Spiral Sand Pump.

Frenier & Son, Rutland, Vermont, make a spiral sand feed, of which two views are herewith presented, the smaller showing interior construction of pump.





In the box is a pump wheel with its shaft supported on each side by bearings bolted to box. At the upper part of this box is an overflow opening to let off all the mud and worn-out sand which rise to the surface. This overflow opening is connected to the waste water drain or sewer of the mill.

The wheel is made spiral-like, consisting of a hollow passage or groove which starts from the outside, where it forms a scoop, and is coiled round and round until it reaches the center. The shaft of the wheel is hollow and open on one side, which connects with the spiral groove in the center of the wheel. The outer end of the shaft is connected with a detachable hollow, tapering shaft, which works in a packing box, preventing the sand from coming in contact with the shaft. The vertical pipe is connected to packing box by elbow. The pipe is 3 inches diameter for the 6-inch and 8-inch pumps and 3½ inches for the 10-inch pump. It connects at the top to a distributing box. Valves are connected to this box to cut of the supply. The pump wheel is made of steel plate, $\frac{3}{16}$ inch thick, and is made in three sizes, 6, 8 and 10 inches in width and 44, 48 and 54 inches in diameter.

These spiral sand pumps are designed for pumping sand, slimes, tailings and crushed ores. J. A. Frenier & Son are represented by M. S. Hauser, 12 Front street, San Francisco, Cal.

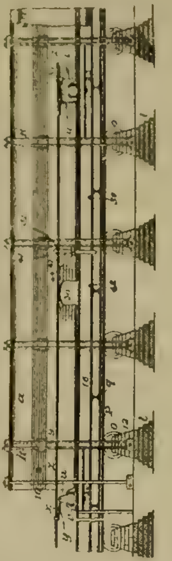
THE new engines of the Denver & Rio Grande Railway have iron pipes extending along the roof of the cab, connecting with the boiler. Through this pipe, without making a perceptible motion, either the engineer or fireman can send, under 200 pounds pressure, a jet of steam and boiling water that would effectually kill or injure anything living that happened to be on the tender or the front end of the baggage car. The blow-off cock thus arranged is expected to prevent train robbers climbing over the tender.

Mining and Metallurgical Patents.

Patents Issued July 10, 1900.

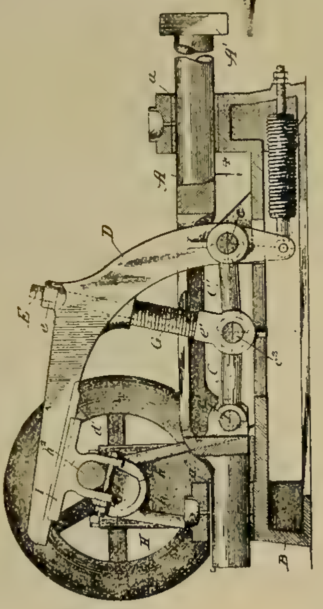
Specially Reported for the MINING AND SCIENTIFIC PRESS.

ORE ROASTING FURNACE.—No. 653,202; P. Argall, Denver, Colo.



An ore roasting furnace, combination, reciprocating hearth or bottom, means for reciprocating same, series of hollow rabble arms extending transversely across movable hearth or bottom at definite intervals, rabbles fixed upon rabble arms, crank arms on ends of rabble arms, horizontal rods extending the whole length of furnace on each side, adjustable link connections between rods and crank arms, and means for moving rods, whereby all rabble arms are simultaneously moved and rabbles thereby lifted from the ore.

ACTUATING MECHANISM FOR CONCENTRATING TABLES.—No. 653,285; D. Cole, Chicago, Ill., assignor to the Gates Iron Works, same place.

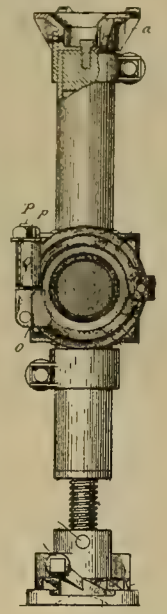


In machine of class described, combination of reciprocating bar, frame or base portion in which bar is reciprocatingly mounted, pivotally connected toggle links, one fulcrumed at one end upon base portion and the other at other end to reciprocating bar to reciprocate same by and during their vibrations, an operating lever pivotally mounted upon frame portion at one fulcrum point of the toggle links, pitman pivotally secured to toggle links at pivot connection thereof and having threaded end portion passed through smooth perforation in operating lever, adjusting nut on threaded outer end of pitman, extensible spring washer surrounding pitman and inserted between it and operating lever, crank shaft and crank rotatably mounted in frame portion, shoe pivotally mounted upon crank and having its saddle engaging with slide on operating lever, and spring secured to operating lever and frame portion to assist in vibrating operating lever in one direction.

PROCESS OF EXTRACTING COPPER OR OTHER METALS FROM TAILINGS OR ORES OF SUCH METALS.—E. Fink, Milwaukee, Wis.

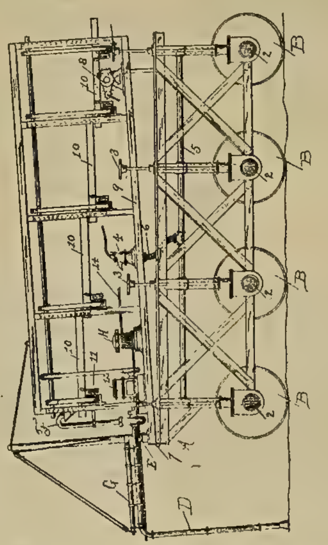
Process of extracting copper from tailings or ores containing that metal, subjecting tailings or ore alternately to action of solution containing sulphuric acid and primarily compound of nitrogen, capable of liberating nitric oxide, and to action of higher oxide or oxides repeatedly reproduced by supplying air or oxygen under pressure to liberated nitric oxide and to higher oxide or oxides which have been reduced by acting on tailings or ore and are confined in presence of solution until metal contained in tailings or ore is dissolved in solution, then separating matrix or earthy matter from solution, and finally separating and precipitating copper from solution.

DRILL-SUPPORTING COLUMN AND COLUMN CLAMP.—No. 653,307; W. K. Millholland, Chicago, Ill.



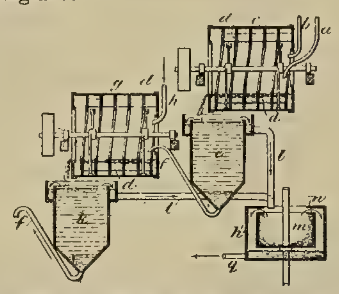
In column for rock drills and the like, in combination, shaft, foot block, screw fixed in block and entering shaft end, boss formed on block and having face tangential thereto, foot plate upon which screw is adapted to rest and turn, annular ratchet formed on upper face of plate, abrupt faces of ratchet teeth being on planes radial as to ratchet, and pawl secured to tangential face of boss and co-operating with ratchet.

PLACER MINING DREDGE.—No. 653,205; S. K. Behrend, Washington, D. C.



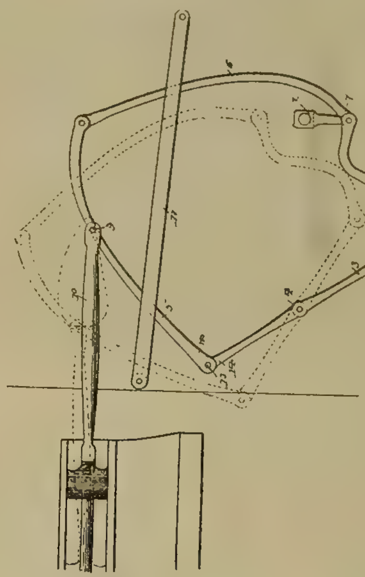
Combination with hollow rollers, of platform having horizontally hinged connection with rollers and dredge carried on platform; truck constructed and adapted for support directly upon water bottom whereby truck is upon fixed and immovable support, of platform carried by truck and capable of vertical adjustment with respect thereto.

APPARATUS FOR SEPARATING METALLIC FROM ROCKY CONSTITUENTS OF ORES.—No. 653,340; F. E. Elmore, Leeds, England.



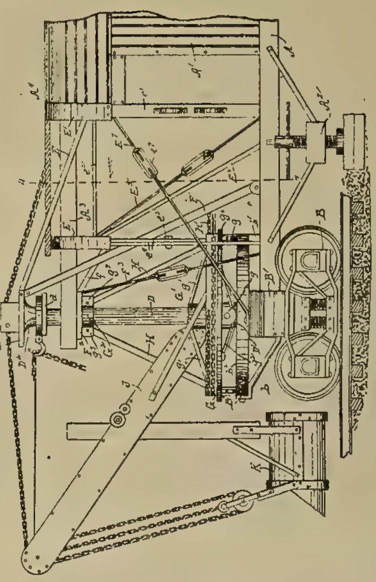
Combination in apparatus for separating metallic from rocky constituents of ore, of rotary drum having internal helical ribs divided into cells by longitudinal blades, pipes for delivering oil and ore and water into one end of drum, water-subsiding vessel arranged below drum and receiving oil, ore and water therefrom, centrifugal drum arranged below water-subsiding vessel, and constructed with inwardly projecting lip and surrounding casing, and pipe for conducting metallic portions and oil from top portion of water-subsiding vessel into centrifugal drum at point in proximity to inwardly projecting lip thereof.

DEVICE FOR OVERCOMING DEAD CENTERS.—No. 653,257; J. Martin, Howard Lake, Minn.



Combination of crank, the curved link 6 pivoted at its inner end to outer end of crank, lever 3 fulcrumed between its ends and disposed opposite link 6, the short sigmoidally bent link 2 connecting one end of lever with outer end of crank, long, slightly curved link 5 disposed opposite link 2 and connecting other end of lever with outer end of link 6 and pitman connected with one of the links.

STEAM SHOVEL.—No. 653,391; W. Mullen, Elizabethtown, Pa.



Combination with movable platform, of crane on platform, arch extending transversely of platform and located behind crane, vertical post supporting one end of arch, struts supporting other end, second arch parallel with and located behind first arch, horizontal braces connecting ends of two arches, horizontal brace beam supported by both arches and having upper end of crane post secured thereto, braces connected with second arch and extending to platform, brace connected with top of crane post and extending to second arch, diagonally disposed braces connected with upper end of crane post and with first arch and diagonally disposed braces connected with upper end of crane post and with platform, all braces being so disposed as to permit jib of crane to swing under end of first arch unsupported by post.

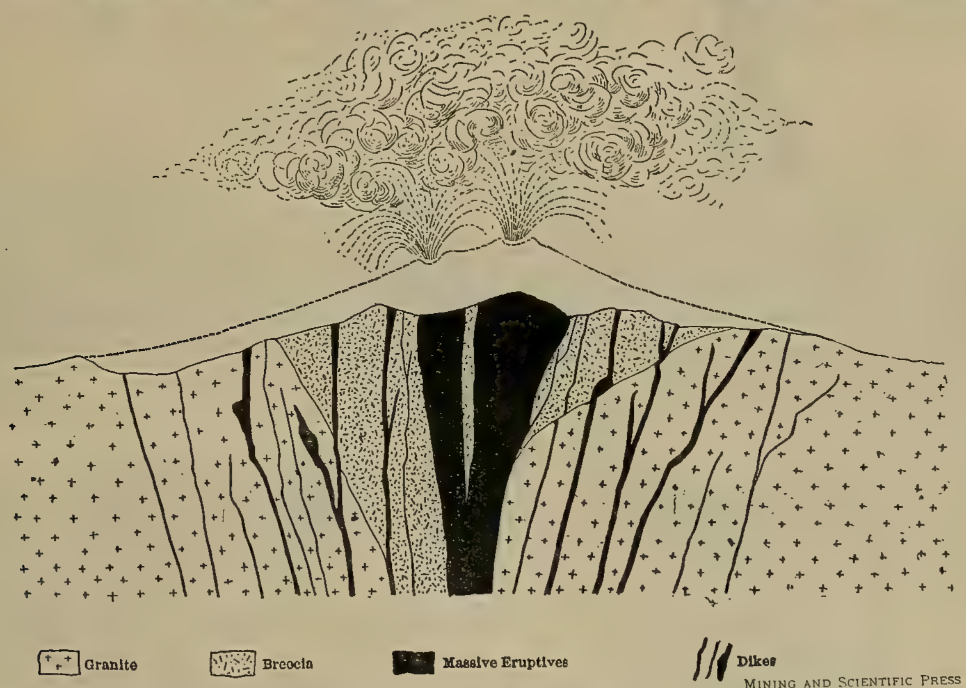
PROCESS OF EXTRACTING PRECIOUS METALS.—No. 653,325; C. P. Tatro and G. Delius, Seattle, Wash.

In extracting precious metals from ores, process comprising following steps: pulverizing ore to fine pulp; dissolving metals from foreign matter by immersing pulp in bath comprising aqueous solution of common salt, caustic lime, and small percentage of bromine fluorspar and saltpeter; recovering precious metals from bath by electrolytic action.

The Cripple Creek Volcano.*

NUMBER II.

Projectile discharges were succeeded by tranquil emissions of lava. The bodies of massive andesite in the southeastern part of the district may represent such extrusions. They were marked by an absence of the violence which accompanied the earlier outbursts, due, perhaps, to a diminution in the quantity of escaping steam and a lessening of the pressure upon that which remained. The earlier ejectamenta of a volcano are scoriaceous and vesicular; that is, they have been penetrated and torn by the explosive escape of superheated water vapor, while the lava characterizing the later stages of activity is compact and homogeneous. The creation of a vent serves as a safety valve in releasing the tremendous pressure of the steam, due to its sudden expansion when coming into contact with incandescent fused rock. Attendant upon the relief given to that pressure, are all the terrifying phenomena of the first outburst. Subsequently the force of the eruption diminishes. The lava ceases to be violently projected by escaping high-pressure steam. The underground waters near the conduit have become used up. The rise of the lava underground, followed by its protrusion at the surface, becomes a quiet process, which must be referred to a more deep-seated cause, namely, the local readjustment of the earth's crust, causing the fused rock to ooze out slowly. Many lava streams have a glacier-like movement. They seldom progress more than 3 miles per day, and often require a year to advance a few miles. Observers have described the flows of lava which follow the first eruption as welling out "with the tranquility of a water spring," as "proceeding in silence," as "being effected quietly and without noise." All this is in vivid contrast to the paroxysmal outburst which marks the first stage of volcanic activity. The difference is to be referred to the relative quantity of steam taking part in the process of eruption.



IDEAL SECTION OF THE CRIPPLE CREEK VOLCANO.

The period of quiet may have been, and probably was, succeeded by a complete, though temporary, cessation of activity. This interval may have persisted for several hundred years. Geology is lavish of time. The inaction was due to the diminution of pressure consequent on the withdrawal of the lava in the conduit of the volcano. Such a result would be brought about by the shifting of the center of eruption to another place along the line of fissure. The first conduit of the Cripple Creek volcano became plugged up by material which had failed of ejection. Other minor vents may have been formed on the flanks of the mountain which had been slowly formed by the long continuance of discharges. When, after an interval, a vigorously active condition was resumed, the second eruption, in all probability, took place through a new vent, produced, as the original one had been, by a fissuring of the rock immediately over congested masses of steam due to the water which had accumulated during the interval of inaction.

There is evidence indicating that the Cripple Creek volcano had several vents. One existed near the present site of the Hull City placer; another must have been situated near Anaconda. The original position of the orifice of an extinct volcano can be inferred from the composition of the rocks. The lava which cools rapidly in the open air assumes the charater of a glassy substance, containing only a few embryonic crystals, but that which cools slowly underground, and while still subjected to great pressure, is developed into completely crystalline rock. Experiments with smelter slags, and a microscopic examination of the resulting material, have confirmed this proposition. In this way the lava streams which have issued from the vent are distinguishable from the material which has solidified in the throat of the volcano. The nepheline-syenite near the Lillie and Vindicator mines is the granular equivalent of the phonolite which occurs so plentifully all over the district. The phonolite and the syenite have a similar chemical composition, but their texture is very different. This is due to the fact that in the former a crystalline structure has not been fully developed, but the ground mass or matrix, as seen under the microscope, being made up of crystallites—minute, hair-like bodies without the properties, but with the tendency to become, crystals. This indicates that the rock cooled too rapidly to permit of proper crystalline growth. The nepheline-syenite, on the contrary, is made up entirely of developed minerals, no part of the original ground mass having failed of arrival at true crystalline maturity; so that even the slight excess of quartz, though uncombined, presents a crystalline structure. This indicates that the rock cooled very slowly, giving ample time for the full play of the forces which produce crystallization. It is to be inferred that the nepheline-syenite fills an old vent, or is close to it. The same inference is drawn from the patch of syenite-porphyry between Gold hill and Squaw gulch. Further evidence suggestive of the former existence of a vent thereabouts is afforded by the steepness of the plane of contact between the granite and breccia on the adjoining Guyot hill. The dissection of extinct volcanoes in other parts of the world, a dissection brought about by natural erosion, which has cut valleys right into the flanks of ancient eruptive centers, furnishes numerous examples confirming such deductions as have just been made with reference to the vents of the Cripple Creek volcano.

The bulk of the material thrown up by the Cripple Creek volcano was fragmentary, and became the great mass of breccia now constituting the leading geological feature of the district. The earliest lavas extruded were of medium fusibility: namely, andesite, and then phonolite. On reaching the surface, they formed streams, the exterior of which became promptly chilled to a black-looking slag, to which escaping steam gave a cindery structure. The lava rolled down the slope of the volcano with the utmost slowness, making clinking sounds such as are heard when the workmen empty the slag pots over the dump of a smelter. Such lava streams weather very easily; the exterior, by the contraction of the surface due to cooling, becomes porous, and water penetrates into the mass of them, disintegrating them so that they are readily carried away by the rains of spring.

The last extrusions of the Cripple Creek volcano were of basalt. These were more limpid, and must have formed streams which traveled much farther than the less fusible phonolite and andesite. The basalt, judging from the behavior of similiar lava flows actually observed in the Hawaiian Islands and elsewhere, would progress rapidly down the slopes of the mountain and overwhelm the forests which, probably, clothed the lower portions of the Cripple Creek volcano, setting them on fire and adding greatly to the aspects of destruction presented by the scene. Upon cooling, these basaltic flows would be cleft asunder by symmetrical series of cracks forming prismatic columns grouped like the pillars of a Gothic cathedral. But where they were not protected by a later covering of rock, the ruthless hand of decay attacked them also, the frost of many thousand years shivered the straight columns; and the freshets of spring swept the remnants into the torrents which fed the Arkansas river.

The successive periods of activity in the life of the Cripple Creek volcano are marked by the sequence of lavas extruded. This sequence is indicated by structural relations, the older extrusions being penetrated by the younger. But this is not all. The crystalline structure and the chemical composition of the rocks resulting from the cooling and consolidating of the successive lavas exhibit differences which have been found to be closely analogous to those presented by similar successions of rock at other volcanic centers, both in the United States and in Europe. The earliest lava extruded by the Cripple Creek volcano was andesite. Then came the phonolite, and, lastly, the basalt. These three rocks represent types which vary in their chemical composition and in their consequent fusibility. Basalt fuses at about 2250° F.; certain varieties fuse at about 2000° F. What is usually termed a "white heat" is equivalent to a temperature of 2100° F. The least fusible rocks are of the granite and trachyte class; they fuse with difficulty at about 2700° F. To the intermediate type belong the andesites, which fuse at about 2500° F. The relative fusibility of these rocks is dependent upon the fusibility of their chief constituent, feldspar, the variety in the basalts being labradorite, the most fusible of the feldspars. Moreover, in basalt there is present a good deal of augite, a still more fusible mineral, and a large percentage of iron which, as in smelter slags, contributes directly to fusibility. The trachytes are largely made up of orthoclase, the least fusible of the feldspars. The andesites are intermediate in composition and of medium fusibility, their characteristic feldspar being oligoclase.

This fusibility used to be expressed in terms of "acid" and "basic character," the rocks high in silica and low in iron being at one extreme, those low in silica and high in iron at the other. But Dana has pointed out that this does not express it correctly, fusibility being dependent not so much on the percentage of silica as upon the amount of alkali, namely, potash and soda. Thus the rocks rich in alkaline feldspars are the most fusible. Free quartz exists in most rocks; and the percentage of it, which is far from uniform among the members of any particular type, increases the acid character of the rock, so that it becomes a secondary factor in determining fusibility. Similarly iron occurs as an oxide (magnetite) in all rocks, to an insignificant degree in the granites, but in the basalts and gabbros freely, so as to form an important ingredient, giving them their dark coloring. This large percentage of iron contributes to easy fusibility; indeed, certain basalts are known to become so limpid that they can be taken up in a spoon attached to the end of a cane.

This question of fusibility would be of slight importance were it not for one interesting fact, namely: it has been observed in several volcanic regions that lava of intermediate extreme types, namely, the very alkaline or comparatively non-alkaline rocks, such as basalt and rhyolite, respectively. This was the case at the Cripple Creek volcano. It has been inferred from these facts that in the earlier stages of volcanic activity the lavas are mingled together underground, and that during the period of eruption the heavier portion separates from the lighter, causing two diverse products to be separately emitted.

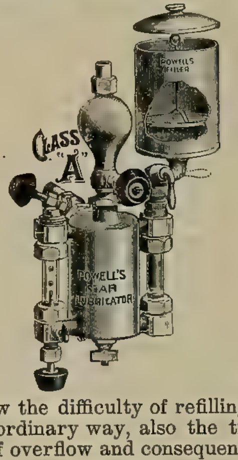
(TO BE CONTINUED.)

---

*Condensed from a paper read at the Washington meeting of the A. I. M. E. by T. A. RICKARD.

The Powell Filler.

The accompanying illustration shows Powell's filler in position attached to their Class "A" lubricator.



Engineers know the difficulty of refilling a lubricator with oil in the ordinary way, also the time required, the liabilities of overflow and consequent waste of oil, besides messing everything in the act, especially if the oil is thick or heavy. The Wm. Powell Co., Cincinnati, O., claim that by the use of the Powell filler all this trouble and annoyance is done away with. An illustrated circular explaining in detail the operation and economy of this useful device will be sent anywhere upon request.

MINING SUMMARY.

ALASKA.

(Special Correspondence).—(The following is from an old and experienced California miner):

We arrived on the 18th. Have traveled faithfully every day; have been up the Snake, Cripple and the Piney rivers and many of their tributaries, also on Dexter, Snow and many other creeks. I find very little doing anywhere, excepting on the beach, and most of the men for 20 miles whom I have talked with declare they are not earning over $3 per day. There are a few exceptions, no doubt, doing well.

On Anvil creek there are not over fifty men working, owing to scarcity of water; only about ten men working on Lane's claims, below discovery; not a man working on Snow gulch, although there is rich gravel on the gulch. I panned out one pan that yielded about $1. Lane's claim at the head of Snow gulch will no doubt turn out well when he gets water, which will have to be pumped.

All of these creeks are very flat. Usually three men shovel into the sluice and two men shovel out, and it has to be rich to pay.

There are just two things possible to save the reputation of this country: the tundra, of which there is little or nothing known, and the dredging of the beach below high tide, which no one has yet done. Yet there are several who say they are going to try it. There is any quantity of machinery strewn along the beach for miles. Much of it will never be used nor even taken away. I do not think any man can judge fairly of this country in twelve days, but I feel like advising my friends to stay away for the present. Things are very much mixed—no law, no security of titles. So far it is a town boom, pure and simple.

Nome, July 1.

At Sumdum the Bald Eagle and Sumdum Chief consolidated into the Sumdum Chief M. Co.; H. T. Tripp, manager. A two weeks' run of the 10-stamp mill milled fifty tons each day, yielding $19 per ton. Ore is partially blocked out by the tunnel, which, cutting both ledges, is 3500 feet long; its end is 1600 feet below the surface.

At the Bauer mine at Sitka a 4-stamp mill is being put in.

Supt. Nevens has 102 men on the payroll of the Juneau-Alaska mine.

The steamship Noyo, fourteen days from Cape Nome, arrived at San Francisco on the 18th, confirming former reports therefrom. Many are leaving; some prospectors are scattering out; more are hanging around waiting for something to turn up. There were seven new cases of smallpox reported the day before the steamer sailed.

ARIZONA.

COCHISE COUNTY.

At Pearce the Commonwealth will rebuild the mill, recently burned—a 50-stamp mill, capacity 200 tons a day. The company's loss in the recent fire was $200,000.

From the Peabody mines, 9 miles from Cochise station, two carloads of ore are being shipped daily. The mine is operating two hoists and employing forty men.

The Turquoise mine, south end of the Dragoons, is shipping a carload of copper ore daily through Cochise station.

Supt. H. B. Clifford of the Dragoon M. Co. is working 100 men on the company's mines at Johnsonville and has copper ore.

At the Great Western Copper Co.'s mine twenty men are at work.

R. A. F. Penrose, Jr., manager Pearce mines, Pearce, will put in new material and machinery to continue work on the property. The fire burned 150 feet in the shaft. It is estimated the loss will be $200,000.

MOJAVE COUNTY.

Chloride reports a discovery of silver ore in the 90-foot tunnel of the Redemption mine, belonging to R. J. Ferguson & Sons. The ore body is 2 feet thick. Native silver permeates the width of the ore body; there are also black sulphites, copper, iron and lead.

PINAL COUNTY.

The Arizona Copper Hill M. Co.'s properties are on the west side of the Canyon del Oro, 20 miles from Tucson. They have driven a 700-foot tunnel on one of the claims, and are putting in a gasoline hoist with intention of sinking a vertical shaft 500 feet.

The company developing the Geiseman copper group in the Catalinas, east of Oracle, have a body of ore 20 feet wide.

R. Leatherwood is chloriding the Apache copper mine, on the San Pedro side of the Catalina mountains.

YAVAPAI COUNTY.

The new 40-stamp mill of the Octave M. Co. is in operation.

Fourteen miles from Jerome the Eclipse is to be developed. The 5-stamp mill has produced gold to the value of $6300.

A million-dollar fire in Prescott on the 15th destroyed five blocks in the business portion of the town. There was no loss of life and the burned district will be rebuilt.

The old Crook mine, in Crook canyon, under the superintendency of W. Mendenhall, is being developed. About 200 tons of ore have been milled at the Pickerel mill on the Hassayampa with good results; mill runs will be made until the property is in shape to have its own equipment.

A railroad will be built from Seligman to Hillside. C. Timmons of Kingman has charge of the engineering department. J. Lawler is the heaviest owner of the Hillside mine.

CALIFORNIA.

AMADOR COUNTY.

At Sutter Creek ten stamps of the South Spring Hill mill are running on ore from the 500 level of the Lincoln, testing the new ore body found at that point.

The Record gets the following from Supt. Voorheis: - The result of milling 1100 tons of ore from the Lincoln mine was:

Free gold, 182.69 ozs. at $17 oz...	$3,105 73
Sulphurets, 39 tons at $77.51, assay value per ton............	3,022 89
Loss in tailings, 53 cents per ton..	583 00
Total value 1100 tons..........	$6,711 62
Average value per ton........	6 10

The same mill has started running on another lot of 1000 tons of this rock.

BUTTE COUNTY.

Doyle, Petkin & Levy of Nevada county have bonded of Adams & Achern, Clipper Mills, a tract which embraces placer and quartz properties.

CALAVERAS COUNTY.

The Golden Gate mine, near Angels, is to have a 5-stamp mill.

The Ford mine, near San Andreas, is temporarily closed to retimber the shaft.

EL DORADO COUNTY.

The Eagle G. M. Co., near El Dorado, has made its final cleanup for the season, paying about $100 per day for the time it was worked.

At the Ribbon Rock mine, Placerville, the shaft is 215 feet deep. Drifts are being run north and south on the ledge.

The ten stamps at the Omo mine are crushing ore from tunnel No. 3.

Development work on the Cincinnati mine, south of Placerville, is still being vigorously prosecuted. Six men are now employed, who are rapidly driving the tunnel ahead. The company have a 12-foot ledge and are very much pleased with the outlook.

Fifteen men are drifting in the French Hill Seam Diggings.

C. W. Kenney is sinking the shaft of the south extension of the Schleger mine, near Greenwood.

The Big Canyon mine has closed down.

INYO COUNTY.

Mining Review: The Ratcliffe Co. at Ballarat have closed down their mine, the main reason given being that their ore could not be handled by amalgamating and cyaniding processes, and that it will be necessary to put in a smelter.

KERN COUNTY.

In McKittrick district, the Royal Union Oil Co. incorporated June 17th; on the 18th derricks were built and machinery shipped; on the 25th drilling commenced; on the 1st of July oil was struck at a depth of 400 feet; the company, not being satisfied, the well was cased and drilling continued. The well is now down 800 feet in oil sand.

The Monarch Co., at Sunset, has a flowing well at a depth of 460 feet.

The Central Point has the deepest well in that locality at 750 feet, containing nearly 450 feet of oil sand.

MARIPOSA COUNTY.

At the Mariposa mine the shaft has been sunk 595 feet. Work on the east drift at the first level was stopped at 390 feet to prevent interference with the work on the shaft and lower levels.

MONO COUNTY.

In the Standard Con. mine at Bodie, for the week ending July 7: Ore crushed, 212.5 tons; average assay vanner tailings, $11; concentrates produced, .60 ton; assay value, $56.86; amalgam produced, 780 troy ounces; value per ounce, $3.09.

NEVADA COUNTY.

The Blue Gravel M. & M. Co. is incorporated; H. C. Stillwell, T. S. Irwin, W. Kolman, L. Legarde, P. Campbell; capital stock, $50,000.

A new 10-inch pump has been installed at the Champion mine.

PLACER COUNTY:

H. F. Calenberg is Supt. at the Jupiter gravel mine, Iowa Hill. He reports the outlook favorable.

Wm. Muir, Supt. Boston & S. D. M. Co., Michigan Bluff, has forty-three men at work.

The South Yuba Water Co. will raise the dam at the Summit valley reservoir 25 feet, giving additional capacity of 150,000 gallons.

PLUMAS COUNTY.

W. T. S. Kirk of San Francisco has bought J. A. Mayn's mine, near Cromberg, for $15,000. He expects to put men at work.

SAN BERNARDINO COUNTY.

H. M. Crowther tells the Tribune that on Gold mountain, purchased last season of E. J. Baldwin by J. R. De Lamar, is ore showing free gold, and great volumes in which to the eye there is no sign of gold. A $3 amalgamable ore will afford profit. The mines are 37 miles from the Southern California Railway. Labor is $3 a day throughout the region. In a few days the mill will start.

C. S. Corning expects to have his smelting plant at the Needles finished next September.

SHASTA COUNTY.

At the Mt. Shasta mine the shaft is 325 feet deep. Arrangements are being made to install machinery for working the mine on a larger scale.

The Gladstone mine has been sold to Roberts, McIntosh & Jillson, comprising the Hazel G. M. Co., who will put the mill in operation.

J. W. Parmelee at the Minnesota mine is working twelve men. The company is shipping to Keswick.

TRINITY COUNTY.

T. J. Loftus will put in a 30-ton milling plant at his mine on Coffee creek.

TUOLUMNE COUNTY.

The Banner M. D. Co. is incorporated; C. M. Belshaw, J. M. Castle, J. R. Phillips, F. M. Manson, C. J. Jones, V. Van Hal, J. A. Brent, G. Gates; capital stock, $200,000; subscribed $120,000.

W. L. McKinley, electrician of the Tuolumne Water Co., has started a 20 H. P. motor at the Golden Gate mine to operate the concentrators.

Rawhide proposes to have a wagon road to the line of the Sierra Railway.

At the Grand View gravel mine a flow of water occasions the installation of a 50 H. P. engine to run the 6 and 10-inch pumps.

The Kinkaid Flat gravel mine, near Sonora, has resumed.

The Starr King mine, now owned by Boston men, is being unwatered. Hoisting works and a stamp mill will be put in. Wm. Floyd is superintendent.

VENTURA COUNTY.

In Los Angeles, on the 20th, 6000 acres of oil land in this county were bought. Los Angeles bankers and oil men put in $250,000. Senator Bard has a one-fifth interest. The company is controlled wholly by southern California men.

COLORADO.

CUSTER COUNTY.

Silver Cliff reports that the Geyser mine has shut down, after steady sinking of its shaft for over fourteen years. The shaft has a perpendicular depth of 2650 feet, the deepest in Colorado. A general assignment has been filed to Supt. Elmendorf under the State law. The mine closed down July 4. The assignee has filed an inventory showing a gross debt of $65,000. Of this $25,000 is for labor, fuel and supplies. Assignee Elmendorf has filed a bond in the sum of $100,000. Reorganization may result. There has been expended on the property $2,000,000.

CLEAR CREEK COUNTY.

Idaho Springs reports the Franklin and Lady Franklin mines on Seaton mountain sold to the Colorado & California S. M. & M. Co. for $35,000. Work will be carried on through the adit tunnel. The same company has bought the Wilkie mill, and has taken charge of the Allen mill, which is being changed from a stamp to a concentrating plant.

Gazette: At the Empire City mine, Empire, the shaft is 200 feet below the tunnel level.——The adit on the Mint mine, Covode mountain, in 340 feet, has for two-thirds of its length a vein of mill stuff averaging about $10 per ton in crude value. The property is in operation under lease to Denton Bros.——The Gold Fissure at Empire proposes to sink a three-compartment shaft to develop their five claims by crosscutting from a central point.

DOLORES COUNTY.

A strike is reported at the B. & M. property, West Dolores, near Rico. The B. & M. property is owned by E. A. Thayer of Pueblo.

FREMONT COUNTY.

The United Oil Co., at Florence, has struck oil in well No. 231 at a depth of 2300 feet, in new territory.

The Florence Oil Co. has oil in a new drill at a depth of 2500 feet.

GILPIN COUNTY.

Supt. Jesup of the Gold Coin Mines Co. has suspended operations at the California and Hidden Treasure properties.

C. C. Reid is in charge of the Kountz & Ashley mine, at Phœnix, 2 miles south of Eldora. He has a number of men and will do considerable work this summer.

Cundy & Co., in the Fannie property, Cyclops hill, west of Blackhawk, have a streak of silver ore that carries values of 700 ounces silver per ton.

GUNNISON COUNTY.

A. McVey, president of the company owning the Black Queen mine, is at Crystal to consider a $50,000 concentrating mill. The Black Queen has ore running $30 a ton in gold, $30 in silver and copper. The mine is 17 miles from a railroad and is working forty men.

JEFFERSON COUNTY.

(Special Correspondence).—The Anna L. mine, 30 miles southwest of Denver, belonging to C. R. Critchell and associates, is being developed through a shaft which is now 135 feet deep. A body of ore about 4 feet wide has been encountered, which consists, in the main, of iron and copper sulphides, associated with which is metallic bismuth, said to run from 16% to 22%. The ore also carries fair values in gold and copper.

LAKE COUNTY.

In the Last Rose mine, near Twin Lakes, a vein in porphyry and granite, 20 feet wide, averages, where recently cut, 4% to 5% copper, with a little gold and silver. Streaks of azurite and malachite run from $60 to $100 per ton in gold, silver and copper. There are also some black sulphurets of silver. The main values appear to be in copper, of which there are a variety of compounds. The Last Rose mine is 8 miles from the old town of Dayton.

PITKIN COUNTY.

A silver strike is reported from Aspen in the A. J. mine, the ore shoot coming in on the eleventh level.

SAN MIGUEL COUNTY.

(Special Correspondence). — A proposition is before the county commissioners to build a wagon road from Telluride to Savage Basin which will be 6 miles long and cost $30,000. From Telluride to Savage Basin is an ascent of 2000 feet.

Telluride, July 16.

SUMMIT COUNTY.

(Special Correspondence).—The Augusta M. & M. Co., under the management of T. R. Griffith, recently took control of the old Juventa mine, on the south slope of Farncomb hill, and are driving a tunnel to cut the ore body at a point 400 feet below the workings, which consisted of a 400-foot shaft and considerable of drifting. The tunnel work has progressed about 175 feet, but it will be an 1100-foot tunnel when completed.

Ore shipments from the Breckenridge district run from 300 to 400 tons per month, whose values average about $35 per ton.

Manager C. A. Finding announced a cessation of work on the property of the Breckenridge Deep M. Co. on the 23rd ult., till such time as sufficient funds shall be provided to continue the work and carry it to completion. Present depth of shaft is 440 feet, from which a drift was run 310 feet deep in a fair-grade ore, carrying lead, zinc and iron, with values in gold, silver and copper. When work resumes it will be with the intention of sinking to the second contact.

G. H. Evans, M. E., well known in California, has the management of a group of properties owned by the Gold Pan, Fairview, Royal Blue and Oro Grande placer mining companies, which aggregate nearly 6000 acres of placer grounds in the valley of the Blue river. During the past few months these grounds have been pretty thoroughly prospected with drills, to ascertain the depth of material above bedrock and its value. Some sixty holes have been drilled at different points, ranging in depth from 15 feet at the rim to 70 feet in main channels. Six Evans hydraulic elevators will be put in, which are expected to handle 6000 yards per day. Orders will soon be given for 1100 tons of steel for 3 miles of pipe line, to be divided into three sections—the first to be 1 mile of 60-inch pipe for 400 feet pressure; the second to be also 1 mile, of 56-inch pipe, subject to 350 feet pressure; the third mile to be 52-inch, with 700 feet pressure. These companies—virtually one concern—are erecting a machine shop at Breckenridge at a cost of $20,000, which will be equipped specially for such work as is required in the district, and will include air compressor and electric generator.

The Mecca Gold Placer M. Co., under the management of Lemuel Kingsbury, owns about 200 acres of placer ground on the south side of French gulch, extending part way up Nigger hill to the company's two flumes, one taking water from the

Blue and the other from French creek. These grounds were worked in a small way for years by their former owners, by whom the value of the material was demonstrated. Under the present ownership and management, two hydraulic giants were set to work June 4, 1900, and have been kept busy day and night since, with the idea of getting in about five months work this season. Manager Kingsbury estimates that he handles from 700 to 800 yards per twenty-four hours with each giant. In the sluiceway below one giant there are 36 feet of triangular steel riffles and ¼-mile of riffled sluiceway below the other. Each giant works under a pressure of about 175 feet head of water. (See illustration, page 64.) Besides the water which passes down the sluices from the giants, there is a constant wash from small reservoirs, which fill and empty automatically by means of gates and traps. A special run of 600 yards of material from these grounds last year gave a mint return of $649.71. Near the bed of the gulch a shaft was sunk to bedrock—30 feet—within the past few days, the material from which was found to be extremely rich. A bedrock drift will be run several hundred feet from this shaft to determine further as to values.

The North American Gold Dredging Co., whose placer land comprises a large area on the Blue and Swan rivers, are now operating one Risdon dredger and two hydraulic elevators. Two of the lighter dredgers were sent to California several months ago and were replaced by heavier machines. The dredger in operation is said to be handling about 1800 yards per day.

The Peabody placer, on the Gold Run, on the north side of Gibson hill, is being operated by lessees.

The Uba Dam is being worked by a company, of which M. M. Howe is manager.

The Iowa, in charge of R. E. Norton, is now in operation.

Toney Bianchi recently made some shipments from a lode mine called the Carpenter Placers.

Some shipments are also made from the Gold Dust and Washington lease. The Johannesburg is sinking a shaft at a point higher up the hill. WASCOTT.

Breckenridge, June 27.

TELLER COUNTY.

The Post hears that the Portland Co. has bought the Thomas ranch, southwest of Colorado Springs, as a smelter site, and that a Denver firm is drawing plans for a 300-ton smelter.

W. R. Foley et al have bought the Keystone mine for $60,000.

The Laribee G. M. Co. will sink 500 feet on the Canyon City claim, on Straub mountain.

(Special Correspondence). — The Unexpected, under lease to S. McDonald, manager of the Strong mine, is attracting special attention by reason of the discovery of 8 feet of ore near the surface, which, it is asserted, averages two ounces gold in value.

Victor, July 16.

IDAHO.

BLAINE COUNTY.

The Minnie Moore, near Hailey, is sold to the Tustin Bros. of Kansas City and T. H. Moriarity of Hailey. The first payment has been made, and work will be begun immediately by the new owners.

ELMORE COUNTY.

In the Volcano district, Camas Prairie, a ledge at a depth of 125 feet shows ore. Supt. Clemens is in charge of the work.

At Rocky Bar four companies are operating in that vicinity; $100,000 has been expended recently in improvements. The Red Warrior has a 10-stamp mill and a cyanide plant. Six tons of ore a day is taken out to the man.

E. & M. Wilbur are working forty men at Rocky Bar. The company has a mill and cyanide plant. Mr. Taylor is in charge.

The Idaho M. & M. Co. is operating 10 miles above Junction Bar.

The Sawtooth Co., operating near the old Ophir mine, is milling ore. The work is in charge of E. T. Brockman. Fifty-two men are employed.

L. Vinton, manager Idaho Con. M. Co., operating placer mines near Atlanta, has the coarsest gold ever taken from ground along Boise river, some nugget size. This gold was taken from the Queen river placers. Operations will be continued at Queen river until winter. A supply of 5000 inches of water is available. The flume leading to the placers has a capacity of 1500 inches.

IDAHO COUNTY.

At the Little Giant mine at Warrens J. J. Bennett is Supt., who has the Iola mill, which he will increase from five to ten stamps. The price paid for the mine was $50,000.

"The first tellurium ever found in the State of Idaho" is reported discovered by P. H. Leach, near Grangeville, the ore running $90 per ton.

KOOTENAI COUNTY.

J. C. Huage, Supt. Park River G. & C. M. & M. Co., Trestle creek, near Hope, proposes to run a tunnel 1000 feet into the mountain, tapping the ledge at a depth of 600 feet. The work done so far shows 7 feet of copper-gold sulphide ore. The vein is covered by an iron cap.

OWYHEE COUNTY.

Avalanche: At the Cumberland the new shaft has a pitch of 77½° east. It has two 4x4 compartments. The new plant will be the largest and most complete ever installed in southern Idaho.——At the Red Jacket operations were resumed three weeks ago.——The Baxter Gulch Bonanza property is operated under bond by J. H. Hutchinson. L. Sorensen is in charge.

SHOSHONE COUNTY.

Wardner News: Grading for the Empire State flume on Pine creek is completed 5 miles. The contractors have 100 men in their employ. This flume will be 16 miles in length to Government gulch, where the water will be used to furnish power for use in the tunnel and for the concentrator to be erected. The flume will be 4 feet wide, 3 feet deep.

The Dobson Pass M. Co. has incorporated at Wallace; capital, $100,000.

WASHINGTON COUNTY.

Kleinschmidt & Stuart of Helena, who own the Peacock mines, near Weiser, operated by the Boston & Seven Devils M. Co., say the group has been tapped with the diamond drill to a depth of 900 feet and good ore found there.

MONTANA.

BROADWATER COUNTY.

Gold is reported in Confederate gulch, near Diamond City.

CASCADE COUNTY.

The Silver Belt M. Co., near Neihart, will work its claim near the Broadwater group.

DEER LODGE COUNTY.

Anaconda Standard: The complete returns of the net earnings made to the county assessor for 1900 by the different mining companies and mine operators are as follows:

Anaconda Co	$ 5,365,520
Boston & Montana	6,073,150
Butte & Boston	571,310
Colorado Co	142,580
Colusa-Parrot	325,045
W. A. Clark	1,545
John S. Harris, receiver	79,800
Silas F. King	715
Lexington Co	665
James A. Murray	600
Montana Ore Purchasing Co	400,000
Pat Mullins and others	2,500
Parrot Co	800,655
Speculator mine	92,185
Total	$13,856,270

FLATHEAD COUNTY.

The Pacific Northwest M. Co. has shipped thirty-five cars of concentrates from Libby to the smelters at Great Falls. The concentrates average about 60,000 pounds to the car. The company employs eighty-five men at the mine.

MADISON COUNTY.

The Pony Sentinel says Swanson & Co. have a lease and bond for $20,000 on the Manila and Sunrise claims. The ore assays $10 to $15 gold and 4% copper.

NEVADA.

ELKO COUNTY.

Secretary Airis reports that the Dexter G. M. Co., Tuscarora, during the year ending July 1 received $1435.64 from the sale of ore. From the sale of bullion $162,955.33 was received; cyanides brought $46,994.15; other receipts during the year were $5000 from the sale of the Chignon ranch and $545 from the sale of the Kinkead mill, together with accounts payable, making the total receipts from all sources $231,526.76. The mine expenditures for the same period were $100,421.07; expenses of running the stamp mill, $26,060.68; cyanide plant, $29,060.78; power plant, $9713.93, miscellaneous, $11,991.36; total, $167,738.55.

A 10-stamp mill and cyanide plant is approaching completion at Bull Run, 35 miles north of Tuscarora, 80 miles from Elko, Nev., the latter being the nearest railroad station. The ore is gold-bearing.

ESMERALDA COUNTY.

The reported sale of the Silver Peak mines to Jno. W. Mackey had no foundation. A deal is, however, reported on with an English company.

Siegal & Jackson, at Sodaville, are installing a cyanide plant for working the Stewart tailings.

HUMBOLDT COUNTY.

The rate on ore shipments from Oreana to Reno has been restored to the old figure—$5.50 per ton. A raise to $11 per ton was made by the S. P. Co. some months ago.

LINCOLN COUNTY.

As outlined in these columns a few weeks ago, the proposed consolidation of the April Fool and De Lamar mining companies at De Lamar is off.

WASHOE COUNTY.

The Con. Cal. & Va. M. Co. has $17,500 net proceeds of sale of concentrates to the Selby Smelting & Lead Works.

WHITE PINE COUNTY.

To develop the New Home mining claim and operate the Millick mill at Osceola, Nev., the Nevada G. D. Co. is organized in Salt Lake City; capital stock, $15,000; F. S. Luff, secretary and treasurer.

The Wilson Leaching Co., operating a cyanide plant on the tailings from the Wilson mill at White Pine, recently brought 200 pounds of gold slimes to Salt Lake.

OREGON.

BAKER COUNTY.

The Eagle G. M. Co., Cable Cove district, has contracted for the shipment of all its ores to the Selby Smelting & Lead Works of San Francisco. The company has shipped considerable ores in the past to the Northport smelter at Trail, B. C., but the latter company has always refused to pay for the lead.

The Red Boy mine reports a strike of gold ore 40 feet below the lower workings in sinking a winze. Godfrey & Tabor, the owners, say they will sink on the property to a depth of 2000 feet.

CROOK COUNTY.

At Ashwood the Oregon King M. Co. owns thirteen claims, developing them by a shaft 200 feet in depth and tunnel 350 feet long. Estimate placed on expenditures to date, $25,000. W. S. Thomas is in charge.

JOSEPHINE COUNTY.

Ankeny & Cook of the Sterling mine near Cole's have a second clean-up of 1270 ounces valued at $21,000. S. J. Fore, the superintendent, expects the mine to yield $50,000 for the season's run.

UTAH.

BEAVER COUNTY.

At the Imperial M. Co.'s property, near Frisco, Mgr. Lewis has eight samples averaging 18.5% copper, 5 ozs. silver and $1 in gold.

JUAB COUNTY.

Eureka Miner: The May Day management is shipping 500 tons of ore every month.——Manager McIntyre of the Mammoth and Manager Cunningham of the New East Tintic Railroad have an agreement that the proposed tramway will not be built. Mr. Cunningham will be paid in accordance with the past contract—30 cents per ton on ore and 35 cents for the up-hill freight—until Jan. 1, 1901. After that date a 5-cent reduction goes into effect.

SALT LAKE COUNTY.

The Dalton & Lark drain tunnel at Bingham will be 5800 feet, and will reach the vein under present workings at 1200 feet on the dip.

SUMMIT COUNTY.

The Constellation M. Co. will sell its property at Park City to Colorado Springs men for $187,500.

WASHINGTON.

The C. H. C. group, Silver creek, Summit mining district, is sold to G. H. Morgan of Watertown, N. Y., for $13,500.

CHELAN COUNTY.

O. R. Dahl, secretary Crown Point, on Railroad creek, reports an 8-foot vein carrying molybdenite, together with free gold, and "a dozen chunks of solid molybdenite averaging four pounds each." The company have carload orders for molybdenite from different Eastern firms.

CLALLAM COUNTY.

McKeesport, Pa., men propose to establish iron and steel works at Port Angeles, but the iron ore supplies will be obtained from the Barclay Sound district of the Alberni mining division of Vancouver island.

FERRY COUNTY.

At Keller, the old town being on ground which could not be patented, a new townsite is staked out one mile above and a patent secured. The old town people are preparing to move to the new town. In the Manila the ore averages 3% copper. Farr Brothers own the mine.

The Empire is bonded for $20,000 by Nichols & Norman of Spokane.

The Umatilla, one mile west of town, has been bonded for $70,000 to Eastern men. Ten men began work the 15th.

At the Dewey they are running the main tunnel to tap the ledge. The ore is black oxide and native copper.

The Justice has a ledge, 12 feet wide, of steel galena and assays well in silver and lead. It lies between two walls of granite. It is on Jack creek, 4 miles from Keller.

In the Humboldt, the company has money for development work.

The Legal Tender is being developed by A. W. Merk of Spokane.

The Congress Hill group is a nickel proposition and is ready to ship ore, as soon as the wagon road is completed to the mine. John Hopkins is Gen. Mgr.

LINCOLN COUNTY.

Moscow reports a strike in the tunnel on the White Cross at 310 feet from the mouth.

OKANOGAN COUNTY.

J. X. Jones, at Molson, is developing claims near Bolster, a new town.

SNOHOMISH COUNTY.

C. Campbell, manager Blue Bird mine, reports a body of ore in the lower tunnel at Darrington.

FOREIGN.

BRITISH COLUMBIA.

(Special Correspondence).--The Toronto-Lillooet G. R. Co., Ltd., has its reduction works completed and in charge of A. S. Additon. They will start up on the 16th. The plant is of fifty tons daily capacity and was furnished by the Union Iron Works and Pacific Tank Co. of San Francisco. The ore is arsenical pyrites, of which there is an abundance. Twenty-five men are employed.

Lillooet, July 5.

Low grade siliceous ore containing only a low percentage of sulphide is treated at the B. C. bullion extracting works at Silica. The mill was built to treat this class of ore by the Pelatan-Clerici process, on the Red Mountain railway, 3 miles southwest of Rossland. The mill is practically in two sections, the upper or crushing and sampling section, and the lower or treatment section. The ore is delivered in cars, are side-tracked, passing over a track scale, where they are weighed, to the receiving bins, which are under cover; the cars, returning, are weighed again. The electric current, as delivered, is 2080 volts to two motors, 50 H. P. An induction motor drives the crushing and sampling machine in the upper section; a 75 K. W. synchronous motor furnishes power for the lower or treatment section. The mill is lighted throughout with electricity by the use of two lighting transformers, taking the current from the power mains. All current consumed at the mill is paid for on the meter basis.

The treatment the ore receives in the first section is dry crushing. It is fed by gravity to a crusher, thence by carrying belt to a roll belted, thence carried by a second carrying belt to another roll geared, thence by a third carrying belt to a bucket elevator and raised 40 feet for sampling. The material leaving the last set of rolls will all pass a ¼-inch mesh screen, and a third of it a 30-mesh screen. The elevator delivers the material direct to a sampler, so set that one-sixteenth of the whole is retained. This is further reduced by passing it through another sampler, where one-sixth is cut out, giving a sample of one-ninety-sixth of the whole; this is the floor sample, quartered down by a corno. The ore rejected by the samplers falls from a hopper through three 6-inch iron pipes to three storage bins. The whole of the ore is easily converted to either of the three bins. The ore from the storage bins now enters what may be considered the treatment section of the mill, and is fed by two James automatic feeders to two 6-foot Bradley crushers driven from underneath, the crushing taking place on a steel ring inside, diameter 4 feet and 6 inches, outside 5 feet and 10 inches, with three rotary wheels, diameter 4 feet 7 inches, face surface 8 feet, weight 6475 pounds, making thirty revolutions per minute; depth of discharge 5 inches, screen area 2730 square inches, the tires being of prepared steel. The crushed product discharged varies considerably, depending on the character of the ore, and on the ratio of water to ore during crushing. When using a 60-mesh screen and crushing a siliceous ore containing from 4% to 6% of sulphide with such a quantity of water that the resulting sludge shall contain 50% of water, 90% of the ore will pass a 150-mesh screen, the remaining 10% a 100-mesh screen. But, on the other hand, increasing the quantity of water so that the sludge shall contain four times of water, 17% passed the 150-mesh screen, 12% the 100-mesh screen and 40% the 80-mesh screen, the remaining 31% remaining on the 80-mesh screen. Generally, in stamp mill practice, all that passes the 120-mesh screen is considered slimes; this, however, is not the case with ore crushed by this mill, as when a resource to wet separation is had, 40% of the product passing the 100-mesh screen is a good leachable product. The crushed material from this crusher passes direct to the four vats 9x15, where it was kept agitated until the C. P. vats are ready to receive a charge, which consisted of 2½ tons of dry material with 3¼ tons of water, which gives fairly thin pulp. The current for electrolysis used in the Pelatan-Clerici vats is a direct current generated by two dynamos, each having a capacity of 12 volts by 750 amperes. The switchboard is so arranged that each one of the twelve vats is on its own independent circuit, and in such a manner that the current generated by either of the dynamos can be connected with any one of the twelve vats.

The relative degree of the pulverization the ore has been carried to varies the chemical, electrical and their combined effects, especially when dealing with refractory ores. During the whole time of treatment agitation is kept up with the accompaniment of an electric current. To the sludge salt is added, varying between 5% and 1% of the weight of the ore in the sludge by degrees, the effect of the sodium chloride being first to increase the conductivity of the solution. The effect that takes place on the addition of sodium chloride to water brought between an anode and a cathode is that the sodium chloride in solution is disintegrated and reformed, and thus it becomes the intermediary by which, at the instant that chlorine gas and sodium are set free, the current is able to communicate between the electrodes.

During electrolysis, when the liquid contains only sodium chloride, the primary decomposition will be sodium at the cathode and chloride at the anode. To consider the action of these products of electrolysis as the sodium comes in contact with the mercury, a small portion will be dissolved by the mercury as amalgam, a portion with the water, giving $NaOH$ and H. The chlorine liberated at the anode, a small portion will attack the metal of the anode, the greater part be dissolved in the solution, some of which will reform with the $NaOH$ sodium chloride, another portion sodium hypochlorite $NaClO$ and water. The action of the chloride liberated and not engaged as above will to some extent attack the free gold and form $AuCl_3$, which is readily deposited by electrolysis on the mercury. The rest will attack the base metallic ore present in a finely divided state, when present, uniting with the metallic bases, the sulphur and arsenic being oxidized by the combined action of the chlorine and sodium hypochlorite into sulphuric and arsenic acids. These will again form with the sodium, sulphate and arsenate, with the consequent formation of free acids, which must be neutralized with lime before potassium cyanide is added.

With the addition of potassium cyanide it is advisable to have it in excess, not only to allow for oxidation, if any hypochlorite is present, but to allow the formation of cyanogen at the anode, which, being dissolved in the solution, will readily unite with the minutest particles of gold to form with the excess of potassium cyanide the double cyanide of gold and potassium. At the same time chlorine and cyanogen, both yielded at the anode, would form cyanogen chloride, which, in the presence of potassium cyanide, is effective in dissolving gold.

Owing to the high specific gravity of the sludge, arising from the character of the Rossland ore, the process finally adopted was close classification of the ore before treating with cyanide. For this purpose Wilfley tables were placed before the crushers. The sludge leaving these tables contains an excess of water. This is concentrated by the use of large vats of conical form, fitted with a valve at the apex of the cone. In these a concentration is effected, the ratio of water to ore being as 1 is to 1.

The concentrated sludge flows direct to the agitation vats, and on its way encounters a solution of KCN flowing in the opposite direction, and in this manner the sludge becomes well mixed with the KCN solution, of such a strength that, diluted with the water contained in the sludge, it will give—depending on the ore—a solution in the aggregate of a value of .08% to .15%.

After the charge has been agitated the required number of hours fresh slaked lime is added, the agitation being continued from five to ten minutes.

The exhausted sludge, together with the gold solution, flows into concentrating vats, and on its passage it is diluted to such an extent that the sludge entering the concentrating vats is of a consistence of 3 to 1. The discharge valve at the apex of these vats is kept shut until clear solution commences to flow into the discharge landers. The concentrated pulp is now allowed to flow to a second similar vat.

In this manner two-thirds of the gold solution is separated from the exhausted sludge by the first vat, and a further two-thirds by the second, according to the dilution that takes place between, respectively, the agitation vat and the first and second settling vats. Any desired quantity of the gold in the more or less diluted solution can be separated from the pulp.

The gold-bearing solution now flows to the Pelatan Clerici vats. The time to effect this is dependent on current and richness of solution. Six hours suffices to reduce a $4 solution to 7 cents per ton, with a current of 5 to 7 volts and 70 to 80 amperes.

The treatment of a siliceous ore assaying from 4.3% to 7% copper, a trace of lime and magnesia, 0.3 ounce gold, 0.5 ounce silver, gave a theoretical extraction of 94% of gold and 73% of silver. A pyritic ore—gold 0.8 ounce, silver 1.3 ounces, copper 1.8% and iron 22%—resulted in an extraction of 89.87% gold and 72% silver.

At Grand Forks, on the 13th inst., arrived the first ore-laden train from Phœnix at the Granby smelter—ten carloads (300 tons)—from the Old Ironsides mine. It is expected that as soon as the Canadian Pacific Railroad supplies additional ore cars the ore receipts at the smelter will approximate 600 tons daily. The ore bins of the Old Ironsides, Knob Hill and Victor contain 8000 tons, and there is an equal amount in the stopes awaiting removal. The Phœnix ores do not require any preliminary roasting in heaps, saving from 25 to 50 cents per ton in handling charges. A. B. W. Hodges is Supt. of the smelter.

Moyie has about 250 men at work in the St. Eugene group of mines. About sixty more are at work in the North Star mine at Kimberley and about twenty at work on the Sullivan. All these mines are shippers.

The first cleanup of the season from the Consolidation Cariboo, J. B. Hobson, Mgr., at Quesnelle Forks, was $135,000, the result of sixty-two days' work.

At Nelson, Supt. Gifford has been re-engaged as superintendent by the newly organized company, the Hall Mines M. & S. Co., Ltd. R. R. Hedley, former superintendent Hall Mines smelter, has been similarly advised by cable. The Hall mines and smelter have started up.

One hundred and thirty carloads of ore were shipped during June from the North Star and Sullivan mines, 20 miles northwest of Cranbrook.

The Silver King mine, near Nelson, will resume operations under the superintendency of J. R. Gifford.

Another crosscut tunnel has been started at the Vancouver mine, says the Silvertonian, which will be 700 feet—the longest crosscut tunnel in the district.

The B. C. Copper Co.'s smelter at Greenwood is expected to begin work on a 300-ton daily capacity October 5th.

Manager Rowe of the inchoate Quatsino coal mines, on the north of Vancouver island, has taken up from San Francisco a diamond drill to exploit the property.

The Cariboo Hydraulic Co. has completed its wash-up of the season with results stated to be satisfactory.

The Emily Edith Mines, Ltd., is organized to operate the Emily Edith mines, near New Denver; capital, £75,000; C. E. Hope local manager, J. D. Kendall consulting engineer. Four known ore-bearing veins cross the property of the Emily Edith Mines. No. 1 vein runs for 3000 feet horizontally. A shipment of fifteen tons gave 110 ounces of silver per ton, 46½% lead.

During June there were shipped from the Eugene mine at Moyie 1800 tons concentrates.

Ashcroft Journal: Sixty thousand pounds of powder was loaded this week at Ashcroft for the Cariboo mine. It will be exploded about Aug. 15th in a shaft and drift across the face of the bank above the workings of the mine, for the purpose of breaking down and shortening the high gravel bank.

MEXICO.

W. C. Lockhart, manager for A. W. Longley & Co., is in Hermosillo preparing to start work at the company's Suaqui Grande placer mines.

NEW SOUTH WALES.

The mining of New South Wales includes gold, silver, lead, zinc, copper, tin, coal, shale, iron, diamonds, opals, chromium, antimony, bismuth, platinum, limestone, cobalt, fireclay, scheelite and wolfram. The value of New South Wales' mineral output last year was £6,157,557—gold £1,751,815, silver, lead and zinc £2,070,657, copper £399,814, tin £98,428, coal and shale £1,325,798, coke £77,130, iron £77,130, diamonds £376,599, chromium £70,975, opals £376,599, antimony £190,621, platinum £1070.

THE KLONDIKE.

Free-milling quartz is reported between the head of Sulphur and Cariboo creeks, a tributary of Dominion. The vein is 6 feet wide, composed of quartz intermixed with manganese, honeycombed in character, shows leaching near the surface and carries gold.

Personal.

J. R. DE LAMAR has returned to Utah from Europe.

LOUIS JANIN has returned to San Francisco from Grass Valley, Cal.

HARTWIG A. COHEN has gone to Indian River, near Dawson City, Alaska.

E. L. BALLOU of Igo, Cal., takes charge of a milling plant at Pony, Montana.

W. S. STRATTON has given $25,000 to the State School of Mines, Golden, Colo.

S. K. THORNTON has returned to the Shenandoah, Cal., mine from San Francisco.

R. A. THOMAS is general manager of the Black Hills Copper Co., Jerome, Arizona.

H. VAN F. FURMAN of Colorado is examining mining property at Seward, Alaska.

W. J. SCOUTT, former manager of the Suffolk group, Ophir, Colo., is operating now at Rico.

R. J. CORY, Western manager for Edward P. Allis Co., has returned to Denver from the East.

G. E. BAILEY, manager Lewiston, Trinity county, Cal., cement gravel mine, is in San Francisco.

J. J. BROOKS has charge of the mill at O'Brien, Arizona, owned by the Saginaw L. Co. of Flagstaff.

S. A. KNAPP of Esmeralda county, Nev., is forwarding a local mining propotion in San Francisco.

G. M. FORD, who has been in Corea putting up mining plants, will return to California in September.

FELIX CHAPPELLET, Pres. Eureka Con. Drift M. Co. of California, is convalescent after a severe illness.

ROSS E. BROWNE has returned to San Francisco from giving expert testimony in Grass Valley, Cal, mining litigation.

J. D. LUDWIG, former superintendent Mariposa, Cal., grant, has returned from a six months' trip to Japan and China.

JOS. DEDRICHS, at Gold mountain, San Bernardino county, Cal., expects to start up the new mill at the DeLamar property next week.

H. C. HOOVER, a California mining engineer in charge of Chinese mines, cables from Shanghai that he has escaped from Tientsin and is safe.

C. A. PLATT, former foreman leaching plant Golden Gate, Mercur, Utah, mill, will have a similar position at the Republic Con., Republic, Wash.

J. P. LUDDY has resigned as foreman at the Golden Rule mine, Tuolumne county, Cal., to occupy the same position at the Mt. Jefferson mine, Groveland, Cal.

NEVADA'S Secretary of State, Howell, is in San Francisco organizing a company to develop copper properties in the southern part of Nevada near El Dorado canyon.

HENY JONES, former Supt. Golden Gate Extension, Mercur, Utah, has gone to Hailey, Idaho, to take charge of the development of mining property for Salt Lake parties.

C. D. HOYT, assistant assayer U. S. Assay Office, Helena, Mont., goes to Philadelphia to take a similar position in the mint. C. Hillman, second assistant melter, succeeds Mr. Hoyt.

S. F. EMMONS is in Salt Lake City, Utah, collecting data for the completion of the report upon the economic geology of the West Mountain mining district. He is assisted by J. M. Boutwell.

R. U. GOODE of Washington, D. C., geographer in charge of the Pacific coast section of the U. S. Topographical Survey, is in the Cœur d'Alene mining district, where two surveying parties are preparing the data for a topographical map of that section.

T. H. SIMMONS, formerly Supt. W. Y. O. D. and Empire mines, Grass Valley, Cal., has been appointed manager of some mines being operated in South Africa by the London Exploration Co. He left England for his new duties June 30th. The Union learns that the position carries with it a salary of $18,000 a year.

Commercial Paragraphs.

THE Medler, Arizona, Copper Co. have ordered a 100-ton concentrator from Fraser & Chalmers of Chicago.

F. W. BRAUN & CO. of Los Angeles, Cal., have bought a business corner in San Diego, Cal., for a branch establishment.

THE Edward P. Allis Co. of Milwaukee, Wis., have an order for a 120-stamp mill, with concentrators, to be erected at Dahlonega, Ga., this being the second mill of that size and description ordered for that district within the past year.

CHARLES C. MOORE & CO., 32 First St., San Francisco, now have the agency for Magnolia metal in all territory west of the Rocky mountains.

FLINT & LOMAX, Denver, Colo., who recently sustained a severe fire loss, are able to fill all orders in their line, and will be only temporarily affected by the disaster.

List of U. S. Patents for Pacific Coast Inventors.

REPORTED BY DEWEY, STRONG & CO.,
PIONEER PATENT SOLICITORS
FOR PACIFIC COAST.

FOR THE WEEK ENDING JULY 10, 1900.

653,373.—GAS GENERATOR—C. A. Bacon, Lockford, Cal.
653,375.—MUSICAL WHISTLE — M. Barthel, San Jose, Cal.
653,465.—HARVESTER—D. Best, San Leandro, Cal.
653,210. — NUT LOCK — C. O. Bulmer, Nooksachk, Wash.
653,376. — POPGUN — A. E. Chapman, Placerville, Cal.
653,619.—STOVE — L. A. Devin, Sacramento, Cal.
653,503.—DOOR FOR DIGESTERS—P. F. Dundon, S. F.
653,571.—GAS BURNER — J. P. Farmer, Portland, Or.
653,622. — GAS STOVE BURNER — J. P. Farmer, Portland, Or.
653,385. — POTATO CUTTER — Howell & Chamberlain, Montague, Cal.
653,386.—BICYCLE CARRIER FOR CARS—A. Hunter, S. F.
653,397.— COUPLING — J. W. Pettijohn, Montesano, Wash.
653,532.—RAIL JOINT FASTENING—F. W. Schimmel, Portland, Or.
653,404.—PORTABLE BED—Seitters & McDonald, McMinnville, Or.
653,534.—CARBURETOR — J. E. Shearer, Chico, Cal.
653,325.—EXTRACTING PRECIOUS METALS — Tatro & Delius, Seattle, Wash.
653,632.—VARIABLE SPEED GEARING—G. W. Waltenbaugh, S. F.
653,633.—VARIABLE SPEED GEARING—G. W. Waltenbaugh, S. F.
653,431.—TRUCK—G. M. Williams, Santa Rosa, Cal.
653,634. — CAR BRAKES — S. F. Woodworth, Clipper Gap, Cal.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

POTATO CUTTER.—No. 653,385. July 10, 1900. J. E. Howell and W. A. Chamberlain, Montague, Cal. This invention is designed for cutting and slicing potatoes into forms for cooking, such forms being known as "French fried" potatoes. It consists of a table or support having surfaces at different elevations, one of such surfaces provided with a longitudinally extending slot, vertical and horizontal knives are secured to the surfaces, and a slide including end heads and connecting sides for an open center adapted to receive the potato to be cut. A bolt passes through one of the heads and the slot and a cover confined between the heads and sides is hinged at one end to hold the article in place. By pushing the holder back and forward the potato is repeatedly brought into contact with the cutting knives and is thus sliced or cut into any desired form.

ACETYLENE GAS GENERATOR.—No. 653,373. July 10, 1900. Chas. A. Bacon, Lockford, Cal.; assignor of one-half to Samuel Cohn, Stockton, Cal. This invention is designed for the economical production of acetylene gas from carbide of calcium. It comprises a generator with a succession of independent carbide containing boxes, a water tank with a rising and falling gasometer and connections between this and the generator whereby the gas is transferred from the generator to the gasometer. Means are provided for automatically cutting off the flow when the gasometer is full, and a means for automatically supplying water to the generator. A controlling cock is actuated by the rising gasometer so that the supply of water is cut off when the gasometer is sufficiently full of gas. There is a trap intermediate between the water supply and the generator, and a supplemental passage connecting said trap with the gasometer so that any gas produced after closing the valves will be admitted into the gasometer and the pressure upon the generator relieved.

Latest Market Reports.

SAN FRANCISCO, July 19, 1900.

SILVER—Per oz., Troy: London, 28¼d (standard ounce, 925 fine); New York, bar silver, 61¼c (1000 fine); San Francisco, 61½c; Mexican dollars, 48¾c.

The troubles in China are expected to occasion an advance in prices. The American Smelting & Refining Co. controls the supply of silver in the United States, but the price is fixed in London. The United Metals Selling Co. controls the sale of silver for export and domestic use.

The price of silver in India is reported 71¾ to 72¼. The small boom has been induced by a real demand combined with a temporary short supply, a great deal of the current business being purely speculative. All Mexican securities have advanced in sympathy with silver.

COPPER.—New York: Lake, 1 to 3 casks, 16.50 cash; carload lots, 16.25; Electrolytic, 1 to 3 casks, 16.35; carload lots, 16.12½; Casting, 1 to 3 casks, 16.25; carload lots, 16.00. San Francisco: 17. Mill copper plates, 20c; bars, 22@23c.

LEAD.—New York, $4.00; Salt Lake City, 3.90; St. Louis, $3.95; San Francisco $5.00, carload lots; 5½c 1000 to 4000 lbs.; pipe 6¾, sheet 7½, bar 6c. London, £17 8s 9d = 3.77½c per ℔.

The new prices made by the American Smelting & Refining Co., for shipment before August 1, seller's option, 50-ton lots, are as follows:

Delivered.	Desilverized.	Corroding.
St. Louis	$3 95	$4 05
Chicago	3 95	4 05
Cincinnati	4 00	4 10
Pittsburg	4 05	4 15
Philadelphia	4 05	4 15
New York	4 00	4 15
Boston	4 07½	4 17½

On carload lots 5c. per 100 ℔s. higher.

The conditions of the lead situation are discussed at length on page 62.

SPELTER. — New York, $4.20; St. Louis, $4.05; San Francisco, ton lots, 5c; 100-lb lots, 5¾c.

ANTIMONY. — New York, 10c; San Francisco, 1000-lb lots, 12c; 300 to 500 lbs., 13@14c; 100-lb lots, 15@18c.

IRON. — Pittsburg, pig, No. 2, foundry, $16.50; gray forge, $14.50; San Francisco, bar, per lb., 3c.

STEEL. — Billets, Pittsburg, $22.00; bars, $27.50; San Francisco, bar, 10c to 17c per lb.

QUICKSILVER. — New York, $51.00; London, £9 10s; San Francisco, local, $51.00 ⅌ flask of 76½ ℔s.; Export, $47.

MAGNESIUM.—New York, $3.00 ⅌ ℔.; San Francisco, $4.00.

ZINC.—San Francisco, 5½c; slab, 6c; bar, 7¾c.

SOLDER. — Half-and-half, 100-℔. lots, 21½c; San Francisco, Plumbers', 100-℔. lots, 18¼c.

BABBITT METAL.— San Francisco, No. 1, 10c.

TIN.—New York, pig, $34.00; San Francisco, ton lots, 34½c; 1000 ℔s., 32c; 500 ℔s., 35c; less, 36c; bar tin, ⅌ ℔, 40c.

ASSAY LITHARGE.—San Francisco, 10c ⅌ ℔.

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 30c to 35c.

PLATINUM.—San Francisco, crude, $17 ⅌ oz.; New York, $18.25; manufactured, $19.50@22.00.

BISMUTH.—New York, ⅌ ℔., $1.60 50-℔ lots; San Francisco, $2.50 to $2.75 ℔ lots.

NICKEL.—New York, 50@60c ⅌ ℔.

TUNGSTEN.—New York, ⅌ ℔., 95c; San Francisco, $1.15.

FERRO-TUNGSTEN. — New York, 37%, 35c; San Francisco, 65c (60%).

FERRO-MANGANESE. — Pittsburg, 80%, $125.

CHEMICALS.—Cyanide of potassium, 98%–99%, jobbing, 33@35c ⅌ ℔.; carloads, 31@32c; in 10-℔. tins, 40c; sulphuric acid, 66% B, 2c ⅌ ℔.; soda ash, $1.60 ⅌ 100 ℔s. 58%; hyposulphite of soda, 2¾@3c ⅌ ℔.; blue vitriol, 5½@6c ⅌ ℔.; borax, concentrated, 7@8c ⅌ ℔.; chlorate of potash, 12@13c; roll sulphur, 6c; alum, $1.90@2.00; flour sulphur, French, 2¼@2½c; California refined, 1¾@2c; nitric acid, in carboys, 8c ⅌ ℔.; caustic soda, in drums, 3@4c ⅌ ℔.; Cal. s. soda, bbls., $1.00; sks, 95c ⅌ 100 ℔s.; chloride of lime, spot, $2.35@2.50; nitrate of potash, in kegs, 8c; caustic potash, 10c in 40-℔. tins.

POWDER.—F. o. b. San Francisco: No. 1. 70% nitro-glycerine, per ℔., in carload lots, 15¼c; less than one ton, 17¼c. No. 1*, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1** 50%, carload lots, 11¾c; less than one ton, 13¾c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9½c; less than one ton, 11½c. No. 2** 30% carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9.

FUSE.—Triple tape, $4.35 per 1000 feet; double tape, $3.70; single tape, $3.45; Hemp, $2.55; Cement No. 2, $3.70; Cement No. 1, $2.95.

PHOSPHORUS. — F. o. b. New York or Philadelphia, 45@50c ⅌ ℔.

CANDLES.—Granite 6s, 16 oz., 40s., 11¾c ⅌ set; 14 oz., 40s., 10½c.

COAL. — San Francisco, coast, yard prices: Wellington, $9; Seattle, $7.00; Coos Bay, $5.50; Southfield, $9.00. Cargo lots, Eastern and foreign: Wallsend, $8.00; Brymbo, $7.50; Pennsylvania, hd., $14.00; Scotch, $8; Cumberland, $12; Cannel, $9.50; Welsh Anthracite, $12.00; Rock Springs, $8.50; Colorado Anthracite, $14.50. Coke, $16 per ton in bulk; $18 in sacks.

NAILS.—List prices per keg: No. 20d to 60d, wire, $3.70; cut, $3.70; 10d to 16d, wire, $3.75; cut, $3.75; 8d, wire, $3.80; cut, $3.80; 6d and 7d, wire, $3.90; cut, $3.90; 4d and 5d, wire, $4; cut, $4; 3d, wire, $4.15; cut, $4.15; 2d, wire, $4.40; cut, $4.40. Special rates on carload lots.

San Francisco Stock Board Sales.

SAN FRANCISCO, July 19, 1900.

9:30 A. M. SESSION.

300 Chollar	17c	200 Sierra Nev	26c
100 Crown P't.	13c	100 Silver Hill	58c
300 G. & C.	24c	100	59c
200 Savage	14c	700 Y Jacket	13c

2:30 P. M. SESSION.

200 Ophir	67c	100	08c
200 G. & C.	24c	300	10c
400 B. & B.	20c	200 Sierra Nev	27c
100 Chollar	17c	300 Utah	10c
200 Potosi	13c	100 Silver Hill	63c
100 Alpha	07c		

WANTED.

A Rich Placer proposition, adapted to working by Railroad Steam Shovel, or Dry Land Excavator. Description, with price and terms, to receive attention must be accompanied by reliable reports and references.

Address: **EDWARD N. BREITUNG,**
MARQUETTE, MICH.

Quicksilver

—FOR SALE BY—

The Eureka Company,
OF SAN FRANCISCO.
ROOM 1, - - 320 SANSOME STREET,
SAN FRANCISCO.

Quicksilver

For Sale in Lots to Suit.

REDINGTON & COMPANY, Wholesale Druggists, 23-25-27 Second Street, San Francisco.

THE ERICSSON SWEDISH
TELEPHONES
HAVE BEEN IN USE OVER 20 YEARS.
THEY ALWAYS TALK. GIVE THEM A CHANCE TO TALK TO YOU.
CATALOGUES FREE.
ERICSSON TELEPHONE CO
20 WARREN ST. NEW YORK. N.Y.

HERMANN J. VAN DIEREN,
Assayer and Metallurgist,
1407 Seventeenth St., DENVER, COLO.
Stamp Mill and Reduction Works: 19th St. and Platte River.

Buyer of every description of Ores and Precious Stones. Rights for sale for process of treating refractory gold ores; also process for treating low grade copper ores. Write for particulars.

WE BUY very rich Ores, Dental Scraps, Tellurium Ores, Mill Wastes, Jewelers' Sweeps, Gold Retorts, Old Iron Retorts, Base Amalgam, Quicksilver, Amalgamated Plates, Gold and Silver, Old Slags.

A. M. DONALDSON & CO.,
ASSAYERS AND WASTE PRODUCT SMELTERS,
1661 Larimer St., Denver, Colo.
Write for Donaldson's Assayers' Slag Hammer.

Notice the Shape of
GLOBE BOX---THE BEST BABBITT.

J. M. HAYDEN & CO.
GLOBE BOX METAL
GRAND RAPIDS MICH.
THE BEST BABBITT.

Send for trial order, Ladle free.

The Globe wire lace makes the smoothest joint, runs the stillest and lasts the longest of any lacing. Sent on approval. Write us for booklet with instructions, etc. J. M. HAYDEN & Co., 58 Pearl St., Grand Rapids, Mich.

BENJAMIN T. LLOYD,
STOCKS, BONDS AND MINES.

Have immediate customers for well-developed Gold and Copper Properties.

P. O. Box 608, SALT LAKE CITY, UTAH.

J. W. RICHARDS,
(Late of Aspen, Colo.)
ASSAYER AND CHEMIST. 1754 Champa Street, DENVER, COLO.
Ore Shippers' Agent. Write for Terms.

MILL PLANS.
Cyanide, Concentration, Smelting, Sampling.
F. D BAKER, Mech. Eng., DENVER.

SITUATIONS WANTED.

Chemist and Metallurgist, engaged exclusively in cyanide since 1891, is open to engagement. Address H. B., care of Mining and Scientific Press.

Engineer and Metallurgist, graduate Freiberg, with years of experience in mining, smelting, exploration and ore treatment methods, with most exceptional references, seeks position. No objection to go anywhere. Speaks five languages. Fearless, energetic and temperate. Mexico, Alaska, or South America. Address MINERO, this office.

An Experienced, Aggressive Mining Engineer and Metallurgist, technical graduate, eighteen years' practical experience in the United States and Canada as manager and consulting engineer of mines and mills, is open to engagement as manager, superintendent or chemist. Thoroughly understands economic mining and reduction of gold and silver ores. Not afraid of a hard proposition. Can leave present position with month's notice. Correspondence solicited and references exchanged. Address KARL NEITZEL, Camp McKinney, B. C.

EXPERIENCED METALLURGIST DESIRES position in charge of a gold mill or cyanide plant. Thorough chemist and assayer. Understands handling machinery. Technical graduate. References. Address "Millman," Box A, this office.

WANTED—SITUATION AS MANAGER OF producing or developing property. Twelve years' experience in gold mining and milling, copper mining and smelting. Address C. H., care of Mining and Scientific Press.

MINE SUPERINTENDENT, TEN YEARS' experience in Michigan, Montana and Idaho, desires engagement as Supt. or manager of developing or producing property in this country or abroad. Best of reference. Address D. C., care this office.

CYANIDING.

Have had charge of five mills and worked in every part of process from shoveling to laboratory work. Test ores and outline process for treating them. For three years treated SLIMES successfully. Wish a position after July 10. Have studied to excel. References as to character and ability.

Address K C. N., Boise, Idaho, Box 3.

WANTED.

TO MINING EXPERTS.

WANTED.—A proposition containing magnetic pyrites (Fe_7 S_8 to Fe_{11} to S_{12}).

Address THOS. L. NEAL, Attorney, Lankershim Block, Los Angeles, Cal.

REFRACTORY ORES WANTED.

1000 TONS or more which will assay $75.00 Gold per ton and over, delivered free of charge at San Francisco, Cal. Correspondence solicited.

C. J. TALLON,
308 MARKET STREET, SAN FRANCISCO, CAL.

Notice of Application for Dissolution.

In the Superior Court in and for the City and County of San Francisco, State of California.

In the Matter of the Voluntary Dissolution of the South Paloma Gold Mining Company, Limited. (a corporation.)

Notice is hereby given that the South Paloma Gold Mining Company, Limited, a corporation created and existing under the laws of the State of California, has presented to the Superior Court of the City and County of San Francisco, State of California, a petition praying for a judgment and decree declaring the said corporation dissolved according to law; and that said application will be heard on TUESDAY, the 31st day of July, 1900, at 10 o'clock of said day, or as soon thereafter as counsel can be heard, at the court room of said Superior Court, Department No. 3 thereof, at the New City Hall, in the city and county aforesaid.

Witness my hand and the seal of said Court the 25th day of June, A. D. 1900.

{SEAL.}

WM. A. DEANE,
Clerk.
By JOSEPH RIORDAN,
Deputy Clerk.

WRIGHT & LUKENS,
Attorneys for Petitioner,
222 Sansome Street.

HENRY E. WOOD,
ASSAYER,
1734 Arapahoe St., DENVER, COLO.
Ore Tested in Carload Lots.
Write for Circular.

FRED C. MILES,
CISCO, PLACER CO., CAL.
COPPER AND GOLD PROSPECTS.
A GOING GOLD PROPERTY.

FOR SALE.

FOR SALE --- Developed Zinc-Lead-Silver Property. Texas.

Two trunk lines. 700 acres. 8100 feet on vein. Splendid concentrating proposition. 1500 feet development. Mine average: Zinc, 17.66%; lead, 9.57%; silver, 7.35 ozs.; gold, .04 ozs. Price, $30,000. Principals only. **H. E. RUNKLE, El Paso, Texas.**

Hydraulic Pipe FOR SALE CHEAP.

1500 feet of 10⅝-inch Casing weighing 27 lbs. to the foot, with Flanges, or Screws and Sockets; in lots to suit. Immediate delivery. Correspondence solicited.

C. J. TALLON,
308 Market Street,........San Francisco, Cal.

FOR SALE.
FILTER PRESS.

Johnson, 24-chamber, acid proof, washing Filter Press, 24-in. square plates. Nearly new.

THE S. H. SUPPLY CO.
WRITE FOR CATALOGUE OF MINING MACHINERY AND SUPPLIES.
22nd and Larimer Sts., DENVER, COLO.

SECOND-HAND MACHINERY For Sale.

Boilers, Engines, Heaters, Pumps, Tanks, Steam Pipe, all sizes, Shafting, Pulleys, Boxes, Hangers, Gears, Belting, etc. Iron and Wood Working Machinery, all kinds, all makes. We make a specialty of Saw Mill Supplies. Our prices are low and all goods are guaranteed as represented. Let us know your wants and we will please you.

Harris Machinery Co.,
1042 Washington Ave., S. E., Minneapolis, Minn.

For Sale, or Will Bond With a Cash Payment,

A mother lode claim in Calaveras Co., joining Amador Co., 2000 feet long by 500 feet wide, United States mineral patent, title clear. Ledge of quartz from 6 to 8 feet on top of the ground. Mother lode runs through center of claim. Mokelumne Hill and Campo Seco Water Co.'s ditch close by. Can get big water pressure. Lots of good timber growing on the claim and could get plenty of wood for steam pressure. Also can be got the adjoining claim, which would make this one of the biggest and best mother lode propositions in this part of California. For further information, address

JOHN HOLLAND,
SUTTER CREEK,.... ....CALIFORNIA.

5
Gold Quartz Claims
In Compact Body, Together With
10-STAMP
Quartz Mill and Mill Site
FOR SALE.

Situated on Dog Creek, Shasta Co., California, six miles from Delta Station, on the Shasta Division of the Southern Pacific Railroad, thirty-eight miles from Redding. Mines in good condition for inspection. Will be sold outright, or bonded for a sale after thorough inspection and experting. Property acquired by foreclosure of mortgage. Owner can not handle it.

C. C. BUSH, Trustee,
Address: REDDING, CAL.

The State Ore Sampling Co.
DENVER, COLO.

We buy Gold, Silver, Lead, Copper, Bismuth, Uranium, Wolframite, Cobalt, Molybdenite and Antimony Ores. We have modern sampling mills, also test ore for the new processes of ore reduction.

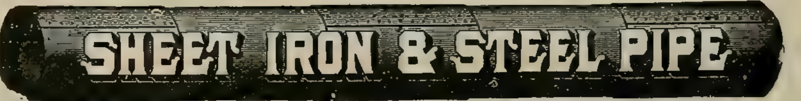
Our long experience in the market enables us to obtain the highest prices for all marketable ores. Write for our "Reference Book." Send analysis of your ore for prices and information.

BAILY & MONNIG, Managers.

ALVIN PHILLIPS & CO.,
Chemists, Mining and Metallurgical Engineers,
1761 MARKET STREET,
DENVER, - COLO.

Complete Ore-Testing Works — capacity ten pounds to two tons. Modern Methods of Lixiviation, Cyanide and Chlorination. Concentration on Bartlett Table. Assaying and Bullion Refining. Chemical Analyses of Oils, Coal, Water, and all solutions. WRITE FOR PRICES.

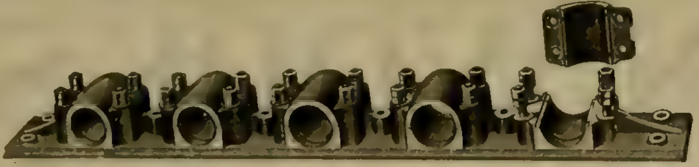
FRANCIS SMITH & CO.,
—MANUFACTURERS OF—



SHEET IRON & STEEL PIPE

FOR TOWN WATER WORKS.
Hydraulic, Irrigation and Power Plants, Well Pipe, Etc., all sizes.
46 FREMONT STREET, - - - - SAN FRANCISCO, CAL.

Iron cut, punched and formed, for making pipe on ground where required. All kinds of Tools supplied for making Pipe. Estimates given when required. Are prepared for coating all sizes of Pipes with Asphaltum.



Globe Battery Stem Guide.

PATENTED AUGUST 24, 1897.

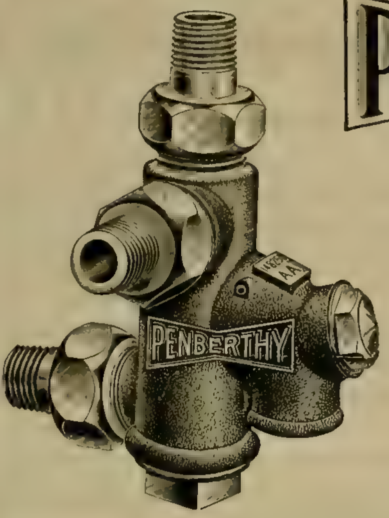
RIGID. SIMPLE. DURABLE. EFFICIENT. ECONOMICAL.

Effect a Saving in Friction Losses. No Trouble to Install.
No Alterations of Mill Necessary. No Keys or Wedges to Adjust

—— MANUFACTURED ONLY BY ——

GLOBE IRON WORKS, STOCKTON, CAL., U. S. A.

Manufacturers of All Classes of Mining Machinery. Estimates Furnished.



TRADE
PENBERTHY
MARK.

AUTOMATIC INJECTOR.

14 Years in the Market.

SALES 200,000.

The result of a business established on MERIT and built up by the production of Injectors unequaled for SIMPLICITY, RELIABILITY AND ECONOMY.

Penberthy Injector Co.,
DETROIT, MICH.

McFARLANE & CO.,

1734 FIFTEENTH ST., DENVER, COLO.

Mining and Milling Machinery.

STAMP AND CONCENTRATING MILLS BUILT AND ERECTED.

STEAM AND ELECTRIC HOISTS, CRUSHERS, ROLLS, REVOLVING SCREENS, JIGS. ORE CARS, CYANIDE TANKS, CORNISH PUMPS, CORLISS ENGINES.

STEEL RAILS, TRACK FIXTURES,

PRODUCT PENNSYLVANIA STEEL COMPANY.

BAR, SHEET AND BOILER STEEL,

STRUCTURAL MATERIAL,

Cold Rolled Shafting.

GEORGE W. GIBBS COMPANY,

33-39 Fremont Street, 38-40 Beale Street,
CORRESPONDENCE SOLICITED. SAN FRANCISCO, CAL.

SMOOTH-ON CASTINGS.

TRADE MARK

An iron cement for repairing leaks or fractures in steam or hydraulic work. When hard it will withstand a red heat, steam, water or oil, and expands and contracts with heat and cold the same as iron, insuring a tight joint at all temperatures. Difficult flange connections can easily be made with Smooth-On, as it adapts itself to the flanged faces whether parallel or not. Connections are easily taken apart. Unequaled for boiler patching, and repairing blemishes in iron castings. Write for catalogue and prices. Sole proprietors and manufacturers: Smooth-On Mfg. Co., Jersey City, N. J., U. S. A.

MESSRS. MADISON, BRUCE & SELLERS,

34-36 STEUART ST., SAN FRANCISCO, CAL.......................AGENTS FOR PACIFIC COAST.

TELEPHONE
MAIN
5303

Union Photo-Engraving Co.

DESIGNING
HALF-TONES
ZINC ETCHING

523 MARKET ST
SAN FRANCISCO, CAL.

WEST COAST OF MEXICO.

WÖHLER, BARTNING Suc's, Mazatlan (Sinaloa), Mex.

Bankers, Importers, Exporters and Commission Merchants.

Representatives and Agents of the principal Mining Companies in the State of Sinaloa and the dependencies of the Pacific coast in the States of Durango, Chihuahua, Sonora, Lower California and Jalisco.

ORE BUYERS AND EXPORTERS. - MINING SUPPLIES.

U
S

IT'S A CATALOGUE.

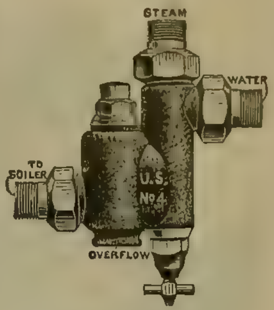
Our little ENGINEER'S RED BOOK is really our catalogue, though it is also one of the best vest pocket reference books for engineers ever published. It answers over 500 engineering problems and incidentally brings out convincing reasons why the

U. S. Automatic Injector

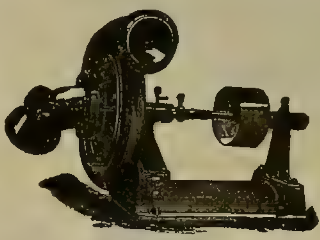
is better than any other.

Most engineers know this about the U. S. Injector, but the Red Book will tell them a good many things they don't know.

Can we send you one?



AMERICAN INJECTOR CO.,
DETROIT, MICH., U. S. A.



Jackson's Whirlpool Centrifugal Pumps. Capacities from 50 gallons to 50,000 gallons per minute.

CAPE NOME

PUMPING MACHINERY.

BUILT LIGHT AND STRONG.

COMPLETE PLANT IN OPERATION AT OUR WORKS.

Centrifugal Pump and Steam or Oil Engine Direct Connected.
Sand Pumps, Rock and Gravel Pumps, Mining Machinery, etc.

BYRON JACKSON MACHINE WORKS,
625-631 SIXTH STREET, SAN FRANCISCO, CAL.

CAPE NOME MACHINERY.

THE KROGH MFG. CO.

—— BUILDS ——

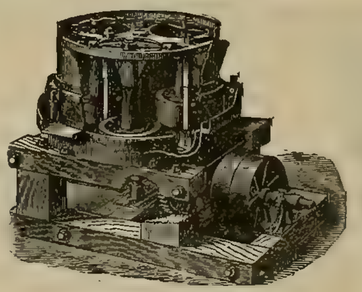
CEMENT GRAVEL MILLS, THE "DRAKE" AMALGAMATOR, THE "KROGH" 2-STAMP MILL AND MINING MACHINERY OF ALL KINDS.

The Krogh Centrifugal Pumps are the Best for CAPE NOME SANDS.

Capacity from 1 to 100,000 gallons per minute.

Send for Illustrated Catalogue.

KROGH MANUFACTURING CO.,
BRANCH, 134-136 MAIN ST. 9-17 STEVENSON ST., SAN FRANCISCO, CAL



Centrifugal Roller Quartz Mill.

F. A. HUNTINGTON,

—— Manufacturer of ——

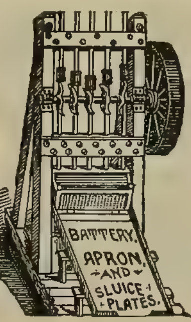
CENTRIFUGAL Roller Quartz Mills.

CONCENTRATORS and ORE CRUSHERS.

Mining Machinery of Every Description.

Steam Engines, Shingle Machines.

Room 1, 3d Floor, Mills Building,
SAN FRANCISCO, CAL.



To Gold Miners!

Silver Plated Copper Amalgamating Plates

For Saving Gold in Quartz and Placer Mining.

ONLY BEST COPPER AND REFINED SILVER USED. OLD MINING PLATES BOUGHT OR TAKEN IN EXCHANGE FOR NEW PLATES. GOLD EXTRACTED FROM OLD PLATES AT A MODERATE COST. OLD PLATES REPLATED. GOLD, SILVER, NICKEL, COPPER AND BRASS PLATING.

Denniston San Francisco Plating Works,
652 Mission Street, Cor. Annie, San Francisco, Cal.
E. G. DENNISTON, ... Proprietor.

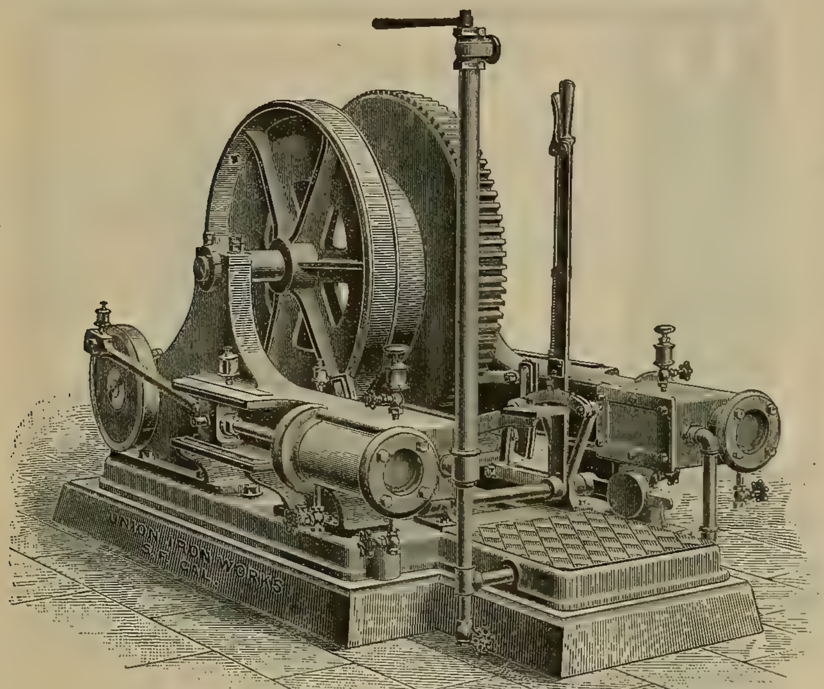
——:Send for Circular.:——

UNION IRON WORKS,

★ ★ 222 Market Street, San Francisco, Cal. ★ ★

MAKE THIS SMALL

DOUBLE CYLINDER SINGLE DRUM HOIST



HOIST FOR PROSPECTING.

For Prospecting Purposes
or Underground Work,

USING COMPRESSED AIR.

The entire hoist is self-contained, being mounted on an iron sole plate or bed which carries all the operating levers and provides a footboard for the operator. The engines are provided with reversible link motion and the drum with a broad strap brake, insuring safe and rapid work.

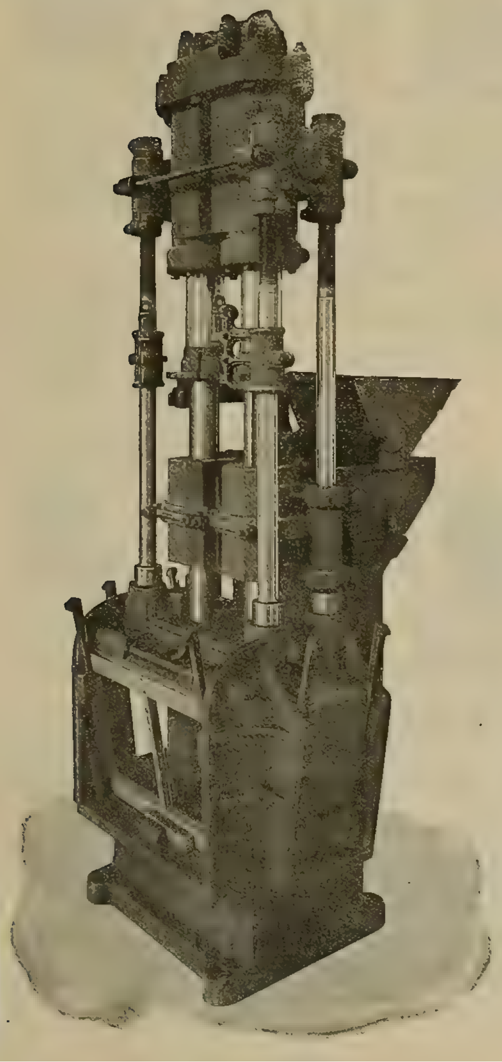
The general lines upon which this hoist is designed are neat, strong and substantial and all the operating parts are conveniently arranged.

The size herewith illustrated is the 4 in. x 10 in., rated at 15 horse power. The larger sizes, 8 in. x 12 in. and upwards are provided with post brakes.

CATES IRON WORKS.

THE TREMAIN STEAM STAMP MILL

has made many fortunes for its owners. It costs but little money. Can be transported anywhere.



A Money Maker in Nicaragua.

MURRA GOLD MINING COMPANY, NICARAGUA, C. A.
NICARAGUA, June 20, 1899.

GATES IRON WORKS, CHICAGO.—GENTLEMEN:

After an experience covering a period of three years with both the first and improved "Tremain Steam Stamp Mill," in every particular I have found it perfection—a money maker, and just the thing for a small capital, while companies organized on a large scale would do well to look into its merits.

I find no difficulty in crushing eight tons of ore per day and running on hard ore. This mill should be a winner.

Very truly yours,
[SIGNED] L. W. ADAMS,
General Manager Murra Gold Mining Co.

Eight Years in Operation Without a Cent for Repairs.

GOLDEN P. O., JOSEPHINE CO., COLO., December 23, 1899.

GATES IRON WORKS, CHICAGO.—GENTLEMEN:

Our Tremain Mill is giving us good results, and although being in operation since 1892 has not cost us $1 for repairs, and to-day is making 180 drops per minute with 95 lbs. steam pressure.

The ore we are working at present is soft and we mill in 24 hours, using No. 10 slot screen, 15 tons.

Yours truly,
M. C. DAVIS,
Superintendent Sarah Belle Mines.

Running Under Compressed Air in West Australia.

293 ST. GEORGE'S TERRACE, PERTH, W. A., February 6, 1900.

F. R. PERROT, ESQ, AGENT OF GATES IRON WORKS, PERTH, WEST AUSTRALIA.

DEAR SIR: In reply to your enquiry as to the working of the Tremain Mill on the Burbanks Grand Junction, I would state that at the start we worked this from the boiler supplied by the Gates Iron Works Company, but owing to certain irregularities of the running, which were in a measure due to the intermittent supply of ore and the short time that we were able to run it per day, I finally laid on air piping from my air compressor, a quarter of a mile distant, and used the boiler as an air receiver, with the result that I got an absolutely constant run, which, I believe, averaged about 105 drops per minute, and this was kept up with great regularity and showed a much better return in the treatment of the ore. The usual air pressure in this case was 8J lbs, whereas under steam we were not so satisfied with the result as worked at 100 lbs. By this we were also saved in cost the charges of stoker, fuel and water, and it was worked with much greater cleanliness, and during the whole time the mill was running—which was several months—it never froze up on us or showed any signs of trouble in that direction.

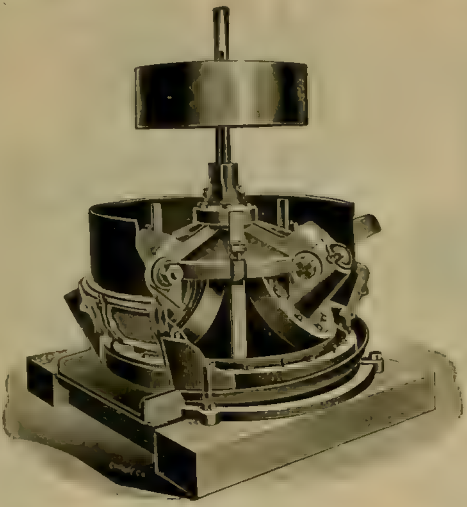
The mill is now temporarily stopped, but when it is again started I shall most decidedly continue the use of compressed air.

Yours faithfully,
[SIGNED] GEO. HEWER.

Send for Catalogue No. 8.

San Francisco Agents:
AMERICAN M'F'R'S ASSOCIATION,
20 & 22 Fremont St.

MAIN OFFICE AND WORKS:
650 ELSTON AVENUE,
CHICAGO.



THE GRIFFIN
THREE ROLLER
ORE MILL.

The Griffin Three Roller Ore Mill is a simply constructed Mill, suitable for working all kinds of ores that require uniformly fine crushing by the wet process. This Mill is a modification of the well-known Chilian Mill, but the rollers run upon a crushing ring or die, which is inclined inwardly at an angle of about 30 degrees, the rollers themselves also being inclined to the central shaft of the Mill, thus utilizing the centrifugal force, as well as the weight of the rollers themselves as a crushing agent. The Griffin Three Roller Ore Mill is therefore a Mill of great strength, and has few wearing parts. We construct these Mills with extreme care, using only the best of raw materials, which are most carefully worked by men who are specialists as mill builders. We sell the Griffin Ore Mill on its determined merits, and will gladly supply full information regarding it to any one.

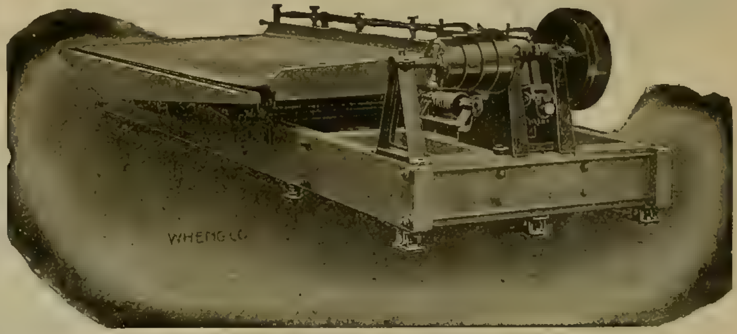
SEND FOR FREE ILLUSTRATED AND DESCRIPTIVE CATALOGUE TO

Bradley Pulverizer Co., Boston, Mass.

THE : CAMMETT : CONCENTRATOR.
Designed with some Regard for the Laws of Concentration.

From **The Denver Evening Post**, March 2nd, 1900.

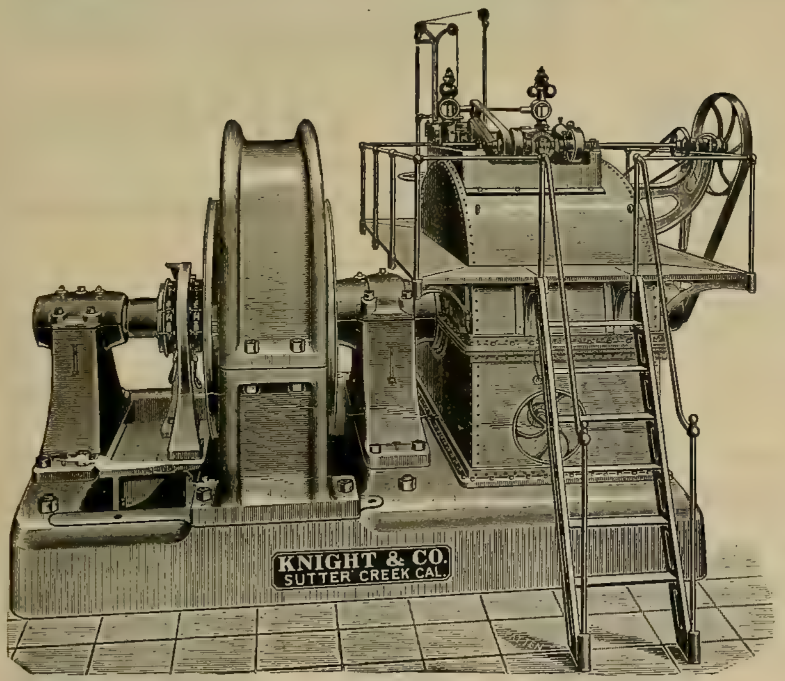
"Empire, Colo.: **The success achieved** by the **Cammett tables** in handling the ore from the Maud S. mine, **an ore especially difficult to concentrate** on account of the **great variety** of its **metallic contents,** has given the Bonaccord mill a reputation that will firmly establish it as a safe plant for general custom work."



Manufactured Under U. S. Patent No. 632,892; Dated Sept. 12, 1899.

Denver Engineering Works,---Shepard & Searing,---Sole Manufacturers,
30th and Blake Streets, - - - - DENVER, COLORADO.

KNIGHT'S WATER WHEEL.


KNIGHT & CO.
SUTTER CREEK CAL.

The accompanying cut shows the general arrangement of **The Knight Water Wheel,** direc-coupled to a 750 kilowatt generator, with governor mounted on top of wheel casing.
These wheels are designed for **100 to 2500 H. P. Highest efficiency and regulation guaranteed.**
WHEELS FROM 6 TO 24 INCHES, ENCLOSED IN CAST-IRON CASING.
Wheels for mill and reversible hoisting works a specialty.

KNIGHT & CO., Sutter Creek, Cal.
For full particulars, send for descriptive catalogue.

GENERAL PHOTO-ENGRAVING CO.
[SUCCESSORS TO DEWEY ENGRAVING CO.]
FINE ZINCOGRAPHS, HALF-TONES, AND DESIGNING.
ENGRAVINGS OF MACHINERY OUR SPECIALTY.
SEND FOR SAMPLES AND PRICES. NO. 536 CLAY STREET,
TELEPHONE BLACK 1466. SAN FRANCISCO, CAL

THE

Pelton Water Wheel Company

Gives exclusive attention to the development and utilization of water powers by the most modern, economic and improved methods. An experience of more than fifteen years, involving both the theory and practice of hydraulic engineering as relates to power development in its widest range of application, is at the service of its customers.

Nine Thousand Wheels Now Running,
Averaging some 700,000 H. P.

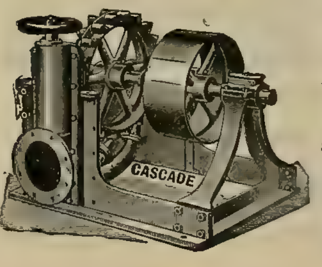
ELECTRIC POWER TRANSMISSION.

Pelton wheels afford the most reliable and efficient power for such service and are running the majority of stations of this character in the United States, as well as most foreign countries. Highest efficiency and absolute regulation guaranteed under the most extreme variations of load.

The Pelton Water Wheel Company,
121 & 123 MAIN STREET, SAN FRANCISCO, CAL.

TURBINE AND CASCADE WATER WHEEL

Adapted to all Heads from

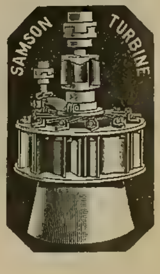


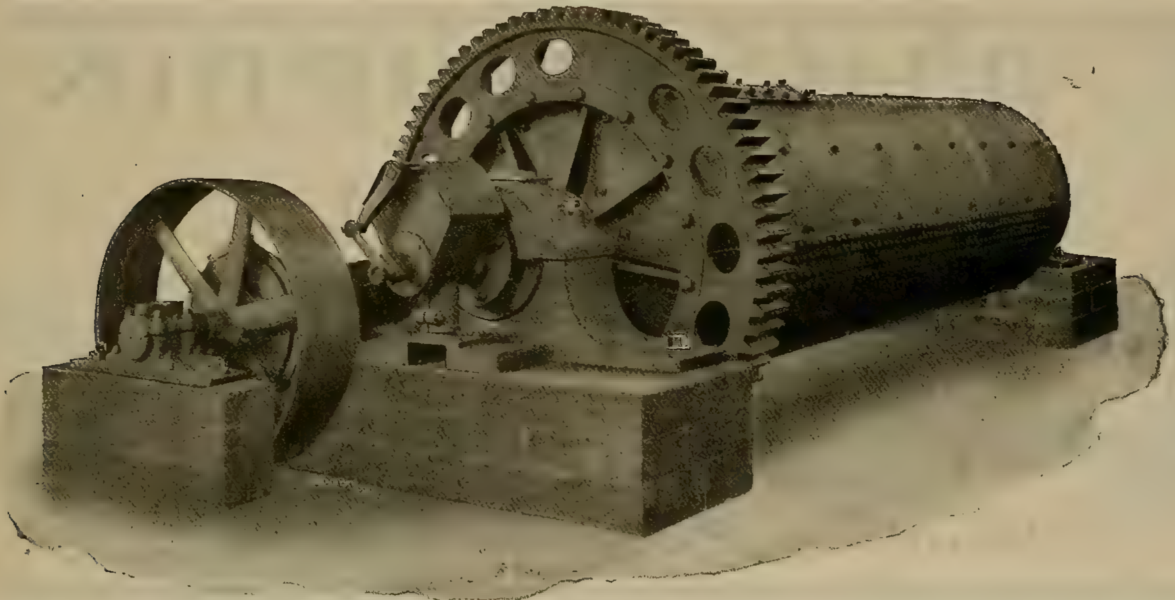
3 Feet to 2000 Feet.

Our experience of 38 YEARS building Water Wheels enables us to suit every requirement of Water Power Plants. We guarantee satisfaction.

State your Head and requirements. Send for pamphlet.

JAMES LEFFEL & CO.
SPRINGFIELD, OHIO, U. S. A.





GATES IRON WORKS.

Sole Manufacturers of the

Clark Patent Tube Mill.

The simplest and most durable machine for very fine grinding of ores either wet or dry.

Catalogue No. 15 describes it.

—Address—

650 Elston Ave., Chicago.

THE MINE AND SMELTER SUPPLY CO.,

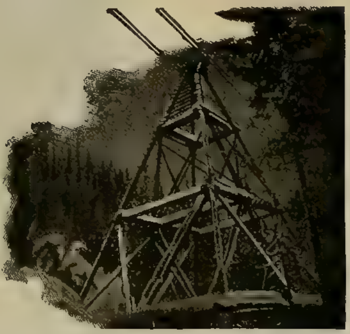
DENVER, - - COLORADO.

Mining and Milling Machinery and Supplies.

We beg to call your attention to

THE FINLAYSON PATENT WIRE ROPE TRAMWAY—

the latest and best system of double-rope automatic aerial tramway in the market.
If interested in the most economical system of transporting ores from mine to mill and to shipping stations, send for our special tramway catalogue.



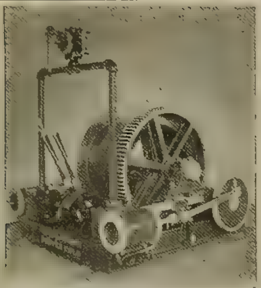
We carry a complete stock of Machinery and Supplies for immediate delivery.

Send for our special catalogues on Mining Machinery, Milling Machinery, Wilfley Concentrators, Tramways, Power Transmission Machinery, Machine Tools, Etc.

THE MINE AND SMELTER SUPPLY CO., ... Denver, Colorado
THE MINE AND SMELTER SUPPLY CO., ... Salt Lake City, Utah
THE MEXICO MINE AND SMELTER SUPPLY CO.,
No. 16 San Francisco St., City of Mexico.

BOILERS, ENGINES, STEAM HOISTERS, ELECTRIC HOISTERS, ROLLS, CRUSHERS, WILFLEY TABLES, CARS, CAGES, ORE BUCKETS, RAIL, PIPE, FITTINGS, BELTING, ETC., ETC.

JOHN A. ROEBLING'S SONS Co.
IRON & STEEL
WIRE ROPE
TELEGRAPH WIRE COPPER WIRE
Works at Trenton, N.J.
WAREHOUSES,
117 LIBERTY ST., NEW YORK.
25 FREMONT ST., SAN FRANCISCO.
173 LAKE ST., CHICAGO, ILL.
MAGNET WIRE & INSULATED ELECTRIC WIRES.



The above cut illustrates my new and improved Hoister.

Hoisting Engines

A SPECIALTY.

REVERSIBLE, LINK-MOTION, GEARED and FRICTION CLUTCH HOISTS carried in stock.

Special Machinery Built to Order.

GEO. G. JACKSON,

1724-34 Wynkoop St., DENVER, COLO.

GENERAL ELECTRIC COMPANY

Schenectady, N. Y.

Standard of the World.

EQUIPPED

The Great Electrical Transmissions

— OF —

FOLSOM-SACRAMENTO (Cal.), 24 Miles,
SAN JOAQUIN-FRESNO (Cal.), 36 Miles,
WILLAMETTE-PORTLAND (Or.), 12½ Miles

The Power is now used for Railways, and Lighting and Operating Large Mill Plants.

Write--
SAN FRANCISCO, CAL., Claus Spreckels Building.
DENVER, COL., Kittredge Building.
PORTLAND, OR., Worcester Building.
SALT LAKE CITY, UTAH, Templeton Building.

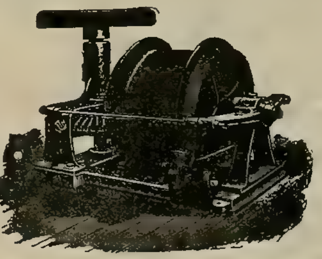
If You Want Anything Electrical.

JOSHUA HENDY MACHINE WORKS,

No. 42 FREMONT STREET, SAN FRANCISCO, CAL.

—BUILDERS OF—

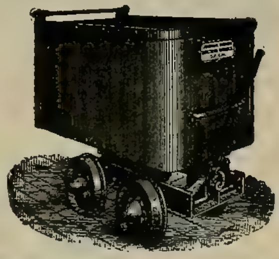
"Davis" Horse Power Whims. Ore and Rock Cars.



Specialty of
PROSPECTING,
MINING and
MILLING
PLANTS.

ORE and WATER
BUCKETS.

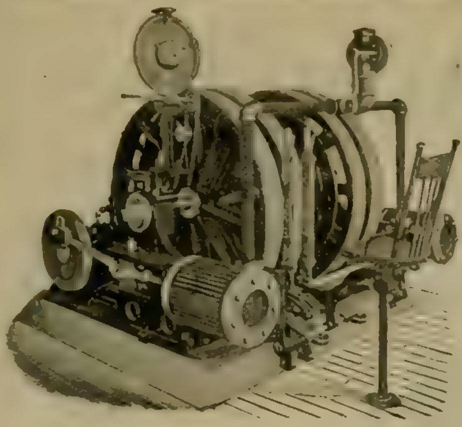
"T" RAIL OF
USUAL WEIGHTS,
EITHER NEW
OR SECOND-HAND,
FOR SALE
CHEAP.

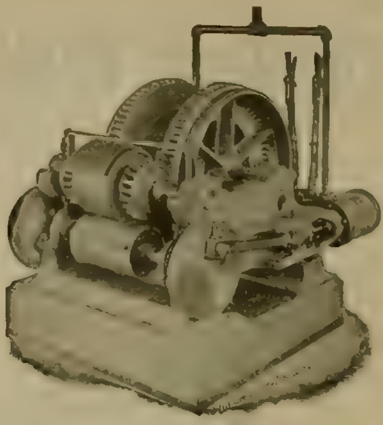


THE CAL. ANTI-CALORIC COMPANY,

Tel. Main 5752. Office, 217-219 Mission St., San Francisco, Cal.

Sole Manufacturers of ANTI-CALORIC SECTIONAL COVERINGS AND BLOCKS FOR BOILERS. ANTI-CALORIC PLASTER for Boilers, Domes, Pipes, Heaters, Etc.,—the Best and Cheapest Insulating Plaster in the Market. Send for Samples and Prices. Factory, Potrero.



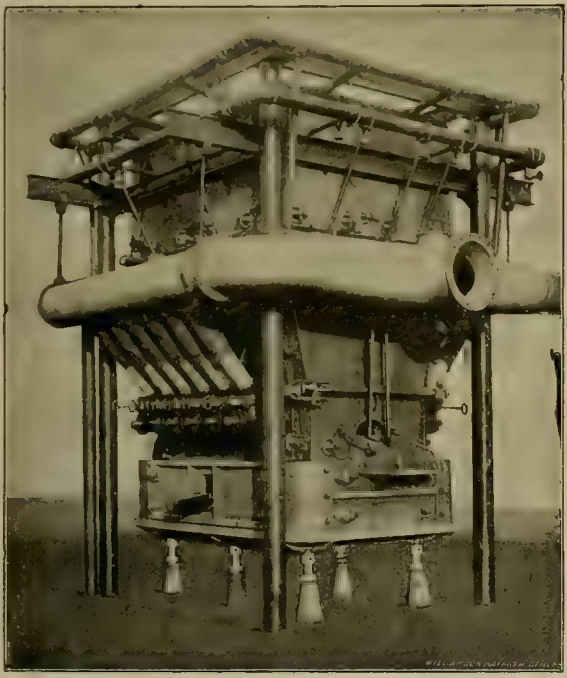


BOLTHOFF'S
HOISTING ENGINES
ARE POPULAR
Wherever Used
AND
Used Everywhere.

SEND FOR OUR SPECIAL HOISTING MACHINERY CATALOGUE.

The Hendrie & Bolthoff M'f'g & Supply Co.

No. 37. DENVER, - - - - - - COLORADO.



A MODERN COPPER SMELTER.

THE COLORADO IRON WORKS CO.

ESTABLISHED 1860. DENVER, COLO.

—MANUFACTURERS OF—

Smelting Furnaces and Equipments

: : : FOR THE TREATMENT OF : : :

Gold, Silver, Lead and Copper Ores.

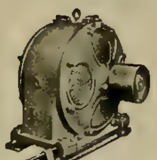
We build furnaces to drawings and specifications, and furnish drawings and full instructions for erecting.

We erect all furnaces at our works and carefully mark every piece before shipping. By this means, trouble in erecting at the smelting plant is entirely avoided.

We contract to build and equip smelting plants complete, of any required tonnage capacity above forty tons per day, at any desired location and put them into successful operation under guarantee. We contract to smelt a thousand tons of ore, more or less, before turning the plant over as completed under the guarantee

We have in the past built more Blast Furnaces for smelting the ores of the valuable and the precious metals—gold, silver, lead and copper—than any other manufacturing concern on the American continent, and in the past year of 1899 we built more such furnaces than all others combined.

(SEE PAGE 81.)



Westinghouse Induction Motor.

Polyphase Induction
Motors

Most reliable and economical
for operating mine machinery.

WESTINGHOUSE ELECTRIC
THE NAME WESTINGHOUSE IS A GUARANTEE

Westinghouse Electric
& Manufacturing Co.,

All Principal Cities
in U. S. and Canada.

Pittsburg, Pa.

Mills Building,
San Francisco.

65-D

TO SECURE GOOD RESULTS BUY

JESSOP'S STEEL

FOR TOOLS, MINING DRILLS, ETC.

Chief American Office,
91 John St., New York, N. Y.

Wm. Jessop & Sons, Ltd.
Manufactory, Sheffield, England.

I. WILLARD BEAM, Agent,
29 MAIN STREET,
SAN FRANCISCO, CAL.

PIPE BARGAINS.

Suitable for Water Mains, Mining, Irrigation, Air, Oil etc , etc. New Spiral Welded Asphalted Steel Pipe with any style coupling desired.

460 ft. 6-in.	3,480 ft. 10-in.	1,828 ft. 14-in.	1,077 ft. 18-in.
50,000 " 8 "	2,428 " 12 "	520 " 16 "	1,623 " 24 "

All Sizes Wrought Pipe, Well Casing and Straight Riveted Pipe in Stock. Equipment of All Kinds for Mine, Railroad and Contractors' Outfits. Write for Prices and Particulars.

BOWES & CO., 23 Lake St., Chicago, Ill.

DEWEY, STRONG & CO., Patent Agents, 330 Market St., S. F., Cal.

The Best Yet!

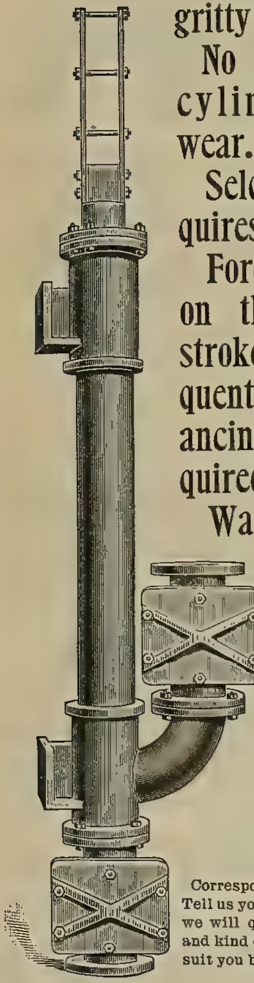
That is what they say about our new Jack-head Plunger Pump. Especially adapted for pumping very muddy or gritty water.

No smooth cylinder to wear.

Seldom requires packing.

Forces water on the down stroke, consequently no balancing bob required.

Water column can be perfectly and inexpensively balanced.

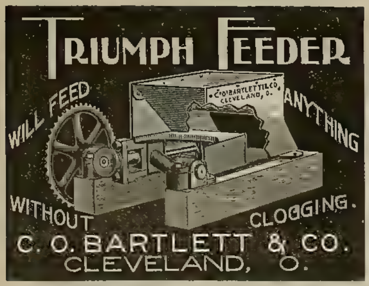


Correspondence solicited. Tell us your conditions and we will quote you on size and kind of pump that will suit you best.

W. T. GARRATT & CO.,

Cor. Fremont and Natoma Sts.,

SAN FRANCISCO, CAL.


TRIUMPH FEEDER
WILL FEED ANYTHING
WITHOUT CLOGGING.
C. O. BARTLETT & CO.
CLEVELAND, O.
C. O. BARTLETT & CO. CLEVELAND, O.

PRICE, $50.00.

AMERICAN AND FOREIGN
TRADE MARKS
SCIENTIFIC PRESS PATENT AGENCY
PATENTS
CAVEATS
DEWEY. STRONG & CO. 330 MARKET ST.

INVENTORS, Take Notice!

L. PETERSON, MODEL MAKER,

544A MISSION STREET, bet. First and Second Sts., SAN FRANCISCO. Experimental machinery and all kinds of models. Tin and brasswork. All communications *strictly confidential.*

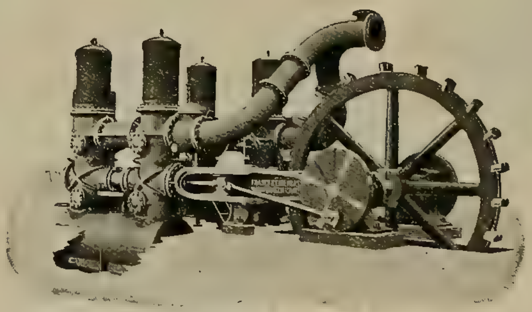
WRITE TO

FRASER & CHALMERS,

CHICAGO, ILL.,

If you are interested in

- Rock Crushers,
- Air Compressors or Pumping Engines,
- Hoisting Engines,
- Boilers, Etc.



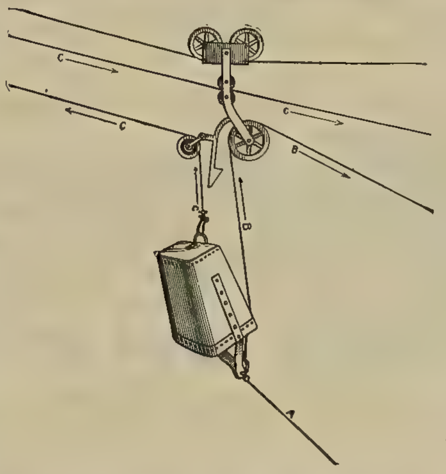
NIAGARA FALLS POWER CO. RIEDLER PUMP.

- Gold or Silver Mills,
- Smelting Furnaces,
- Concentrating Plant,
- Screens, Jigs,
- Frue Vanners,
- Huntington Mills.

Specify the descriptive catalogue you require by giving the subject of your interest.

TO OBTAIN LOWEST NET PRICES examine these catalogues and write describing the machinery needed. A SPECIAL ESTIMATE will then be promptly sent you with points of valuable information and advice.

FRASER & CHALMERS, CHICAGO, ILL.



Carriage and Bucket

OF THE

HALL

PATENT

CABLE HOIST CONVEYOR

FOR

Excavating Canals and Trenches.

Used in excavating the Suwanee Canal, Georgia.
Only system with a bucket that is absolutely self-filling.
Also adapted to the construction of levees and embankments.

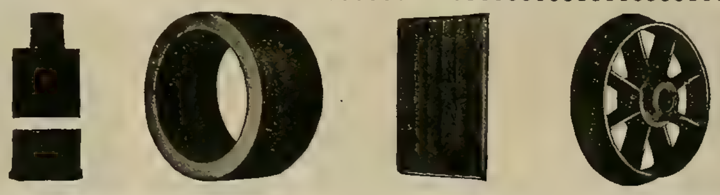
THE TRENTON IRON CO., Trenton, N. J., Manufacturers,

Also, Wire Rope Tramways, Surface and Underground Haulage Plants, etc. Wire Rope of all kinds for regular and special applications. Illustrated pamphlet on application.

For Particulars, Address, **NEWTON M. BELL, Agent, 308 Market St., San Francisco.**

☞ A full stock of the Trenton Iron Co.'s Wire Ropes, made from "SPECIAL" Crucible and Plough Steel, carried in San Francisco.

HARD ☙



TOUGH

TAYLOR IRON AND STEEL COMPANY,

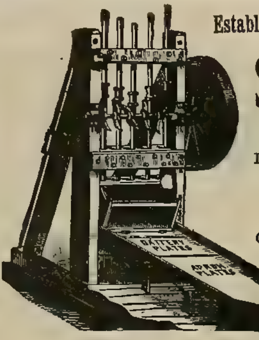
HIGH BRIDGE, NEW JERSEY, U. S. A.

Sole Licensees in America under the HADFIELD System and Patents for **MANGANESE STEEL,**

Best Metal Known for Roll Shells, Stamp Shoes and Dies, Crusher Plates and Side Liners, Toggles and Toggle Bearings, Gyratory Cones and Concaves, or Liners, Mine Car Wheels, Coal Crushing Rolls, Etc.

PACIFIC COAST PARTIES INTERESTED PLEASE ADDRESS PARKE & LACY CO., SAN FRANCISCO, CAL.

WRITE FOR INFORMATION AND PRICES.



Established 1865. **NOTICE TO GOLD MINERS.** Incorporated 1890.

Silver-Plated Copper Amalgamated Plates

FOR SAVING GOLD

IN QUARTZ, GRAVEL OR BEACH MINING. MADE OF BEST SOFT LAKE SUPERIOR COPPER.

AT REDUCED PRICES.

Our Plates are guaranteed, and by actual experience are proved, the best in weight of Silver and durability. Old Mining plates replated, bought, or gold separated. THOUSANDS OF ORDERS FILLED.

SAN FRANCISCO NOVELTY AND PLATING WORKS,

☞ SEND FOR CIRCULARS. Telephone Main 976. 68, 70, 72, 74 and 76 FIRST STREET, COR. MISSION, SAN FRANCISCO, CAL.

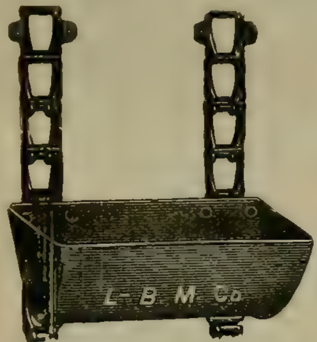
THE IDEAL CONVEYOR BELT

Is the one that will carry stone, ore, coal, wet or dry material, holding buckets firmly and securely; will stand all kinds of exposure, and resist the heaviest strains during a long period of service. This is what the **LEVIATHAN BELT** has done, and we quote the following from a letter from the New York Steam Co.:

"We have used Leviathan Belting for four years, up to 24-inch by 8-ply, elevating and conveying coal. Some of the Belting is outside, exposed to freezing weather; some in a steam bath. In both conditions the results have been very gratifying, over 500 tons having been handled in ten hours time."

MAIN BELTING COMPANY,
1225-41 Carpenter Street, Philadelphia.
55-57 Market St., Chicago. 120 Pearl St., Boston.
SEND FOR PRICE LISTS AND SAMPLE.

Small Portable Saw Mills and
DRAG SAWING MACHINES
FOR RANCHES AND MINES.



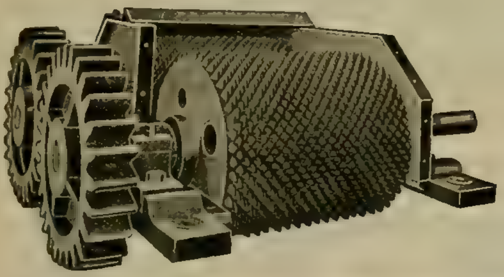
Woodworking Machinery.

LINK BELTING, SPROCKET WHEELS,
ELEVATOR BUCKETS & BOOTS,
TAKEUPS, FRICTION CLUTCH
PULLEYS, ETC.

ALL STYLES AND SIZES IN STOCK FOR IMMEDIATE DELIVERY.

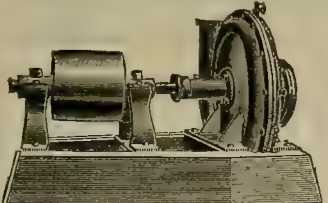
JNO. D. EBY,
17 & 19 MAIN STREET, - SAN FRANCISCO, CAL.

LINK-BELT ELEVATORS —AND— CONVEYORS.



BREAKER ROLLS,
PICKING TABLES,
MALLEABLE IRON BUCKETS,
SHAFTING, PULLEYS,
GEARING, CLUTCHES, Etc.
Catalogue Upon Application.
LINK-BELT MACHINERY CO.,
Engineers, Founders, Machinists,
CHICAGO, U. S. A.
DENVER, 1328 17th St.,
A. E. LINDROOTH, Manager.

For handling Ore, Coal, Tailings and Dredgings. Catalogue mailed on application.
ROBINS CONVEYING BELT CO., Park Row Building, NEW YORK.

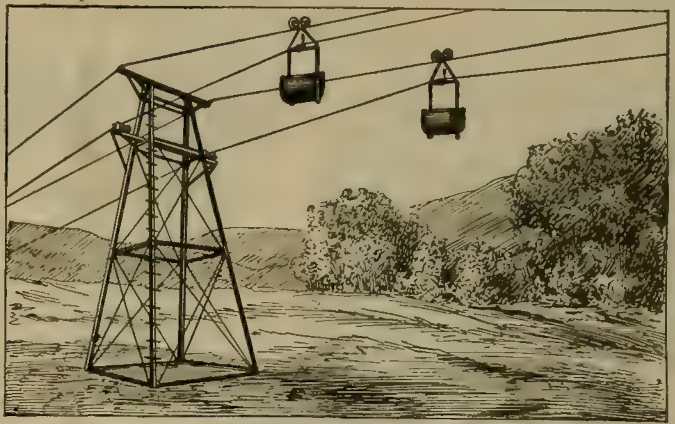


CENTRIFUGAL
PUMPS

COMPLETE PUMPING PLANTS INSTALLED.
JOHN WIGMORE & SONS CO.,
117-123 S. Los Angeles St., LOS ANGELES, CAL.

FLINT & LOMAX,
DENVER, COLO.
ELECTRICAL AND MECHANICAL ENGINEERS.
—DEALERS IN—
BOILERS, ENGINES, DYNAMOS, MOTORS, ICE MACHINERY,
SHAFTING, HANGERS, BELTING, PULLEYS, and
ELECTRICAL SUPPLIES OF EVERY KIND.
OPERATING MACHINE, PATTERN, BLACKSMITH AND PLATING SHOPS. MAKERS OF SPECIAL APPARATUS TO ORDER.

VULCAN DOUBLE ROPE TRAMWAYS.
VULCAN ROPEWAYS (SINGLE ROPE SYSTEM).
AUTOMATIC LOADING AND DUMPING APPLIANCES



AND OTHER ROPE HAULAGE SYSTEMS.

—

SEND FOR CATALOGUE.

Vulcan Iron Works, Manufacturers of Mining Machinery, SAN FRANCISCO, CALIFORNIA.

SCREENING MACHINERY FOR ALL PURPOSES.

VIBRATORY, SHAKING, REVOLVING, STATIONARY AND MECHANICAL HAND SCREENS FOR ALL MATERIALS.
SCREENS SPECIALLY ……… ADAPTED FOR……… MINING PURPOSES.
COMPLETE PLANTS ERECTED.
SEND FOR DESCRIPTIVE MATTER.
WESTERN MACHINERY & SUPPLY CO., Engineers and General Machinists,
161 La Salle Street, CHICAGO.

THE WM. HAMILTON MANUFACTURING CO.,
LIMITED,
MINING MACHINERY,
PETERBOROUGH, ONTARIO,
CANADA.

Roller, Steel and Special CHAINS
ELEVATORS AND CONVEYORS
COAL MINING MACHINERY.
WIRE CABLE CONVEYORS.
For long and short distance conveying.

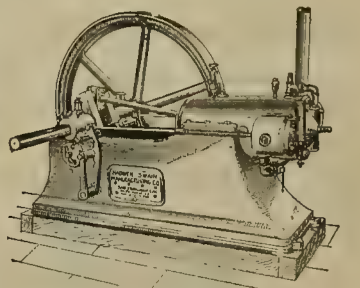
THE JEFFREY MFG. CO., Columbus, Ohio.
Send for Catalogue. 41 Dey Street, New York.
Western Branch, Equitable Bldg., Denver, Colo.,
F. R. FIELD, Representative.

Hoskins' Patent Hydro Carbon Blow-Pipe and Assay Furnaces.

No dust. No ashes. Cheap, effective, economical, portable and automatic.

SEND FOR PRICE LIST TO
W. HOSKINS, 81 South Clark St., Room 55, CHICAGO, ILL.

WHITEWASHING —AND— TREE SPRAYING PUMPS.
Prices from $4 to $60. Nozzles from 75 cts. to $1.00. Catalogues. WM. WAINWRIGHT, 1411 Jackson St., San Francisco. Telephone Hyde 2986.



Distillate Engines and Hoists.
Air Compressors.
HADWEN SWAIN MFG. CO.,
215-217 SPEAR ST., SAN FRANCISCO, CAL.
CATALOGUES MAILED.

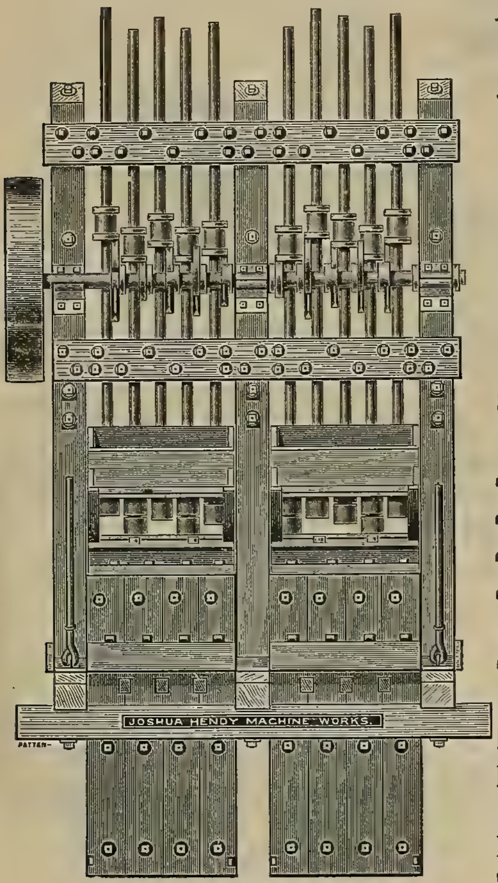
SMITH & THOMPSON,
Manufacturers of Fine
ASSAY BALANCES.
Write for Catalogue.
2219 Stout St.,
Denver, Colo.

MICHIGAN COLLEGE OF MINES.
An Engineering School with unique location, giving it unusual facilities. Distinctive methods of instruction. Special courses. For catalogue giving occupation of graduates, address
F. W. McNAIR, President, Houghton, Mich.

Joshua Hendy Machine Works,

San Francisco, Cal.

Office and Salesroom....................................38 to 44 Fremont Street.
Works ....Cors. Bay, Kearny and Francisco Streets.



10-STAMP BATTERY.

MINING AND MILLING MACHINERY.

Stamp Mills;
"Hercules" Ore Crushers;
"Challenge" Ore Feeders;
"Triumph" Ore Concentrators;
"Hendy-Norbom" Ore Concentrators;
"Triple Discharge" Two Stamp Mills;
Hydraulic Mining Machinery;
Hoisting, Pumping and Irrigating Plants;
Boilers, Engines and Pumps;
Tangential Impact Water Wheels.

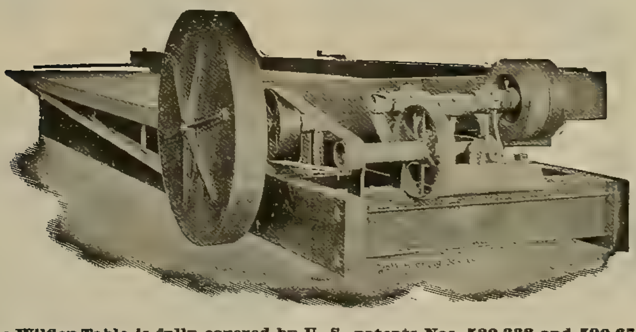
WHITE, ROGERS & CO.,

Contracting Engineers and Millwrights,

OFFICES, 306 PINE STREET, - - - SAN FRANCISCO, CAL.

Sole Pacific Coast Agents and Builders of the Celebrated

WILFLEY CONCENTRATOR.



The Wilfley Table is fully covered by U. S. patents Nos. 580,338 and 590,675. Infringements will be prosecuted to the full extent of the law.

PRICE, $450, F. O. B., San Francisco.

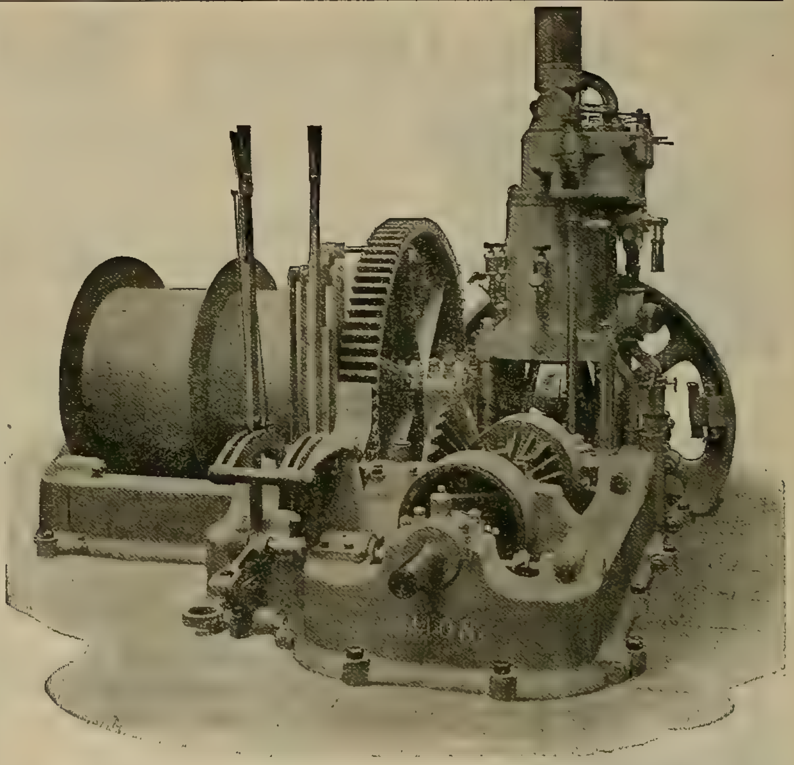
One of these machines will take the place of two or three belt concentrators of any style and do very much better work. Easy adjustment. Little wear.

Some Practical Reasons Why the Wilfley Concentrator Should Be Used in Gold Mills:

1. It will successfully handle three or four times more material than any belt Concentrator made, without exception.
2. It will save more sulphurets in proportion while so doing, and catch any float gold, amalgam or quicksilver which may escape from mortars or plates.
3. It will make cleaner and much more valuable concentrates, thus saving useless expense for transporting valueless material, as also extra cost for treatment.
4. It requires little or no attention when once adjusted and no expert is required to either adjust or run the machine.
5. It will save much expense in power and room, and the first cost of a mill requiring concentrators.
6. It has no expensive belts to crack and wear out, nor complicated machinery to keep in repair.
7. It is the only sensible plan of concentration, as any kind of material can be worked, which is not true of any style of belt machine.

SEND FOR CIRCULARS.

These Machines are Kept in Stock Ready for Immediate Shipment.



The above illustrates the "Union" 25 H. P. double cylinder divided drum mining hoist for double compartment shaft. Cages and cars balance each other, therefore power is only used to raise ore; cost of hoisting ore is therefore reduced to the minimum. Made in sections for mountain transportation.

THE UNION GAS ENGINE CO.

BUILD THE

"Union" Gas Engines,

Which use either MANUFACTURED or NATURAL GAS, ORDINARY STOVE GASOLINE (NAPHTHA or BENZINE), DISTILLATE or KEROSENE.

STATIONARY ENGINES for All Kinds of Work, Built in Sizes from 3 to 200 h. p.
"UNION" COMBINED HOISTS in Sizes from 2 to 40 h. p.
"UNION" COMBINED COMPRESSORS—20, 30, 40 h. p.
HOISTS and COMPRESSORS Can Be Built in Larger Sizes to Order.
"UNION" MARINE ENGINES, 4 to 200 h. p., of Single, Double and Four-Cylinder Types.
TEN YEARS' EXPERIENCE Building Gas and Oil Engines.
"UNION" ENGINES Are In Use All Over the United States.
"UNION" ENGINES Are Simple, Durable and Economical.

Office, 244 First Street. Works, Corner First and Clementina Streets. SAN FRANCISCO, CAL.

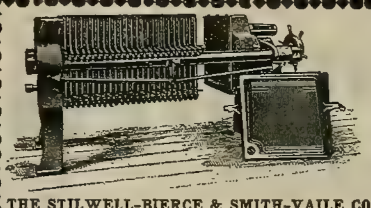
The only roofing without a fault

P & B Ready Roofing

Paraffine Paint Co
116 Battery Street—San Francisco

The best builders in America use P & B Ready Roofing. Shingles may warp, slate may chip, tin may sweat, tar may run, or iron expand, but P & B will stand any climatic condition — the weather of the west requires it

Demand it of your dealer



FOR Removing Slimes

BROMINE
CYANIDE
CHLORINATION
And Other Aquarious Chemical Solutions.

Our FILTER PRESS

Removes all Slimes and Hastens the Deposition of the Metals.

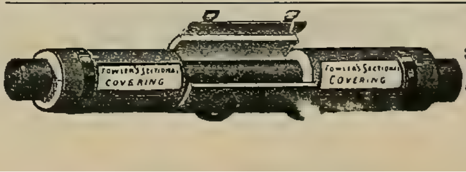
THE STILWELL-BIERCE & SMITH-VAILE CO., 276 Lehman St., Dayton, Ohio. Risdon Iron & Locomotive Works, San Francisco, Cal.; C. B. Boothe & Co., Los Angeles, Cal., Sales Agents.

THE BUCYRUS COMPANY,

DESIGNERS AND BUILDERS OF

DREDGES, STEAM SHOVELS, EXCAVATING MACHINERY,
WRECKING CARS, LOCOMOTIVE CRANES, PILE DRIVERS,
CENTRIFUGAL PUMPS, WITH SIMPLE, COMPOUND OR TRIPLE EXPANSION ENGINES,
MACHINERY FOR PLACER MINING.

SOUTH MILWAUKEE, WISCONSIN.



FOWLER'S AIR SPACE and Asbestos Sectional Covering.

As a Non-Conductor, Unequaled.
Special Rates for Steam Boilers and Drums.
G. C. Fowler, 656-58 Howard St., S. F.

SELBY SMELTING AND LEAD CO.,

REFINERS OF GOLD AND SILVER BARS, GOLD DUST, ETC.

Buyers of Gold, Silver, Lead and Copper Ores, Gold Concentrates, Lead Bullion, Cyanide Product, Etc.

ORE AND BULLION ASSAYERS.

Works at VALLEJO JUNCTION, CAL.

Office, 416 MONTGOMERY ST., SAN FRANCISCO, CAL.

THE COLORADO IRON WORKS CO.,
DENVER, COLORADO.
Manufacturers of HIGH CLASS
Ore Milling Equipments.

WE ARE THE ORIGINATORS
—OF THE—
Narrow Face, Large Diameter, High Speed
CRUSHING ROLLS.

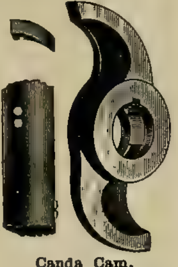
ADAMANTINE SHOES AND DIES.
CHROME CAST STEEL.
CANDA Improved Self-Locking CAMS.

TAPPETS, BOSSES, ROLL SHELLS AND CRUSHER PLATES.

These castings are extensively used in all the mining States and Territories of North and South America. Guaranteed to prove better and cheaper than any others. Orders solicited subject to the above conditions. When ordering, send sketch with exact dimensions. Send for Illustrated Circular.

Manufactured by CHROME STEEL WORKS, Brooklyn, N. Y.

H. D. & H. W. MORRIS,
AGENTS,
Room 194 Crocker Building, San Francisco, Cal.



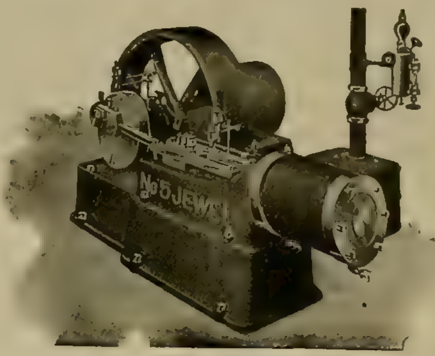
Canda Cam.

W. H. BIRCH & CO.
OFFICE AND WORKS:
127-129-131-133-135 First St., San rancisco, Cal.
WRITE FOR A CIRCULAR ON THE
"BIRCH" Improved Two-Stamp Mill.
IRON FRAME. TRIPLE DISCHARGE. 850-LB. STAMPS. FORGED STEEL SHOES AND DIES.
Price, $450 f. o. b.
Manufacturers of the LIGHTNER QUARTZ MILL.

SECOND-HAND MACHINERY
THE S. S. MACHINERY CO.,
Sixth and Market Sts.,
Denver, Colo.
Write or Ask for Descriptive Circulars.

SPECIALTIES:
PULLEYS, SHAFTING,
BELTING, BOXES,
BOILERS, ENGINES,
HOISTERS,
STAMP MILLS,
RAILS, CABLE,
and all but little used.

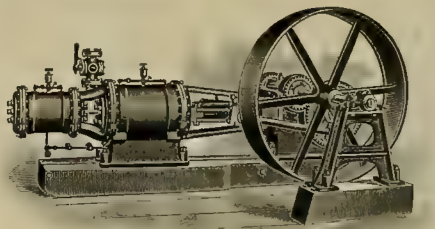
JEWEL ENGINES



A THOROUGHLY RELIABLE, SIMPLE, HIGH CLASS, PERFECTLY GOVERNED AUTOMATIC ENGINE AT A REASONABLE PRICE

BAKER & HAMILTON,
SAN FRANCISCO, SACRAMENTO, LOS ANGELES.

WHY NOT have our catalogues specifications and prices before you purchase AIR DRILLS OR COMPRESSORS?



Our guarantees are strong; our customers are satisfied. We can satisfy YOU.

J. Geo. Leyner,
729 Seventeenth St.,
DENVER, COLO.

CARY SPRING WORKS,
240 & 242 WEST 29th STREET, NEW YORK, U. S. A.
Telephone, 3346—38th St.
WIRE SPRINGS
OF EVERY DESCRIPTION.
MANUFACTURERS OF
All kinds of ROUND AND FLAT WIRE, TEMPERED AND UNTEMPERED.
SPRINGS
For Machinery, Rolling Shutters, Motors Etc.

MUSIC BOX AND FINE SPRINGS OUR SPECIALTY.

MACHINERY BARGAINS.

I have some splendid Air Compressors, Hoisting Engines, Rock Drills, Rock Crushers, Channeling Machines, Steam Pumps, Boilers, Steam Shovels, Locomotives and Relaying Rails, all in splendid condition. Send for printed list and specify your requirements. I can save you money. WILLIS SHAW, 627 New York Life Building, CHICAGO.

STRICTLY C. P. ACIDS and C. P. AMMONIA

MANUFACTURED BY
The Western Chemical Co.,
DENVER, COLO.
For Laboratory Use and Fine Chemical Work
PURITY GUARANTEED.
Also COMMERCIAL ACIDS.

PROFESSIONAL CARDS.

R. H. POSTLETHWAITE, M.I.E.E.
Hydraulic Mining Engineer.
River Dredging for Gold a Specialty.
1315 Leavenworth St........San Francisco, Cal.

THEO. F. VAN WAGENEN, E. M.
Consulting Mining and Hydraulic Engineer.
1508 Fillmore St., DENVER, COLO.

D. B. HUNTLEY,
Mining Engineer and Metallurgist,
De Lamar, Owyhee Co., Idaho.

BERNARD MACDONALD,
Consulting Mining Engineer.
General Manager British America Corporation, Ltd., Rossland, B. C.

DRAPER & McLEOD,
Assayers, Chemists, and Mining Engineers,
1736 CHAMPA STREET,
DENVER.............................COLORADO.

JOHN DWYER, Mining Engineer,
MEXICO.
Address 762-17th Street......East Oakland, Cal.

RICKARD & FROST,
ASSAYERS, 1752 Champa St., Denver, Colo. Formerly assayers at Argo smelter. Specimen, Control and Umpire Work. Prompt attention given to all mail and express samples.

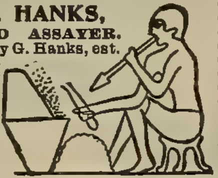
Established 1879.
CHAS. B. GIBSON,
Chemist, Metallurgist and Mining Engineer,
81 CLARK ST., CHICAGO, ILL.

E. H. BENJAMIN, Mining Engineer.
A. M. HUNT, Mechanical & Hydraulic Engineer.
WYNN MEREDITH, Electrical Engineer.
EXPERT EXAMINATIONS. ADVISORY REPORTS.
CONSTRUCTION SUPERVISION
331 Pine Street,...........San Francisco, Cal.
Telephone Main 1870. Cable Address "Edben."

JOHN W. GRAY,
Mining and Hydraulic Work.

Prospecting Operations and Exploration Work.
Examinations, Surveys, Development, Equipment of Mines, Gold-Bearing Gravels, and Water Supplies.
923 Linden St.,...................Oakland, Cal.
Cable "Espra." Correspondence invited.

ABBOT A. HANKS,
CHEMIST AND ASSAYER.
Successor to Henry G. Hanks, est. 1866. The supervision of sampling of ores shipped to San Francisco a specialty.
—531—
California Street,
San Francisco.



RICHARD A. PEREZ, E. M.
Assayer and Analytical Chemist,
120 North Main St., - Los Angeles, Cal.

S. W. TYLER,
Mining and Metallurgical Engineer,
6 Windsor Hotel Block.
Cable: Retyl, Denver. DENVER, COLORADO.

The SPOKANE BUREAU OF MINING,
N. E. LINSLEY, Manager.
SPOKANE, : : WASHINGTON.
Consulting Mining and Milling Engineer.
Will Examine and Report on Mines.

W. J. ADAMS, E. M.,
Mining Engineer and Metallurgist.
Graduate of Columbia School of Mines.
Author of "Hints on Amalgamation," etc., etc.
ROOM 14, 434 CALIFORNIA STREET,
SAN FRANCISCO, CAL.

CLARENCE HERSEY,
Assayer and Chemist,
(Established 1879.) LEADVILLE, COLO.
Gold, Silver and Lead..................$1.00.
Any two of above 75c; any one of above 50c.
Copper analysis...................................$1.00.
Platinum, Nickel or Tin, each..............$5.00.
Twenty-one years successful experience in the mining metropolis of Colorado.
Write for mailing envelopes and price list.

ALMARIN B. PAUL, M. E.,
ROOM 27, CROCKER BUILDING, SAN FRANCISCO.
Will act as AGENT for the sale of RELIABLE Mining Property. SPECIAL AGENT FOR
MacArthur-Forrest Cyanide Process
for California north of and including Mono, Madera and Merced counties; also for State of Nevada. Will act as agent for Eastern parties owning mining interests in California.

F. H. HARVEY,
GALT, CAL.,
Mining and Metallurgical Work in All Branches.
Assays, Chemical Analysis of Ores and experiments on rebellious ores for treatment by cyanide or other processes. Surveys and reports upon mining properties.

L. W. TATUM. Consulting Mining Engineer and Metallurgist.
Genl. Mgr. Providencia Mining & Milling Co.,
DOLORES HIDALGO Gto. MEXICO.
Is prepared to examine mines and mills and undertake the supervision of mine development or milling operations, making visits at stated intervals as case may require, anywhere in Mexico.
High Class References. Codes: Bedford McNeill, Moreing & Neal, A. B. C. 4th Ed. and Liebers.

Simonds & Wainwright,
Mining Engineers,
Assayers and Chemists,
159 Front Street,
NEW YORK.

DAVIDGE & DAVIDGE, Attorneys and Counsellors at Law, Corcoran Building, Washington, D. C. Practice in the Supreme Court of the United States, the Court of Claims, the Courts of the District of Columbia, and the General Land Office. Western Union Code.

Geo. W. Schneider, E. M.,
Mining Engineer,
U. S. Deputy Mineral Surveyor.
Mineral Properties examined and reported on.
Central City, Colorado.

A. F. WUENSCH, M. E.
Inspection and Valuation of Mines.
Ref. D. H. Moffat, Pres. 1st Nat'l Bank, Denver.
827 Equitable Bldg..................Denver, Colo.

WM. VAN SLOOTEN,
Consulting Mining Engineer and Metallurgist.
Cable address: "Yadoplata."
35 WALL STREET........... ....NEW YORK, N. Y.

R. J. WALTER,
1452 Blake St., DENVER, COLO.
Mining Engineer and Metallurgist.
Reports on mining properties.
Assay office and chemical laboratory. Established in Colorado 1879.

SAM'L A. RANK,
MINING ENGINEER,
U. S. DEPUTY MINERAL SURVEYOR.
Mine Examinations and Reports.
514 Cooper Building,
DENVER.........................COLORADO.

EDWARD L. HAFF,
MINING ENGINEER,
U. S. DEPUTY MINERAL SURVEYOR.
Mine Examinations and Reports.
National Annex Block,
P. O. Box 21. CRIPPLE CREEK, COLO.

FRANK C. MANDELL,
MINING ENGINEER,
U. S. Deputy Mineral Surveyor for Idaho and Oregon.
Mine Examinations, Surveys and Reports.
HAILEY, IDAHO.

ERNEST H. SIMONDS,
Late Instructor in Assaying, University of California.
ASSAYS AND ANALYSES.
LABORATORY TESTS OF ORES.
Special Attention Given to the Instruction of Students.
521 Sacramento St., Cor. Leidesdorff. S. F., Cal.

School of Practical Mining, Civil,
Mechanical and Electrical Engineering.
Surveying, Architecture, Drawing, Assaying, Cyanide Process and Metallurgy.
933 Market St., S. F., Cal. OPEN ALL YEAR.
A. VAN DER NAILLEN, President
Assaying of Ores, $25; Bullion and Chlorination Assay, $25; Blowpipe Assay, $10. Full course of Assaying, $50. Established 1864.
☞ Send for Circular.

FRED H. BROWN,
Electrical Mining Expert.
Inventor of the Electro-Geodetic Mineral Locator. Patented March 20, 1900.

Will electrically survey mines and lands for mineral; furnish charts showing run of ore, extensions, pay streaks, and their approximate depth from surface.

References include scientific men, and miners for whom we have located rich mines.

Address, 1025 West 7th St.,
LOS ANGELES, CAL.

W. C. WYNKOOP, M. E.
Woodbury (Cochiti District),
New Mexico.
Economic Geology and Mine Examinations.

RALPH E. STEVENS,
ATTORNEY AND COUNSELOR,
43-44 Jacobson Building, DENVER, COLO.
Special attention to examination of titles. Corporation, commercial, mining law. Collections receive prompt attention. Notary in office. Refers to Denver representative of Mining and Scientific Press.

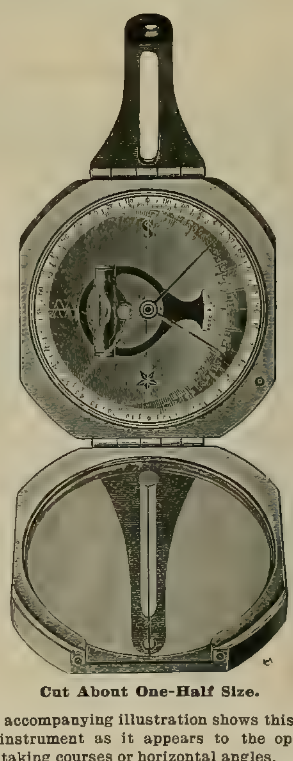
COBB & HESSELMEYER,
Designing and Consulting
MECHANICAL AND HYDRAULIC
ENGINEERS.
421 Market St., Cor. First St.,
Telephone BLACK 3882....San Francisco, Cal.

MINERS' ASSAY OFFICE.
(JNO. HARRIGAN)
10 Stevenson Street, - San Francisco, Cal.
Telephone Clay 972.
Assaying, Analyses, Sampling, Grinding and Pulverizing of all kinds.
Practical Working Tests of Ore by all Processes. Mining Machinery Bought and Sold. Check Assays. Instructions given in Assaying. All Work Guaranteed. **Mines Examined, Sampled and Reported on by M. P. BOAG, M. E. and Cyanide Expert.**

LOUIS FALKENAU,
STATE ASSAY OFFICE,
434 California St., near Montgomery.
Analysis of Ores, Metals, Soils, Waters, Industrial Products, Foods, Medicines, etc., etc.
Court Experting in all branches of Chemical Technology. Working Tests of Ores and Investigation of Metallurgical and Manufacturing Processes. Consultations on all questions of applied chemistry. Instructions given in assaying and all branches of chemistry.

Samples by Mail or Express Will Receive Prompt Attention.
ALBERT I. GOODELL,
ASSAYER AND CHEMIST,
1430 Stout Street.........................DENVER, COLO.

Brunton's Patent Pocket Mine Transit.



Cut About One-Half Size.

The accompanying illustration shows this valuable instrument as it appears to the operator when taking courses or horizontal angles.

A tripod or Jacob's staff is unnecessary, as the sighting and reading are accomplished simultaneously.

Dimensions when folded for the pocket, 2¾x2¾x1 inches.

For complete description send for catalogue B to

WM. AINSWORTH & SONS,
SOLE MANUFACTURERS,
DENVER, COLO., U. S. A.

For sale by dealers in mathematical instruments everywhere.

PACIFIC COAST AGENTS:
JOHN TAYLOR & CO.,
63 First St., San Francisco, Cal.
F. W. BRAUN & CO.,
Los Angeles, Cal.

CHAS. BUTTERS & CO., Limited.
E. S. LEAVER, Manager.
Ore Testing Works,
Chemical and Metallurgical Laboratory,
Assay Office,
DOOLY BLOCK, - SALT LAKE CITY, UTAH.

Telephone, MAIN 5104.
Cable Address, LUCKWARD.
ESTABLISHED 1869.
A. H. WARD.
C. A. LUCKHARDT CO.,
NEVADA METALLURGICAL WORKS,
71 & 73 STEVENSON STREET, - - - - SAN FRANCISCO, CAL.
Assaying, Analyses, Sampling.
PRACTICAL WORKING TESTS OF ORE BY ALL PROCESSES.
STAMP MILL AND CONCENTRATOR IN OPERATION ON PREMISES.

Thomas Price & Son,
Assay Office, Sampling Works
And Chemical Laboratory.
526 Sacramento Street, San Francisco, Cal.

E. E. BURLINGAME & CO.,
ASSAY OFFICE AND **CHEMICAL LABORATORY**
Established in Colorado, 1866. Samples by mail or express will receive prompt and careful attention
Gold & Silver Bullion Refined, Melted and Assayed OR PURCHASED.
Concentration Tests—100 lbs. or car load lots. Write for terms.
1736-1738 Lawrence St., Denver, Colo.

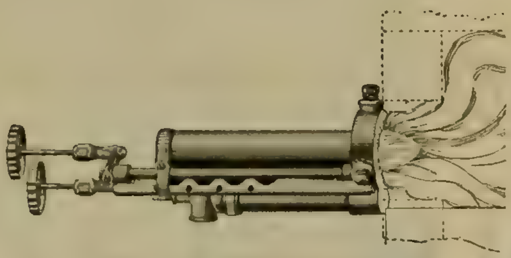
RELIABLE ASSAYS.

Gold...............$ .50	Gold and Silver....$ .75
Lead................ .50	Gold, silver, copper 1 50

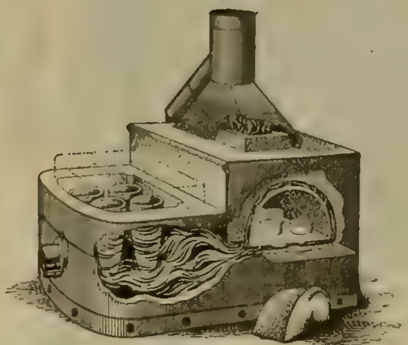
Samples by mail receive prompt attention.
Rich Ores and Bullion Bought.
OGDEN ASSAY CO.,
1429-16th St., Denver, Colo.

Independent Assay Office.
ESTABLISHED 1888.
D. W. Reckhart, E. M., Proprietor.
Agent for Ore Shippers.
Assays and Chemical Analysis.
Mines Examined and Reported Upon.
BULLION WORK A SPECIALTY.
P. O. Box 88. Office and Laboratory:
Cor. SAN FRANCISCO & CHIHUAHUA Sts.
EL PASO, TEXAS.

JAMES ANGUS SNEDAKER,
Mining Engineer,
721-722 Equitable Building, Denver, Colo., U. S. A.



CARY HYDROCARBON BURNER.



CARY COMBINATION FURNACE.

TO ASSAYERS:

With the CARY BURNER AND COMBINATION FURNACE (PATENTED), shown above, it is possible to melt and cupel 144 assays in 12 hours with 5 gallons of gasoline.

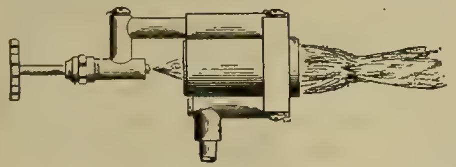
Gasoline is cheaper, quicker, cleaner and cooler to work with than any other fuel.

We make Blow Pipe Outfits in various sizes for use with these appliances. Write for a copy of our new catalogue, in which these and our other specialties are fully described.

F. W. BRAUN & CO.,
Manufacturers of Assayers' Appliances,
LOS ANGELES, CAL

Taylor's Coal Oil and Gasoline Burner

(PATENTED)



A new heating burner for Assayers and Chemists, or for brazing, in which coal oil at 33 deg. to 45 deg., Beaume and 150 deg. fire test, or gasoline at 74 deg. test can be used for fuel. Adapted to crucible, muffle and brazing work. **Price $6.** For sale by

JOHN TAYLOR & CO.,
63 FIRST STREET,
SAN FRANCISCO, CAL.

MINE AND MILL SUPPLIES.

Importers and Manufacturers of Assayers' Materials, Chemicals and Acids, Etc.

CATALOGUE ON APPLICATION.

TRADE MARK.

(M'ARTHUR-FORREST PROCESS.)

CYANIDE PROCESS.

The MacArthur-Forrest Cyanide Process is the Best

For the Treatment of Refractory and Low Grade Gold and Silver Ores and Tailings. We are the Originators of the Cyanide Treatment, and have kept up with the times in all Improvements in Cyanide Methods.

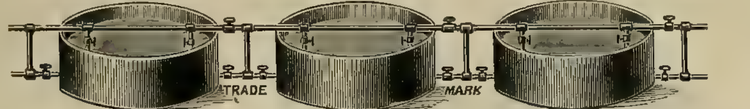
Successful Plants in Operation in all Western Mining States.

Samples Assayed and Fully Reported Upon. Properties Examined Designs Furnished. For Terms and Particulars, Address

The Gold and Silver Extraction Co. of America, Ltd
GEO. A. ANDERSON, General Manager,
Testing Works: 1716 Blake Street, Denver, Colo. 208-210 McPhee Building, Denver, Colo.
ALMARIN B. PAUL, Agent, 27 Crocker Building, San Francisco, Cal.

"PNEUMATIC" CYANIDE PROCESS.

(Patented in U. S., So. African Republic, New Zealand, Victoria, New So. Wales, So. Australia.)



WILL DO IN 7 HOURS WHAT REQUIRES FROM 2 TO 6 DAYS BY OLDER METHODS.

SEND FOR PAMPHLET.

THE PNEUMATIC CYANIDE PROCESS CO., 306 Boston Bldg., Denver, Colo.

Are You Confronted With a Difficult Ore-Separating Problem?

THE WETHERILL MAGNETIC SEPARATING PROCESS

may prove the solution. Apply to Wetherill Separating Company, 52 Broadway, N. Y.

IMPROVED BONE ASH.

It is 100% better than Bone Ash now being used; will absorb more lead, will never crack or split in the Muffle, can be dropped before or after using without breaking. Cupels can be made and used at once; no drying required. Excessive heat has no effect on them. Will stand shipping any distance. It takes up none of the precious metals in cupeling. Cupels much quicker. Once used always used. Sold under a positive guarantee or money refunded. Now being used by all smelters and assayers who have tried it.

Price of Improved Bone Ash, $60.00 per ton; $3.50 per 100 lbs.; or manufactured Cupels, $1.50 per hundred.

CUMMINGS & SWEARS, Sole Mfrs.,
Telephone Clay 972. 10 STEVENSON ST., SAN FRANCISCO, CAL.

For Sale by Justinian Caire Co., Dealers in Assay Goods and Mining Supplies, 521-523 Market St.

PIONEER REDUCTION CO.

Established 1858. Nevada City, Cal.

Buyers of Gold, Silver and Copper Ores and Concentrates.

HIGHEST PRICES PAID FOR COPPER ORES.

WRITE FOR RATES.

ESTABLISHED 1856.

Controls AND Check Assays

(A SPECIALTY.)

MARINER & HOSKINS,
ASSAYERS AND CHEMISTS,
Mining Engineers and Metallurgists.
81 South Clark Street.
Rooms 51-55,
CHICAGO, ILLINOIS.

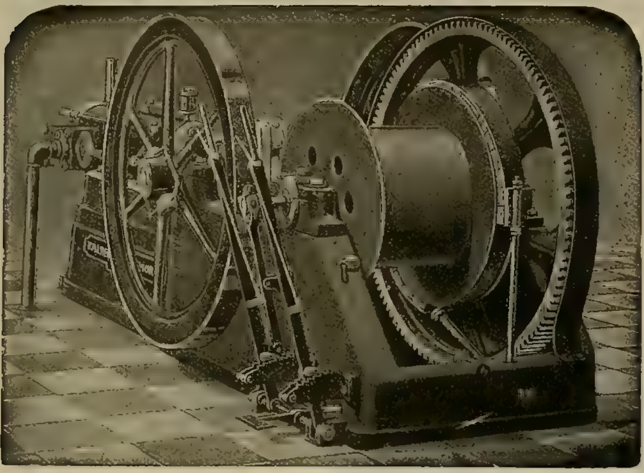
SEND SAMPLES BY MAIL OR EXPRESS.
MAILING SACKS ON APPLICATION. : :

ST. LOUIS SAMPLING & TESTING WORKS,

1225 and 1227 Spruce St.,
ST. LOUIS, MO.

The Largest and Most Complete Ore Testing Works in Existence for Making all Kinds of Practical Working Tests of Ore, etc., to Determine the Most Suitable Method of Treatment.

PLANT FOR COAL WASHING, COKING AND STEAMING TESTS OF FUELS. ASSAYS, ANALYSES, CHEMICAL AND PHYSICAL INVESTIGATIONS OF ALL KINDS. MINERAL PROPERTIES, MINES AND METALLURGICAL PROCESSES EXAMINED AND REPORTED UPON. CORRESPONDENCE SOLICITED.



FAIRBANKS-MORSE
GASOLINE-DISTILLATE GEARED HOISTER.

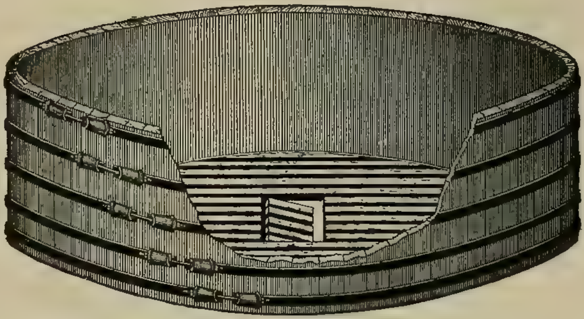
An efficient and reliable combination of a Fairbanks-Morse Gasoline-Distillate Engine on the same base with a Friction Hoist. Modern and up to date. We publish a special catalogue describing our Hoister which we gladly mail prospective purchasers.

FAIRBANKS-MORSE GASOLINE-DISTILLATE ENGINES.
ALL SIZES UP TO AND INCLUDING 54 HORSE POWER.
For Pumping, Milling, Lighting, Air Compressors, Etc.

FOR CATALOGUES AND FULL INFORMATION, ADDRESS
FAIRBANKS, MORSE & CO.,
310 MARKET ST., SAN FRANCISCO, CAL.
201 N. LOS ANGELES ST., LOS ANGELES, CAL.
FIRST AND STARK STS. PORTLAND, OGN.
1600 SEVENTEENTH ST., DENVER, COL.
FRANKLIN AND MONROE STS., CHICAGO, ILL.

CYANIDE TANKS! MINING

LEACHING TANKS,
SOLUTION "
SUMP "
WATER "
EXTRACTION BOXES.



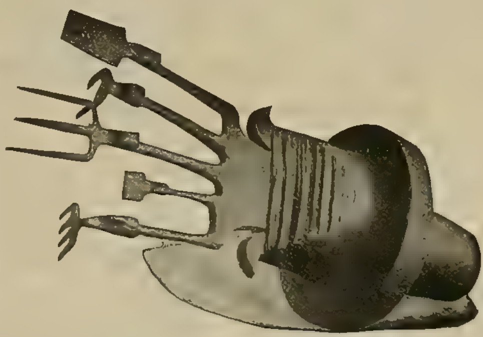
Estimates Furnished for Complete Cyanide Plants.

SEND FOR ILLUSTRATED CATALOGUE OF CYANIDE TANKS AND FIXTURES, MAILED FREE.
Pacific Tank Co., Manufacturers, 35 Beale St., San Francisco, Cal. 348 EAST SECOND STREET, Los Angeles, Cal.

CHAS. C. MOORE & CO.,
...ENGINEERS AND DEALERS IN...
HAMILTON CORLISS ENGINES, N. Y. SAFETY AUTOMATIC ENGINES, BABCOCK & WILCOX BOILERS, McINTOSH & SEYMOUR ENGINES, GREEN'S ECONOMIZERS, HOPPES LIVE STEAM PURIFIERS, WHEELER CONDENSERS, BARNARD-WHEELER COOLING TOWERS, EDMISTON FEED WATER FILTERS, BUNDY STEAM TRAPS, SNOW STEAM PUMPS, QUIMBY SCREW PUMPS, GOUBERT FEED WATER HEATERS, STRATTON STEAM SEPARATORS, SPENCER DAMPER REGULATORS, HYATT ROLLER BEARINGS.

Contracts for Installation of Power Plants, Any Capacity.
SEND FOR CATALOGUES AND FULL INFORMATION.
32 FIRST STREET, SAN FRANCISCO, CAL.
SEATTLE BRANCH..............313 FIRST AVE. SOUTH.
LOS ANGELES BRANCH.......103 SOUTH BROADWAY.

SHOES and DIES
of SUPERIOR quality and at prices 20 to 30% lower than any other maker.
FURNISHED BY
ARTHUR KOPPEL, 66 Broad St., N. Y. City.
WRITE FOR PARTICULARS.



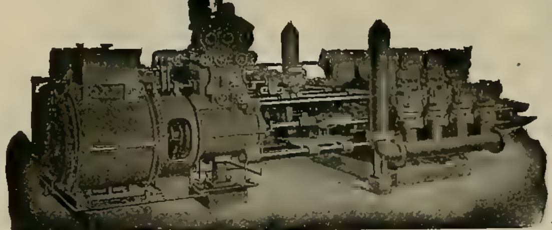
MINING CARS of every description.
PORTABLE RAILWAYS, Rolling Stock, Railway Outfits for Mines of every description. Export Work a specialty.
ARTHUR KOPPEL, 66 Broad St., N. Y. City.
SEND FOR CATALOGUE AND ESTIMATES.

Pacific Coast Agents, Baker & Hamilton, San Francisco and Sacramento.

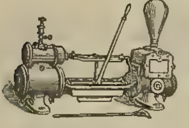
THE MARION STEAM SHOVEL CO.,

Steam Shovels
Dredges and
Traction Dredges
Suitable for all kinds of Excavating Work, making a specialty of
PLACER MINING MACHINES,
separate or self-contained, either as a dry land excavator or floating dredge.
The Marion Steam Shovel Co.
MARION, OHIO.
GEO. W. BARNHART, No. 4 Sutter St., San Francisco, Cal.

The Best MINE PUMPS in the World.
COMPOUND CONDENSING AND TRIPLE EXPANSION STATION PUMPS.
We carry in our Denver store a stock of Improved Pattern Sinkers and Duplex Station Pumps, with duplicate parts for repairs.
Write for Catalogue and Estimates.
Jeanesville Iron Works Co.,
JEANESVILLE, PA.

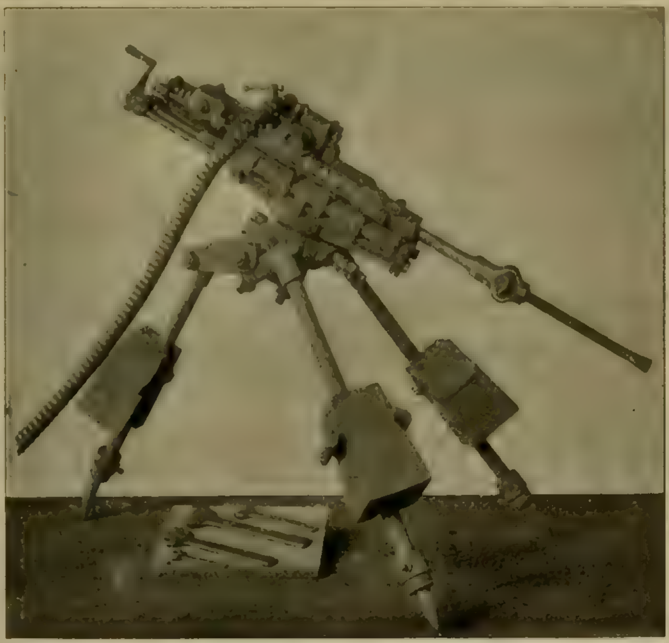


Western Office,
Columbia Hotel Building,
1328 17th St.
Denver, Colo.
Telephone 2298 A.
A. MIDDLEBROOK, Manager.



SOLE AGENCY
Worthington Steam Pumps and Water Meters.
Pumping Plants of any Capacity.
TATUM & BOWEN,
34-36 Fremont Street, San Francisco, Cal. 29-35 First Street, Portland, Or.
MACHINERY—ALL KINDS

Dewey, Strong & Co., Patent Agents.
330 Market St., San Francisco, Cal.



"GIANT" DRILLS AND COMPRESSORS
ARE THE BEST.
"GIANT" BABY DRILLS CHEAPEN MINING.
WRITE US FOR PARTICULARS.
THE COMPRESSED AIR MACHINERY CO., 11-13 First St., San Francisco, Cal.

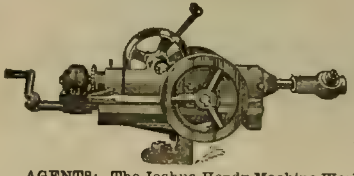
SULLIVAN
Diamond Core Drills
FOR PROSPECTING. Catalogue 29.
The most extensive line of sizes and styles ever offered.
CONTRACTORS FOR PROSPECTING WITH DIAMOND DRILL.
ROCK DRILLS
FOR MINING. Catalogue 30.
Superior valve and ratchet motions. The highest possible grade.
Send for Our New Catalogues.
Sullivan Machinery Co.,
New York. Pittsburg. Claremont, N. H.
Main Office, CHICAGO......................54 to 60 N. CLINTON ST.
Western Office, DENVER....................332 SEVENTEENTH ST.
Pacific Agency, SAN FRANCISCO, HENSHAW, BULKLEY & CO.
Cable Address, Diamond, Chicago. Codes: A. B. C. 4th Edition, Postal Directory, Western Union, Liebers.

Established 1837.
I. C. Yawger,
Successor to VICTOR BISHOP & CO.
IMPORTER OF CARBONS FOR DIAMOND DRILLS.
21 Maiden Lane, - NEW YORK

DIAMOND DRILLS
FOR PROSPECTING.
AMERICAN DIAMOND ROCK DRILL CO.
120 LIBERTY ST N.Y.

THEODOR LEXOW, 14 JOHN STREET, N.Y.
......Importer of......
CARBONS
(BLACK DIAMONDS)
For DIAMOND DRILLS and all Mechanical Purposes.
HENRY DEMMERT.

RAND ROCK DRILLS and Drill Mountings.
HIGHEST DEGREE OF PERFECTION ATTAINED. ∴ INDISPENSABLE IN MINING, TUNNELING & EXCAVATING.
AIR —AND— Gas COMPRESSORS.
STANDARD TYPES! SPECIAL PATTERNS! ALL SIZES!
RAND DRILL CO., 100 BROADWAY, New York, U. S. A.
San Francisco Office: 223 First St.
1328 Monadnock Blk., CHICAGO, ILL.



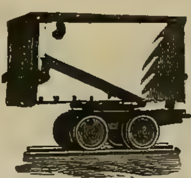
THE JACKSON HAND POWER ROCK DRILL.
Works in Any Rock, in Any Position.
Write for Circulars and References.
THE JACKSON DRILL & M'F'G CO.,
1756 Larimer Street, DENVER, COLO.
Sole Licensees for all Foreign Countries and Eastern United States: THORNTON N. MOTLEY COMPANY (INC.), 43 John St., New York.
AGENTS: The Joshua Hendy Machine Works, 38 Fremont St., San Francisco, Cal.; Chas. B. Boothe & Co., 126 So. Los Angeles St., Los Angeles, Cal.

FIRTH'S DRILL STEEL,
16 cents per pound.
The best drill steel on the market. Has no equal for hard rock drilling. Miners cannot afford to use an inferior steel when FIRTH'S can be bought at the above price.
Abner Doble Company, Gen. Agts.,
Fremont and Howard Sts., SAN FRANCISCO, CAL.

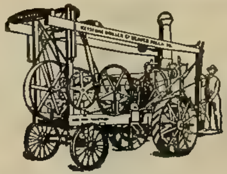
THE Best None Too Good
When in Hard Rock.

CANTON DRILL STEEL.

UNEQUALED IN ROCK-CUTTING QUALITIES. Ask Your Dealer for CANTON Brands.
—— FOR SALE IN CALIFORNIA BY ——
SCHAW, INGRAM, BATCHER & CO., Sacramento — San Francisco.
HARPER & REYNOLDS CO., Los Angeles.



WE HAVE MOVED TO LARGER QUARTERS.
TRUAX
CARS ALWAYS IN STOCK TO FILL RUSH ORDERS.
ORE CARS
WE MAKE CARS FOR YOUR CAGE AND SKIPS FOR YOUR INCLINE SHAFT.
SEND FOR PAMPHLET AND REFERENCES.
Truax Mfg. Co., 69 STEVENSON ST., S. F.



Prospecting Machinery.
Multitudes in use for testing for minerals. Sizes and equipments to suit any and all conditions. Unexcelled for Placer Testing, Oil Wells, Water Wells, testing for Lead and Zinc, Iron and Coal; goes through anything; brings up everything. Large sizes drill as much as 1500 feet. In use all over the world. Every purchaser pleased. Used on boats for testing river and lake beds. Water no hindrance. No skilled labor required.
KEYSTONE DRILLER CO., Beaver Falls, Pa., U. S. A.

BULLOCK DIAMOND DRILLS
If you are interested in prospecting send for our new Diamond Drill Catalogue (No. 33).
BULLOCK MINING MACHINERY
PORTABLE HOISTS—Send for our new Catalogue (No. 40). CHAMPION MINE VENTILATORS—Send for our new Catalogue (No. 35).
HOISTING AND HAULAGE PLANTS, ORE CARS, SKIPS, CAGES, ETC., ETC.
PARKE & LACY CO., Agent,
21 & 23 Fremont St., San Francisco, Cal.
M. C. BULLOCK MFG. CO.,
1172 West Lake St., Chicago, Ill., U. S. A.

Founded by Mathew Carey, 1785.

HENRY CAREY BAIRD & CO.,
INDUSTRIAL PUBLISHERS, BOOKSELLERS & IMPORTERS,
810 Walnut St., Philadelphia, Pa., U. S. A.

☞ *Our New and Revised Catalogue of Practical and Scientific Books, 92 pages, 8vo; a Catalogue of Books on Steam and the Steam Engine, Machinery, etc.; a Catalogue of Books on Sanitary Science, Gas Fitting, Plumbing, etc., and our other Catalogues and Circulars, the whole covering every branch of Science applied to the Arts, sent free and free of postage to any one in any part of the world who will furnish his address.*

ASSESSMENT NOTICES.

MARIPOSA COMMERCIAL AND MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Mariposa County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 11th day of July, 1900, an assessment (No. 17) of Ten ($10) Dollars per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 320 Sansome street, room 24, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 14th day of August, 1900, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 4th day of September, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

JOSEPH H. MOOSER, Secretary.

Office—320 Sansome street, room 24, San Francisco, California.

SIERRA NEVADA SILVER MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Virginia Mining District, Storey County, State of Nevada.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 9th day of July, 1900, an assessment (No. 119) of fifteen cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Room 14, Nevada block, No. 309 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on Tuesday, the 14th day of August, 1900, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 3d day of September, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

E. L. PARKER, Secretary.

Office—Room 14, Nevada block, No. 309 Montgomery street, San Francisco, California.

MAMMOTH GARFIELD GOLD MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Shasta County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 5th day of June, 1900, an assessment of seventeen and one-half (17½) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Rooms 54 and 59, No. 120 Sutter St., San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 4th day of August, 1900, will be delinquent and advertised for sale at public auction; and unless payment be made before, will be sold on TUESDAY, the 2nd day of October, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

SAM W. CHEYNEY, Secretary.

Office—Rooms 54 and 59, No. 120 Sutter St., San Francisco, California.

EUREKA CONSOLIDATED DRIFT MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Placer County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 29th day of May, 1900, an assessment (No. 25) of one cent per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Room 31, No. 214 Pine street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 30th day of June, 1900, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on SATURDAY, the 21st day of July, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

GEO. W. DIXON, Secretary.

Office—Room 31, No. 214 Pine street, San Francisco, California.

POSTPONEMENT.

The date of the delinquency of the foregoing assessment (No. 25) has been postponed to MONDAY, the 16th day of July, 1900, and the day of sale from the 21st day of July, 1900, to TUESDAY, the 7th day of August, 1900.

By order of the Board of Directors.

GEO. W. DIXON, Secretary.

Office—Room 31, No. 214 Pine street, San Francisco, California.

POSTPONEMENT.

The date of the delinquency of the foregoing assessment (No. 25) has been postponed to MONDAY, the 30th day of July, 1900, and the day of sale from the 7th day of August, 1900, to TUESDAY, the 21st day of August, 1900.

By order of the Board of Directors.

GEO. W. DIXON, Secretary.

Office—Room 31, No. 214 Pine street, San Francisco, California.

NATIONAL CONS. MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Rich Gulch, Shasta County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 4th day of June, 1900, an assessment (No. 12) of five cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, 773 Mission St., San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 9th day of July, 1900, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on WEDNESDAY, the 1st day of August, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

GEO. W. FLEISSNER, Secretary.

Office—773 Mission St., San Francisco, California.

POSTPONEMENT.

The date of the delinquency of the foregoing assessment (No. 12) has been postponed to Thursday, the 26th day of July, 1900, and the day of sale from August 1st, 1900, to MONDAY, August 20th, 1900.

By order of the Board of Directors.

GEO. W. FLEISSNER, Secretary.

Office—773 Mission St., San Francisco, California.

DEWEY, STRONG & CO.,
PATENT AGENTS, 330 Market St., S. F., Cal.

DELINQUENT SALE NOTICE.

MAY DAY GOLD AND SILVER MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Calaveras County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 4) levied on the 19th day of April, 1900, the several amounts set opposite the names of the respective shareholders, as follows:

Name.	No. Cert.	No. Shares.	Amt.
J. P. E. Heintz	156	1,000	$100 00
Wm. A. Junker	71	500	50 00
Annie D. Weeks	133	500	50 00
C. G. Von Treutler	127	400	40 00
Duncan S Hayne	157	1,000	100 00
A. Feist	165	1,250	125 00
George Schoenwald	131	100	10 00
Thos. A. De Lay, Trustee	88	6,000	600 00

And in accordance with law, and an order from the Board of Directors, made on the 19th day of April, 1900, so many shares of each parcel of such stock as may be necessary, will be sold at public auction, at the office of the company, Heald's Business College, 24 Post street, San Francisco, California, on WEDNESDAY, the 25th day of July, 1900, at the hour of 1 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

E. P. HEALD, Secretary.

Office—Heald's Business College, 24 Post street, San Francisco, California.

DELINQUENT SALE NOTICE.

CALIFORNIA BORAX COMPANY.—Location of principal place of business, San Francisco, California; location of works, San Bernardino County, California.

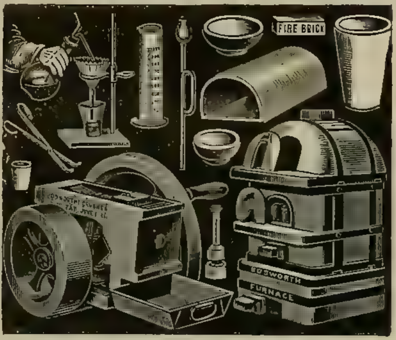
Notice.—There are delinquent upon the following described stock, on account of assessment (No. 3) levied on the 25th day of May, 1900, the several amounts set opposite the names of the respective shareholders, as follows:

Name.	No. Cert.	No. Shares.	Amt.
J. L. Tisdale	34	2	$4 00
J. L. Tisdale	35	2	4 00
H. P. Cartier	67	5	10 00
J. J. Gunn	85	4	8 00
Geo. H. Folsom, Trustee	101	20	40 00
Luther J. Holton, Trustee	107	10	20 00
F. E. Densmore	108	25	50 00

And in accordance with law, and an order from the Board of Directors, made on the 25th day of May, 1900, so many shares of each parcel of such stock as may be necessary, will be sold at public auction at No. 310 Pine street, rooms 35 and 36, San Francisco, California, on MONDAY, the 30th day of July, 1900, at the hour of 12 o'clock M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

J. W. PEW, Secretary.

Office—No. 310 Pine street, rooms 35 and 36, San Francisco, California.


THE DENVER FIRE CLAY CO.,
1742 to 1746 Champa St., DENVER, COLO.

Manufacturers, Importers and Dealers in
Chemicals, Apparatus and Assayers' Supplies, Fire Brick and Tile.
Sole Agents for the "AINSWORTH BALANCES."
WRITE FOR CATALOGUES.

THE ROESSLER & HASSLACHER CHEMICAL CO.,
100 William Street, New York.

THE ROESSLER & HASSLACHER CHEMICAL COMPANY · NEW YORK · CHEMISTS

CYANIDE

Peroxide of Sodium

Hyposulphite of Soda

Chloride of Lime

Sulphide of Iron

And Other Chemicals for Mining Purposes.

HEALD'S

BUSINESS COLLEGE.
24 Post Street, - - - San Francisco.

MINING AND CIVIL ENGINEERING DEPARTMENT: Mathematics, Draughting, Strength of Material, Chemistry, Assaying, Blow-Pipe Analysis, Geology, Mineralogy, Surveying, etc., under the direction of Prof. O. H. Packer, an engineer of national reputation.

ELECTRICAL DEPARTMENT: Theory and Practice; Construction.

BUSINESS: Bookkeeping, Shorthand, Typing, Modern Languages, etc.

Twenty teachers; individual instruction; can enter at any time; Catalogue and Journal free.

AIR COMPRESSORS,
Rock Drills,
Coal Cutters,
Lift Pump, Pohle
and Stone Channelers.
Catalogues.

The INGERSOLL-SERGEANT Drill Co.,
Havemeyer Building, NEW YORK.
San Francisco Agents, PARKE & LACY CO.,
203 Fremont Street.

DEARBORN Drug and Chemical Works. Laboratories. Water Chemists. Vegetable Boiler Compounds.

ALL KINDS OF ANALYSES. WATERS FREE. OILS A SPECIALTY.

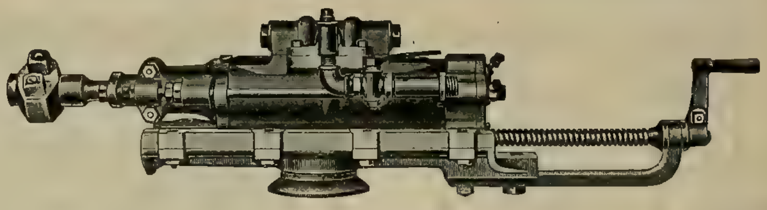
10,000 Boiler Feed Waters Are Being Treated by DEARBORN METHODS.

29, 30, 31, 32 and 33 Rialto Bldg. - - - CHICAGO, ILL.

THE NEW

Leyner Air Drill.

THE MOST ECONOMICAL DRILL on the MARKET.
EASY to HANDLE.



THE LEYNER ROCK DRILL.

Amalgamation and Cyanide Plants,

HOISTING ENGINES.

— FOR FURTHER INFORMATION ADDRESS —

THE EDWARD P. ALLIS COMPANY,
MILWAUKEE, WIS.

WHY NOT PUT IN YOUR OWN PLANT FOR DEPOSITING SILVER ON YOUR AMALGAM PLATES
WE FURNISH DYNAMOS & COMPLETE EQUIPMENT FOR THIS WORK.
WRITE FOR PARTICULARS
THE HANSON & VAN WINKLE CO.
CHICAGO. NEWARK N. J. NEW YORK.

RIVETED IRON AND STEEL PIPE

FOR HYDRAULIC MINES, IRRIGATION AND POWER PLANTS. Manufactured from the best grades of IRON or STEEL by MODERN MACHINERY.

AGENTS FOR THE Celebrated **CANTON STEEL.**

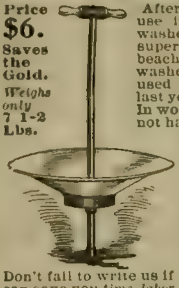
Schaw, Ingram, Batcher & Co., 539 Mission St., SAN FRANCISCO. 211 to 219 J St., SACRAMENTO.

C. H. EVANS & CO.,
Machine Works,
183-185-187 FREMONT STREET,
Where, with Enlarged and Increased Facilities, they are better than ever prepared to do
First-Class Machine Work
Promptly, and at Reasonable Prices, and will continue the manufacture of
Thomson & Evans Steam Pumps,
Deep Well Pumps, Power Pumps, Etc.,
Also Marine Engines, Ship and Steamboat Work, Pipe Cutting, General Jobbing and Repairing.

Thousands of engineers can testify to their efficiency. We want your endorsement also. Buy a Lubricator from your jobber. We guarantee it to give perfect service or money refunded. Jobbers on Pacific coast sell them.

The Wm. Powell Co.,
Cincinnati, Ohio.

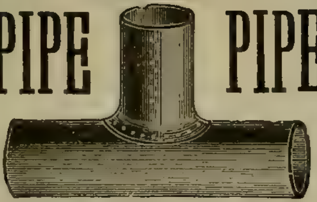
THE LITTLE ALASKA GOLD WASHER.



Price $6. Saves the Gold. *Weighs only* **7 1-2 Lbs.**

After several years' practical use in different fields, our washer has established its superiority over all placer or beach washers. It is just the washer for Cape Nome; it was used extensively in Alaska last year with every success. In working the operator does not have to wet his hands and can stand in an upright natural position. It is just the washer for the poor man who has not the money to put in expensive machinery. It will do the work of ten men with gold pans. It is just the washer for the prospector, being light and easy to pack. Don't fail to write us if in need of a washer; we can save you *time, labor* and *money*. RUSSELL & KINSEY, 1237 Magnolia Ave., Los Angeles, Cal.

PIPE PIPE



PIPE for Hydraulic Power and Irrigation.
OIL STORAGE TANKS.
GENERAL SHEET IRON WORK.
Lacy Manufacturing Co.,
LOS ANGELES.

DENVER & RIO GRANDE R.R.
SCENIC LINE OF THE WORLD

The ∴ Mining Man's Favorite Route

BETWEEN

Denver, Colorado Springs, Pueblo and Florence, Cripple Creek, Leadville, Glenwood Springs, Aspen, Gunnison, Lake City, Creede, Durango, Silverton, Telluride and Ouray,

Reaching all the Mining, Milling, Cyaniding, Chlorinating and Smelting centers in Colorado and Utah, and all mining points in California, British Columbia and the Pacific Northwest by close connections and a perfect system of through car service.

Pullman Palace and Tourist Sleeping Cars between Denver and San Francisco and Los Angeles, and Pullman Palace and Tourist Sleeping Cars and Free Reclining Chair Cars between Denver and Portland. : : A Perfect Dining Car Service on All Through Trains. : :

For Illustrated Pamphlet, address

W. J. SHOTWELL,
G. A. D. & R. G. R. R.,
126 California St.,
San Francisco, Cal.

S. K. HOOPER,
G. P. & T. A.,
Denver,
Colo.

COLORADO'S GOLD

Output for 1899 is unequaled by any State in the Union. Cripple Creek, Leadville, and all the important mining towns are reached by

THE COLORADO & SOUTHERN RY...

For copies of our publications on the Swandyke and Pine Creek Gold Districts, or our pamphlet "Hints to Prospectors," address

T. E. FISHER, GEN. PASS. AGT.,
DENVER, COLO.

EFFECTING ECONOMY IN
Steam and Power Plants
IS MY BUSINESS.
DOES IT INTEREST YOU?
Howard H. Fielding,
1328 Seventeenth St., DENVER, COLO.

LARGE VARIETY.

Perforated Metal

THE ROBERT AITCHISON PERFORATED METAL Co
303-305 DEARBORN ST. CHICAGO ILLS.

SUPERIOR WORK.

QUARTZ SCREENS

A specialty. Round, slot or burred slot holes. Genuine Russia Iron, Homogeneous Steel, Cast Steel or American planished Iron, Zinc, Copper or Brass Screens for all purposes. CALIFORNIA PERFORATING SCREEN Co., 145 and 147 Beale St., S. F.

Mining Screens
A SPECIALTY.

Diagonal Slot,
Straight "
Burred "
Round Holes.

In American planished or Russian iron or steel for all purposes. GEO. WIMMER, 312 Iowa Street, San Francisco. Telephone Mint 1332.

—EASTERN PRICES BEATEN.—

SAN FRANCISCO
Pioneer Screen Works,
JOHN W. QUICK, Prop.
Improved Facilities! Finest Work! Lowest Prices!
Perforated Sheet Metals, Steel, Russia Iron, American Planish, Zinc, Copper and Brass Screens for All Uses.
MINING SCREENS A SPECIALTY.
221 and 223 First Street, San Francisco, Cal.

For Best Satisfaction and Lowest Prices
— IN —
PERFORATED METALS
— AND —

MINING SCREENS

PLACE YOUR ORDERS WITH
Fraser & Chalmers,
CHICAGO, ILL., U. S. A.

SEND FOR SAMPLES, MENTIONING THIS PAPER.

THE MINES OF
Eastern Oregon

Which are now attracting so much attention are reached only by the lines of the

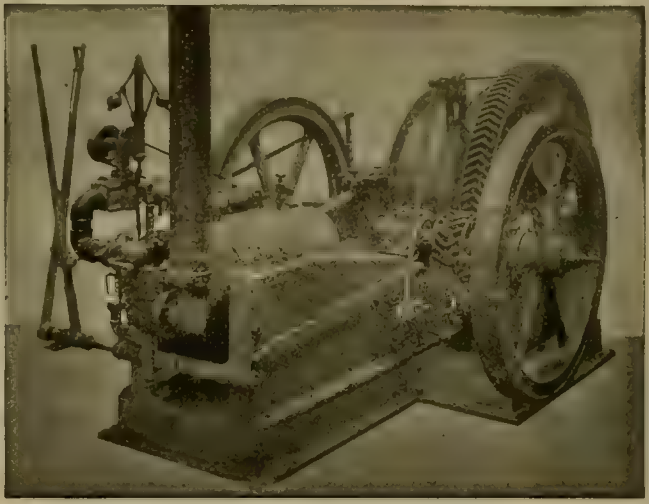
OREGON RAILROAD & NAVIGATION CO.

For Descriptive Pamphlets, Through Rates, Etc., Address

E. C. WARD, Gen. Agt.,
630 Market Street, San Francisco.

HARNESS
—AND—
SADDLES.
CATALOGUE FREE.
L. D. Stone & Co., San Francisco,
417 and 419 Market Street.
A. KEMPKEY & F. M. GILHAM,
Proprietors.

HERCULES HOISTS Are Sold the World Over.

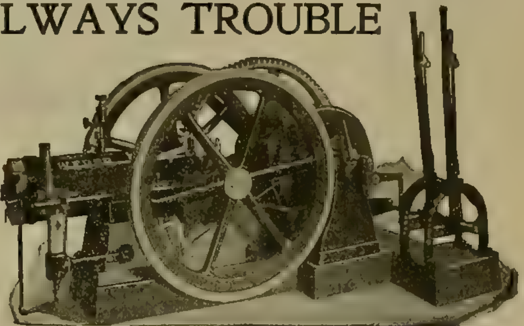


Hercules Gasoline Hoist--Speed 385 Ft.; Load 2500 Lbs.

HERCULES GAS ENGINE WORKS,............141-143 FIRST STREET, SAN FRANCISCO, CAL.

THERE IS ALWAYS TROUBLE

with a second-class Gasoline or Oil Engine or Hoist, and there is no good excuse for buying that kind when the Weber is so easy to get. Write for particulars.



WEBER GAS & GASOLINE ENGINE CO.,
430 S. W. Boulevard,
Kansas City, Mo.

LUNKENHEIMER

On your brass and iron goods means superior quality, and is a guarantee that said article is the best of its kind made. Intelligent steam users recognize this fact hence they are always specified where the best is wanted. All dealers in Mining Machinery and Supplies carry "The Lunkenheimer" goods in stock. Our catalogue will convince you; free for the asking.

THE LUNKENHEIMER CO., Cincinnati, Ohio, U. S. A.,
SOLE MANUFACTURERS.

—— BRANCHES: ——

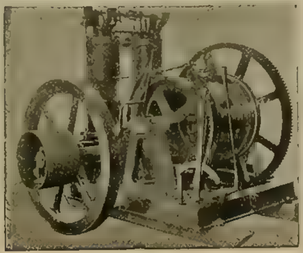
NEW YORK................26 Cortlandt Street
PHILADELPHIA............Bourse Building
LONDON, S. E............35 Gt. Dover Street
MEXICO CITY, Puente de San Francisco No. 6

ALL ABOUT
Sight Feed Lubricators.

Our new catalogue for 1900 is ready for distribution. It explains in detail the principles governing the operation of **Sight Feed Lubricators,** using sectional view to show the internal construction, and containing cuts of the different styles in parts before being assembled into the complete lubricators, thus enabling every one to understand their construction and operation thoroughly.

In addition it shows our full line of **Glass Oilers, Oil Pumps, Oiling Devices, Multiple Oilers, Valves, Etc.** It will be sent to any address on application.

DETROIT LUBRICATOR CO., DETROIT, MICH.



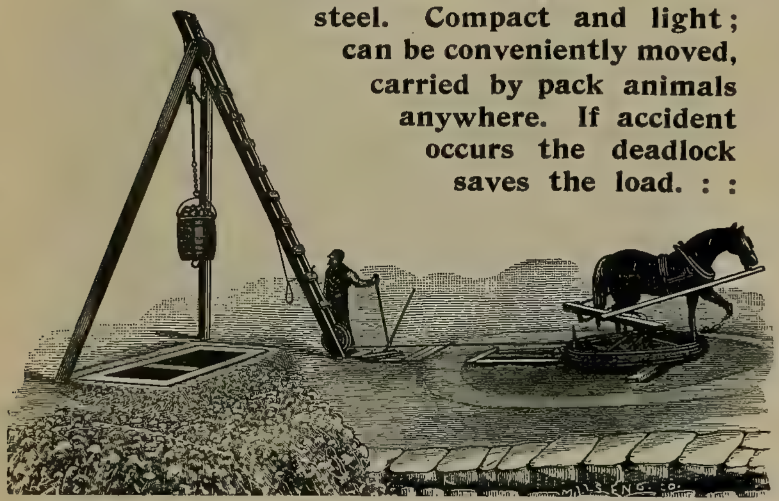
Mining Hoist.

THE GOLDEN GATE GAS ENGINE
Will raise more ore than any other **AT LESS COST.**
MANY IN USE, Giving Satisfaction.
Built for any Capacity and for any Purpose.
Pumping Water, Propelling Boats, Hoisting Ore, Machine Shop Power, Etc.
Send for Particulars and Catalogue.
ADAM SCHILLING & SONS,
213 & 215 Main St., San Francisco, Cal.

This Paper not
to be taken from
the Library. + + + +

THE COMMON SENSE WHIM

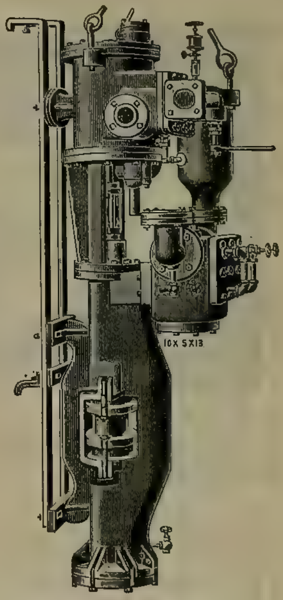
Is made of the best wrought iron and steel. Compact and light; can be conveniently moved, carried by pack animals anywhere. If accident occurs the deadlock saves the load. : :



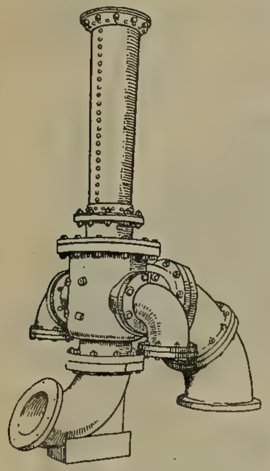
SINKING PUMPS,

Indispensable in sinking mining shafts or pumping out flooded mines. Easily raised or lowered by cable or rope. Equipped with outside packed plungers. Handles gritty or dirty water. Operates bolted to shaft timbers or only suspended by cable at any angle. Packing glands external. May be adjusted while in motion. Removable parts hinged. Steam movement positive and simple.

THE RISDON IRON WORKS,
MANUFACTURERS,
SAN FRANCISCO, CAL.



SEND FOR CATALOGUE.



THE EVANS HYDRAULIC ELEVATOR,

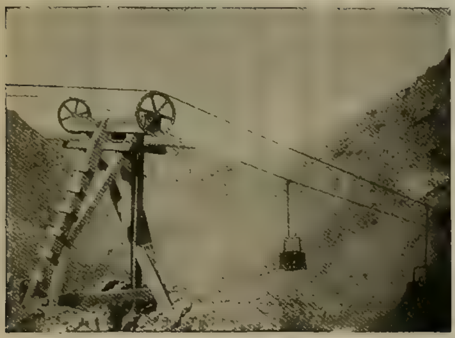
MANUFACTURED BY

RISDON IRON WORKS, San Francisco.

Used in Unwatering the Comstock Lode.

SEND FOR CATALOGUE NO. 5.

The cheapest and most efficient Water Elevator made.
It will do more and better work than any other Gravel Elevator.
It is fully protected by United States and Canadian letters patent.



THE HALLIDIE ROPEWAY

For Transporting Ore, Fuel, Earth, Sugar Cane, etc., by Wire Ropes.

SIMPLE, ECONOMICAL, PRACTICAL, DURABLE.

LOADS MECHANICALLY. DUMPS AUTOMATICALLY.

WIRE TRAMWAYS (Single and Double Rope Systems),

Cableways, Transmission by Wire Ropes,
Incline Planes, Cable Grips,
Logging by Cables, Automatic Loaders,

PLOWING, SCRAPING AND TRANSPORTING by Wire Ropes,

DESIGNED, SUPPLIED AND ERECTED. Estimates Furnished.

Improved GRIP PULLEY.

Patents Nos. 483,442; 610,353.

EFFECTIVE, SIMPLE, AUTOMATIC.

Saves Wear on Wire Rope and Cable.

Send for Illustrated Pamphlet.
Correspondence Solicited.

CALIFORNIA WIRE WORKS, - 9 Fremont St., San Francisco, Cal.

THE BARTLETT CONCENTRATING TABLE.

One of these Machines will take the place of TWO or THREE Belt Concentrators of any make and do as good work.

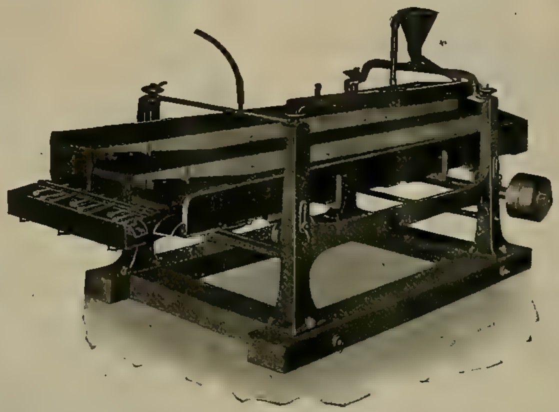
Separates ALL the minerals from each other at one operation.
Gives THREE CONCENTRATES on the one Machine at the same operation.
The Machine is especially adapted to the separation of Zinc and Lead.

- PRICE: -

12-ft. Table, $400.

SHIPPING WEIGHT - - - - - 2200 POUNDS.

CAPACITY - - - 10 to 30 tons per 24 hours.



Parties desiring tests made can send 500 lbs. or more, charges prepaid, and a run will be made and reports forwarded of the results, free of all charges, except for the assays, which will not exceed $10.00.

CAN BE SET UP ANYWHERE.

REQUIRES NO SPECIAL FOUNDATION.

Licensee for the Manufacture and Sale, **PARKE & LACY CO.,** 21 & 23 FREMONT STREET, San Francisco, Cal.

SOLE AGENT FOR

INGERSOLL-SERGEANT ROCK DRILLS and AIR COMPRESSORS.
KNOWLES PUMPS and PULSOMETER PUMPS, BULLOCK DIAMOND DRILLS.

CATALOGUES FREE ON APPLICATION.

CALIFORNIA STATE LIBRARY.

This Paper not to be taken from the Library. * * * *

MINING AND SCIENTIFIC PRESS. AND PACIFIC ELECTRICAL REVIEW.

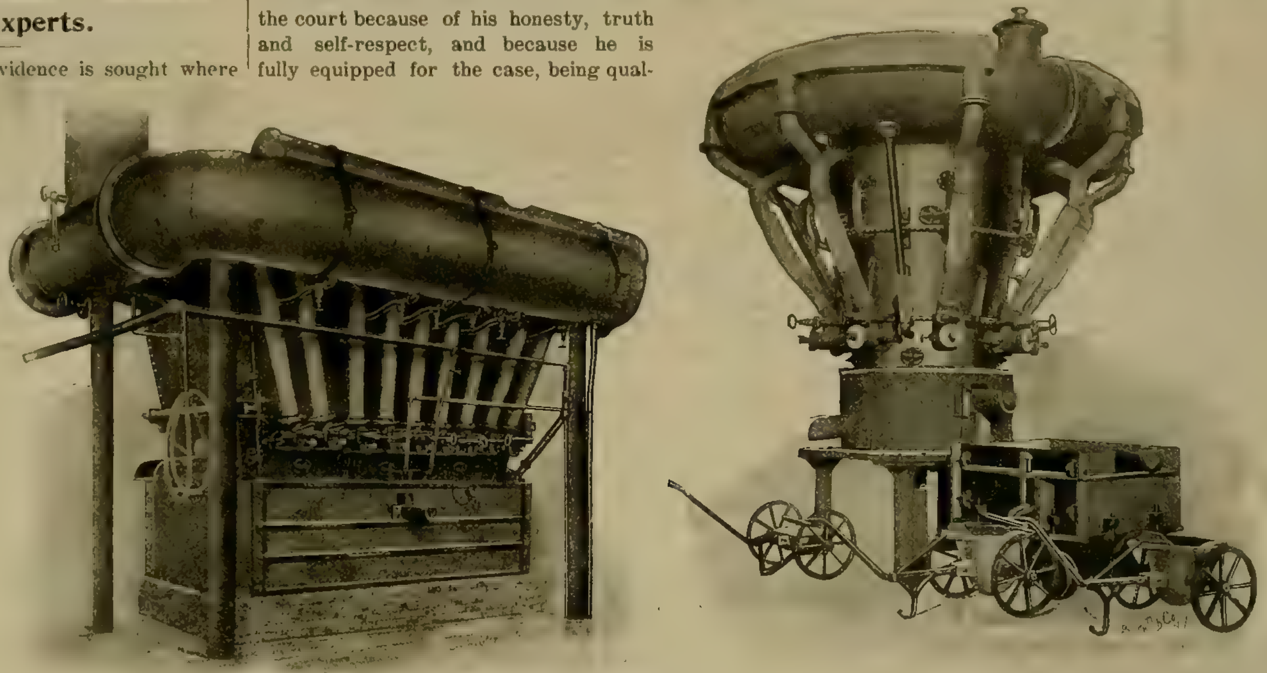
No. 2088.—VOLUME LXXXI. Number 4. SAN FRANCISCO, SATURDAY, JULY 28, 1900. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

Mining Experts.

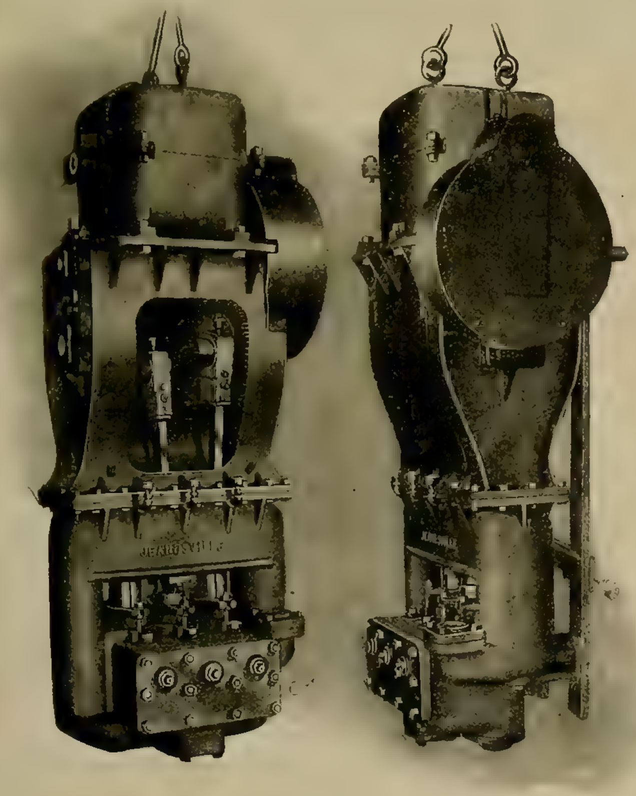
In all sciences expert evidence is sought where there is dispute or litigation. In mining cases the costs of expert evidence are frequently one of the largest items in the bill of expenses, sometimes aggregating $250,000 in a single case. The competent expert is a necessary factor in a mining case, where the interests involved or the intricacy of the question makes justice more likely to be secured by the assistance of men who can state or explain facts, and thus aid the lawyers and the judge to properly deduce correct statements and decision.

There is considerable harsh criticism of mining experts, partly because of the conflicting opinions sometimes given, and some of it is deserved. But even judges' decisions are occasionally reversed, and the Supreme Court of the United States has reversed itself. No one is infallible. The chief trouble lies in some judges being at the mercy of unscrupulous "experts" who impose on their ignorance of the facts.

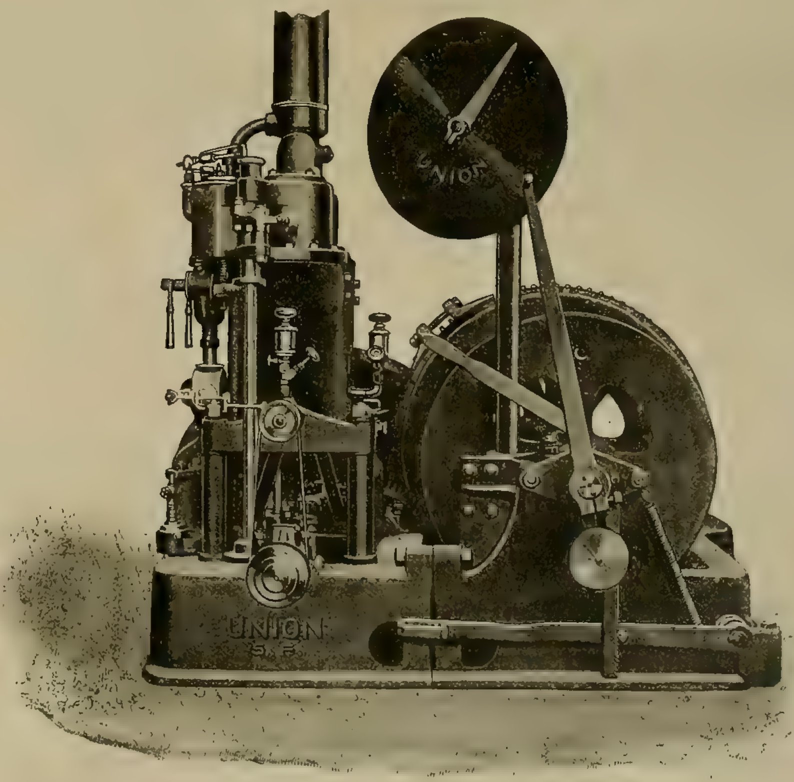
The real mining expert is of value to his client and the court because of his honesty, truth and self-respect, and because he is fully equipped for the case, being qualified to give testimony. The wealthier of two litigants is not always right, nor is the more famous expert. The real expert will state the truth as it appears to him, will not endeavor to confuse nor confound the facts, and will not allow his answers to be influenced by any other consideration than his own independent judgment. In so far as any mining expert giving testimony in a court of judgment deviates from or falls below this standard, so far does he fail in just claim to being a "mining expert." It may be that in time the court will have an expert of its own as a technical adviser in cases where there is a "conflict of evidence." The present tendency is that way, as a matter of necessary evolution.



Vaporizing Attachment for Water Supply for Water Jackets of Smelting Furnaces.—(See page 96.)



Triplex Electric Sinking Pump.—(See page 92.)



50 H P "Union" Hoist.—(See page 96.)

NG AND SCIENTIFIC PRESS.

ESTABLISHED 1860.

Published Every Saturday at 330 Market St., San Francisco, Cal.

ANNUAL SUBSCRIPTION:
United States, Mexico and Canada....................$3 00
All Other Countries in the Postal Union.............. 4 00

Entered at the S. F. Postoffice as second-class mail matter.

J. F. HALLORAN..............Publisher.

Special Representatives:
EASTERN.
E. H. HAVEN..............150 Nassau St., New York City.
MIDDLE WEST.
CHAS. D. SPALDING..............153 La Salle St., Chicago, Ill.
INTER-MOUNTAIN.
W. A. SCOTT..............43 Jacobson Building, Denver, Colo.
SOUTHERN CALIFORNIA.
W. D. CURTIS..............223 W. Second St., Los Angeles, Cal.

San Francisco, July 28, 1900.

TABLE OF CONTENTS.

ILLUSTRATIONS.—Vaporizing Attachment for Water Supply for Water Jackets of Smelting Furnaces; Triplex Electric Sinking Pump; 50 H. P. "Union" Hoist, 89. Map of McGillvery Creek Mining District, Lillooet, B. C., 93. Latest Mining and Metallurgical Patents, 94. Views of the Golden Cross Mill and Mine, San Diego Co., Cal., 95.
EDITORIAL.—Mining Experts, 89. Origin of Ore Deposits; Kinds of Miners; Commendable Work, 90.
MINING SUMMARY.—97-98.
LATEST MARKET REPORTS.—99-100.
MISCELLANEOUS.—Concentrates, 91. Silver Smelting in Mexico; An Old Bell; Structural Steel Consolidation; Triplex Electric Sinking Pump, 92. The Cripple Creek Volcano; A Note on Hand Concentration Tests, 93. Latest Mining and Metallurgical Patents; Stoping with Machine Drills, 94. A Desert Gold Mine; Copper Alloy for Amalgamating Surface, 95. California Petroleum; Fifty H. P. "Union" Hoist; Vaporizing Attachment for Economical Water Supply for Water Jackets of Smelting Furnaces, 96. List of U. S. Patents for Pacific Coast Inventors; Notices of Recent Patents; Personal; Commercial Paragraphs; Recently Declared Mining Dividends; Catalogues Received, 99.

Kinds of Miners.

Viewed in the degree and kind of information individually possessed there are three kinds of miners: men who have studied in a mining school and nothing more; men who never saw the inside of a mining school but have grown up and been engaged in the actual work of mining for many years; and men who have learned a good deal in a good mining school and have had subsequent practical experience in actual mining work. Each has his place, and, in a way, each one can do good work, but it will probably be agreed with by a majority of miners that the third named—the man who unites the knowledge gained from the experience of others given in books with that from his own experience gathered in actual work—is, probably, of the most benefit to himself and those with whom he is associated. In these sunset months of the century it is in order to discuss this subject, a very important one, on which a great deal has already been well said.

The young mining engineer, "fresh" from school, is credited with knowing a good deal, with ability to obtain the best results with the least expenditure of money, time and labor under given conditions, and is supposed to have knowledge of how work should be done to insure such results. A young man of intelligence and trained in competent schools would doubtless be able to do good work under some conditions. But, of many varieties of him, the man whose knowledge is confined to what he has learned by the hard knocks of experience; the man who has learned about the work by actually doing it, is ofttimes the far more useful member. The man who got his mining education about the same way as a chicken gets its breakfast—a grain here and a grain there—and who has been doing practical mining all his life, has in many ways a superiority, the chief trouble with him being that occasionally he thinks he knows it all, though this phase of self-sufficiency is sometimes observed in the mining school graduate.

Success in this class of work offers many shining prizes. Indeed, the close of this century finds the science of mining offering as much inducement as any other occupation, as it is becoming a matter of large undertakings, where much is involved, and, where, as in nearly everything else, mind rules matter: the manual labor being relegated more and more to machines, and the man in charge expected to be sufficiently up in the theory and practice to make him a man of affairs, capable of successfully handling large schemes. This man will probably be oftenest found among those who are well grounded in mining education and who have had the experience that can only be acquired by actual work; that is, the man who combines practice with what is commonly called theory will be the best man. Knowledge gained in the mining school is developed into its fullest value by practical work, though without such primary education he is likely to lose considerable valuable time. His experience will forbid that he err in attempting that which is only apparently possible; it should forbid that he undertake to put into force rules of text books without the modification which almost every practical piece of work enforces upon them; it will also give him the ability to seize the opportunities often presented in practical work and to make the best of the situation. It is to this combination; to the existence of men who have combined the faculties attained by years of hard labor in the doing of work as well as the knowledge of text books, that much of the great progress in scientific mining is due.

The time is about past when the miner who "does not go much on science" has the floor. Time was when the scientist or the geologist was a sort of good joke, to be gently joshed by the men who were doing the work and who in a kindly superior manner declined to take him seriously. This was the time when a choice kind of a joke in a mining camp was to put up a job on anyone who laid claim to any kind of scientific mining—sometimes with entire success, as some of the book miners were as sadly deficient in practical knowledge as any men over-educated on a subject of which they had no practical information. These were the days when the orthodox miner put all the mining schools under excommunication and almost universally voted that if he did not know it all, he came pretty near it, and that the man from the mining school came just as near not knowing anything about it. That day has passed and intelligent miners everywhere now recognize the value of properly directed scientific mining.

The value of a man who is able in an emergency to discern and remedy faults; who can tell when machinery is doing its full duty; who can effect the greatest saving of values from the ores treated; who can determine the most economical method of work but who can refrain from making such economy too expensive; who understands the effect and use of explosives; who has up-to-date knowledge of rock formations; who understands timbering, ventilation and drainage; who knows how to keep from gouging the eyes out of a mine; who is able to block out sufficient ore to insure continuous operation; and who does not hold himself so far above those with whom he daily associates that he would fail to recognize the "man," no matter in what capacity he may be employed—such a man is not an ideal by any means; there are many of him, but they did not get all their education in a mining school, nor did they content themselves with scoffing at those who have.

There has been a tremendous amount of money and effort misspent in mining. Every miner who reads this can call to mind right in his own locality where a little intelligence, where some knowledge of geology and the science of mining would have made all the difference between the place having a black eye and being a producing camp. Monuments to unwise mine management are within sight of each other all over this west half of America. Idle mills built to operate visionary processes; tunnels running away from the vein instead of toward it; costly shafts sunk just where they should not have been; an ideal plant built to crush and treat the ore before its sufficient existence was proven: all these things go to demonstrate the difference in the man. For, after all, as in nearly everything else, the question comes down to what kind of a man is at the head of the project. If he has knowledge, judgment and skill he can make money develop a profitable payer. If he knows nothing except from books, or if he has a scorn of anything in books his self-sufficiency may waste investors' money and throw himself into the ranks of the unsuccessful.

◆

Some splendid specimens of printing are regularly received in the shape of catalogues sent by enterprising makers of and dealers in all kinds of machinery. Many of them are valuable trade treatises, full of fine description of appliances and devices for economical mine work, and are handsomely illustrated. Some of these are rolled and otherwise poorly mailed, which, to the writer, seems a mistake. It is not economy to spend thousands of dollars in preparing a really valuable work and take away from its value to the maker by "saving" a few cents in its proper transmission. A catalogue should not be rolled. It is meant to reach a prospective customer, and should get into his hands in such a shape as to have lost none of its attractiveness. It is good business to put out a good catalogue, but it is poor economy to roll it tight and put on a flimsy wrapper in sending it out. Next to a good advertisement, in the paper seen by the men most likely to be buyers of what is advertised, a good catalogue is a trade getter, but it should be put out in good shape.

Commendable Work.

The receipt of a monograph, "Geology of the Little Belt Mountains, Montana," an extract from the twentieth annual report of the U. S. Geological Survey, is a good example of the fine work that branch of the public service is doing. The U. S. Geological Survey is of great and constant aid to the mining industry, and of late years is paying back in some degree the debt that geologists owe to the miner, for to mining more than to anything else is geology indebted for its present advanced position. Thus the matter is one of reciprocity, and in this regard is to be noted and commended the policy of Director Walcott in his zealous and successful effort to give timely and accurate knowledge of requisite facts. Recognizing the requirements of practical, up-to-date information, has been adopted the policy of making almost immediate reports of great value to miners concerning newly discovered districts. To the Montana monograph is appended a list of sixty-two geologic folios now ready for public distribution, to be furnished to any applicant on payment of a small fee. When all these folios are furnished they will constitute a geologic atlas of the whole nation.

This work goes steadily on year by year, and the sums appropriated are wisely expended. Not the least of the good resultant or made possible is the kindly co-operation of the Federal survey with the several State surveys, and continued co-operation wherever practicable. The U. S. Geological Survey, as at present conducted, recognizes that were it not for the mining industry there would be little practical need for its existence, and the broad policy of its officers and attaches is commensurate with the area and industry they attempt to cover.

In this regard it is to be regretted that the several States are so backward in taking advantage of their possibilities in State geologic survey work. The U. S. Geological Survey is empowered to undertake topographic mapping in any State where it is asked for by the State, the expense to be divided equally between the State and Federal government. The functions of the U. S. Geological Survey and those of any State geological survey are different, and are so recognized, but, while each has its sphere of action, co-operation can be secured entailing increased benefit to the very ones all this is intended to benefit—the miner and, indirectly, the mining industry.

◆

The origin of ore deposits is an interesting and practical subject of discussion, and one that has had considerable of value contributed by men who have given the vast subject careful study. The subject is one of scientific inquiry and of immediate practical value to metal miners everywhere. It is, of course, easy to say: "We don't care how the ore originated. The question for us is where is it and how can it be best reached and most economically treated?" Yet a satisfactory solution of the more abstract scientific inquiry will aid in answering the concrete practical requirements of the miner. This last fact gives great importance to the contributions of geologists and scientists during the past twenty years, the result being that the matter is emerging from the shadowy domain of theory and hypothesis, and is assuming the nature of an exact problem which admits of definite and satisfactory solution. In the last few months have been received several excellent monographs on the subject of the genesis of ore deposits, and another is promised. The requirements are recognized as embracing a scheme acceptable to geologists and of practical aid to the miner, and it is along these lines that present advance is being made.

Concentrates.

Revenue stamps are not required on location certificates.

The Almaden, Spain, quicksilver mines annually produce about 50,000 flasks of 76½ pounds each.

The Selby Smelting & Lead Works, San Francisco, Cal., buy gold-zinc slimes on their assay value.

There is little market for California chrome ore, and none for any carrying less than 40% chromic acid.

As a water column 1 foot high exerts a pressure of .43 pounds per sq. in., a pressure of 3.97 pounds per sq. in. represents a head of 9.2 feet.

With exceptional transportation advantages a 10% lead ore if free from zinc might be mined at a profit, but not in southwestern Nevada.

The highest point reached by any railway in the world is at the Galera tunnel—15,678 feet—on the line from Lima to Oroya, Peru, South America.

Melville Attwood, who died April 25, 1898, is credited in California with having invented and introduced the blanket system of amalgamation.

Chemically pure tin can be had from Jno. Taylor & Co., San Francisco, Cal.; F. W. Braun & Co., Los Angeles, Cal., or the Roessler & Hasslacher Co., New York City.

Work on the four restraining barriers in the Yuba, Cal., river, for which $500,000 is appropriated and available, will begin when the necessary land is under Federal control.

A Honduras, C. A., subscriber writes, ordering an extra copy of this paper, "that I may cut out the advertisements in answering them and yet preserve one copy intact for binding."

Long-continued experiments in the Bodie, Cal., cyanide works of the Standard Con. Co. tend to totally disprove the idea that wooden leaching vats absorb gold to any appreciable extent.

Manganese steel is of undoubted value, having a combination of hardness and toughness that commends it where grind or wear is severe. For marine or dredge work manufacturers consider it particularly well adapted.

Criticism is constantly invited and correction of any inaccuracy or mistake thankfully received. The idea is to be exact and as near correct in statements as possible, for information is of value in direct proportion to its accuracy.

Where practicable, crude petroleum oil is found preferable to oil for fuel in both roasting and smelting furnaces, it being essential to maintain in each case an oxidizing atmosphere, which can be steadily maintained by oil or gas fuel, but not by coal.

It being presumed that every locator of a mining claim in this country is a U. S. citizen, it is unnecessary to mention the matter of citizenship in a location notice. If the locator be an alien, the initiative in dispossessing him must be taken by the Federal Government.

An engine of 180 H. P., burning three and one-half tons of coal in ten hours, ought to be able, with proper accompanying appliance, to dredge and elevate about 350 cu. yds. of solid material per hour, 40 feet high, or 1000 cu. yds. per ton of coal, reckoning on 50% efficiency.

Hydrogen and oxygen can be produced from water by an electric current, but a cheaper and easier way to produce hydrogen is by the action of hydrochloric or sulphuric acid on zinc; and to "make" oxygen, by heating manganese dioxide and potassium chlorate in a retort.

There is no fixed date for the annual convention of the California State Miners' Association. It is usually held in San Francisco in October or November. There is to be an election this year, and it has been suggested that the convention be held before that event takes place.

Were all the gold mines in the world productive, solely, of free-milling ore, there would, doubtless, be great scope for bromine processes, but the usual presence of other metals for which bromine has a great affinity precludes extensive belief in the universal value of its operation.

A bullet fired at 45° elevation is supposed to travel through the most space—that is, of three of the same weight, fired with the same force and under similar circumstances, one horizontally or any angle but 45°, one perpendicularly and one at 45°, the latter would have the longest trajectory.

Green wood when cut down contains about 45% of its weight in moisture; kept for several years in a dry place it will retain 15%; if thoroughly dried, it will, if exposed to air under ordinary circumstances, absorb 5% of its weight in water the first three days and continue absorption till it reaches about 15%.

Doubtless there will be further development in stamp batteries, probably in the direction of increased adaptation to dry crushing, and the introduction of variable adjustment as will enable any number of stamps in the same battery to crush any kind of ore, the latter presenting the most difficult problem.

There is no law nor statutory provision in California or in any other State against hydraulic mining. In California a decree of a court and injunctions under that decree have interfered with hydraulic mining operations, but Congress some years ago passed a law under which hydraulic mining may be carried on. That law, known as the Caminetti Act, has been declared to be constitutional, in a case where its constitutionality was attacked by a California hydraulic mining company at North Bloomfield, Cal.

Permanganate of potash is an antidote for the bite of a rattlesnake or other venomous reptile. To use it the wound should first be enlarged and then saturated with the drug, after having first tied a shoestring, suspender or some handy ligature around the limb, as the leg or arm is usually the point attacked.

The term "lode" is more general and all-embracing than "vein." There may be several "veins" in a "lode." The latter term includes everything between the hanging and the foot wall, and if beyond those there be an impregnation of country rock of equal value to that in the fissure, that, also, would be considered as part of the "lode."

There are abundance of quartz and placer gold mining properties in the island of Borneo, but no one should think of going there unless with abundant capital, credentials and intimate acquaintance with all the conditions and requirements. Chinese and Dyaks work these mines, and, if clever, can earn as much as 7 pence per day, English money.

If exhaust steam be used direct for heating water passed over amalgamator plates, it is liable to contain sufficient oil in solution to form a coating on the surface of the quicksilver and thus prevent complete amalgamation. Where exhaust steam is thus utilized, none of it or of the condensed water should be allowed to come in contact with the plates.

The swindler and bogus mine promoter prefers the newest mining fields as affording less likelihood of immediate discovery of fraud, it being sometimes difficult to get reliable information about a property in a new district. Some of the prospectuses are wonderful illustrations of the possibilities of language when used by men in ignorance or defiance of the facts.

In measuring a miner's inch of water, the surface of the water is to be exactly 6 inches above the center of the discharge. If the aperture be 2 inches in height, each sq. in. of the opening in the plank (1½ inches thick) will discharge a "miner's inch" = .02499 cu. ft. per second, 1.4994 cu. ft. per minute, 89.964 cu. ft. per hour, 2159.146 cu. ft. per day of twenty-four hours.

The Union Iron Works of San Francisco, Cal., has a device intended to increase the capacity of the stamp mill, being the placing of a small fine crusher between the ore feeder and the mortar. The feeder is located above the battery floor, is operated from the stamp, and automatically feeds the ore into the crusher, which, in turn, delivers it in ¼-inch cubes to the stamp.

That a steam boiler explodes because of gases generated in the boiler is only an unproven hypothesis. A boiler explosion is because some part of it is too weak for the pressure. The weakness may be due to poor workmanship, design, material or defect. Nor is there any "accident" about such explosion. It is the result of the action of exact law, and is no more "accidental" than the phases of the moon.

In the case of Hartman vs. Smith, 7 Montana, 19, the court held that "all that is necessary to make the claim of a mill site by the owner of a non-contiguous mining claim valid is the reasonable use and occupation thereof for mining purposes in connection with a mining claim." A mill site may be patented by compliance with the same requirements regarding survey and notice as are applicable to veins or lodes.

The Copper King property is 27 miles from Fresno, Cal. Four reports were made by mining engineers upon it in 1898. The last of the four was made by F. O. Harvey, Dec. 2, 1898, who estimated that there were "60,000 tons ore in sight of 9½% copper ore, wet assay 4 dwts. gold, 4 ounces silver; ore at surface, 7000 tons 9¼% copper, 4 dwts. gold, 3½ ounces silver; 3600 tons 3½% copper, 3 dwts. gold, 3 ounces silver."

The Mauser rifle is not considered equal to the Krag-Jorgensen. The main difference between the two is that while both are bolt guns, the Krag has a magazine which, filled with five cartridges, can be cut off so as to make the rifle practically a single shooter; the Mauser's magazine can not be so cut off. Then, in the Krag, the bolt is opened and closed by the action of cams; in the Mauser the user has to compress the main spring by direct force.

In Tarapaca and Atacama, Chile, S. A., nitrate of soda is found in horizontal or slightly inclined beds or strata 6 feet from the surface, mixed with sand and pebbles. This substance, locally called "caliche," is blasted out and hauled to a maquina, where it is lixiviated and rudely refined, the tailings, or ripios, often containing from 5% to 15% nitrate of soda. The deposit is from 1 to 2 feet in thickness and is indurated something like the cement gravel of the California drift mines.

The temperature of steam in contact with water depends upon the pressure under which it is generated. At the ordinary atmospheric pressure (14.7 lbs. per sq. in.) its temperature is 212° F. As the pressure is increased, as by the steam being generated in a closed vessel, its temperature and that of the water in its presence increases. Saturated steam is steam of the temperature due to its pressure—not superheated. Superheated steam is steam heated to a temperature above that due to its pressure. Dry steam is steam which contains no moisture. It may be either saturated or superheated. Wet steam is steam containing intermingled moisture, mist or spray. It has the same temperature as dry saturated steam of the same pressure.

South African Rand mine managers figure that they can resume their former output within six months after cessation of hostilities. There are a good many things in the way. Were peace proclaimed to-morrow, the force of native workers is so scattered and demoralized that the question depends as much upon the possibilities of obtaining native manual labor as upon replacing the machinery of the mines. They also figure that there may be an opportunity to reduce the salaries of the natives and thus render practicable the working of mines which produce in small quality.

Under Colorado State law a company when incorporating must pay to the Secretary of State $10 for the first $50,000 of capitalization, or fraction thereof, and 15 cents for each additional $1000 capital stock. A $2,000,000 capitalization would have to pay the Secretary of State $302.50. The present war tax requires 5 cents on each $100 face value of each original issue of certificates of stock in any company or corporation. On the capital stock named this would mean $1000 more, federal revenue tax. The county clerk would charge about $2.50 for filing the articles of incorporation.

The profession of mining engineer is a good one for a competent young man to embrace, and, properly equipped mentally and physically, he should be of value to himself and others therein. A certain amount of bodily strength and activity is necessary. No business makes greater demands on the constitution, and without a vigorous physique the utmost meed of success could not be attained. The editorial on the opposite page contains additional suggestions on this topic. There are many excellent mining schools in this country in which a thorough training for actual work can be had at comparatively small cost.

There are several processes of electrolytic extraction of zinc from its ores, all resembling each other to some extent, the ore being crushed, roasted and leached with suitable solutions of acid or salt, by means of which the zinc is dissolved out. A current of electricity is then passed through the solution, when the zinc is deposited at the cathode, and the exhausted effluent is returned to the leaching vats to be renewed by passing through a fresh charge of the prepared ore. In the Siemens & Halske process zinc sulphide is employed to liberate the zinc; in the Dieffenbach process zinc is produced by electrolysis of a zinc chloride solution.

The old laws on the flow of water have been entirely discarded and the literature on that subject as applied to mining has been entirely rewritten. Books and articles in technical papers of a few years ago are back numbers, and are as out of present use as the almanacs of the years in which they were written. The same remark applies in a modified degree to pumping machinery and the application of electricity to mining. The science of mining is progressive, and the rate has been a rapid one in the past ten years. The best way to keep up is to weekly get some technical mining paper in touch with the times and with the mining men now on earth.

To prepare a blasting charge, cut a piece of safety fuse to the right length and carefully insert the fresh-cut end in a blasting cap. See that the cap is free from any particle of sawdust before inserting the fuse. Press the fuse gently into the cap as far as it will go. Crimp the open end of the cap tightly around the fuse with a pair of cap nippers, but under no condition disturb the fulminate or filling in the cap. Then open one end of the cartridge carefully, and with a sharpened lead pencil or pointed wooden stick make a hole in the powder, insert the cap end of the fuse, being careful to see that at least ½ inch of the cap remains out of the powder. Then draw the paper closely about the fuse and tie it with a strong cord. Another way to prepare or charge a hole is mostly used in dry mines, uppers, etc. For instance, if three sticks of powder are used for a blast, place two and one-half sticks in a hole, then put in fuse with cap on end, let down to powder, keep fuse on side of hole, then slit the paper on powder three or four times lengthwise and drop in hole, ram or tamp carefully at start, then tamp as usual. Never allow smoking or fire of any description near the powder nor leave any loose caps or fuse in the vicinity of the powder.

The pressure of the atmosphere is about 14.7 lbs. per sq. in.; with a perfect vacuum it would sustain a column 33.9 feet high. The height that a pump will lift water depends on atmospheric pressure, which decreases as altitude increases: about ½ lb. per sq. in. for every 1000 feet ascent. Thus the altitude being 4500 feet the pressure of the atmosphere is 2¼ lbs. less than at sea level, or, approximately, 12½ lbs. per sq. in. The moisture in the air makes a difference in the pressure. The readings of a barometer indicate both of these. A barometer reading 28 inches would indicate a pressure per sq. in. of 13.74; 28¼, 13.86; 28½, 13.98; 28¾, 14.11; 29, 14.23; 29¼, 14.35; 29½, 14.47; 29¾, 14.60; 30, 14.72; 30¼, 14.84; 30½, 14.96; 30¾, 15.09; 31, 15.21. One pound per sq. in. corresponds to a head of 2.30947 feet of water; so, to find the lift of a pump, multiply the pressure per sq. in. by 2.30947. If the barometer stands at 28, the corresponding pressure = 13.74 lbs. per sq. in.: 13.74 × 2.30947 = 31.73 feet = "lift" of water. Of course, the pump would not lift this height, as it can not produce a perfect vacuum, and even if it could, there must be enough difference between the pressure in the pump chamber and the atmosphere, not only to sustain the height of the column, but to overcome its friction.

Silver Smelting in Mexico

NUMBER I.

Before the London Institution of Mining and Metallurgy was recently read a paper by Otto H. Hahn, "On the Development of Silver Smelting in Mexico," which, among other things, goes into minute detail and criticism of the method in operation at the time the article was prepared, at Smelter No. 3 of M. Guggenheim's Sons at Monterey, Mexico.

Much of it is of general interest, and a free condensation of the paper so far as it applies to that particular smelter is herewith published. After some preliminary history and description of the power plant, Mr. Hahn passes to the sampling department. He says (much condensed):

The sample mill is a most important part of a custom smelter, for, on the assay results of the samples taken from the ores, the settlements are made. A mistake in sampling may entail serious monetary losses upon the smelter by basing the purchase of an ore on false values and the slag calculations on wrong analysis of the earthy ingredients. It is therefore conventional between smelter and ore vendor for the latter to have a representative on the ground to watch all the operations an ore has to go through from the time of its arrival at the weigh bridge till the final sample is turned out. Since all ore is received in railway cars, the smelter is advised of its shipment by having bill of lading mailed to him; and, being in most instances conversant with its character, the official in charge of the sample mill will know how to dispose of it according to instructions he has received from his superiors. After the ore is weighed, the first thing to do is to take moisture samples. The man entrusted with this work has a number of pans ready with tags in them, specifying mark of ore, number of car and day of arrival. He is also provided with a trowel to dig up the ore and a hammer to break up lumps, for it is necessary to get a fair proportion of both fine and coarse ore. The moisture samples are immediately taken to the office at the sample mill, where an even number of grams—say 500—is weighed up on a small platform scale made for this purpose. The samples are then put on the drier—a coil of iron pipe of sufficient length—through which steam is allowed to circulate. The next day these samples are reweighed, and the result is recorded in the moisture book. Ores are divided into parcels or lots of a certain number of tons, according to agreement between purchaser and vendor. Low-grade ores of a uniform character are usually divided into 100-ton lots or more. When a lot is closed, the net weight of each carload is multiplied by the moisture factor, and then the average moisture of the whole lot is computed.

Since a considerable proportion of the ores received arrives in sacks, these are cut open in the car and emptied right there; or, if the ore is rich, they are taken to the sample mill, reweighed on a movable platform scale and emptied on the floor. The moisture sample is then taken as usual. It is a matter of course that the sacks have to be turned inside out and shaken to free them from ore dust before they are weighed and returned to their owners.

The iron ores and other ores of little silver value are unloaded in the open air, while lead ores and high-grade silver ores are put into the covered ore shed between the sample mill and the blast-furnace shed. The roasting ores are unloaded into bins near the calciners, if they are fine, or on a platform adjoining the sample mill if they need crushing.

Ores of the same class are "bedded," that is, spread out in horizontal layers of the same thickness, one above the other. If another lot follows, the previous one has to be leveled off before putting the new one on the bed. The size of the beds is limited by the space available, the height and the time when they are wanted. So of iron ores, beds of 2000 tons are made up, of lead ores from 800 to 1000 tons, and of silver ores less. Of course, these beds are numbered, and a strict record must be kept of the lots composing them and of their weights. If the samples of any of these lots are put on another bed, their weights must be deducted from the weights of the lot. The numbers of the beds must be set up on top of them and marked on material indestructible by the weather. Big lumps are broken with a hammer and the fragments are distribted evenly over the surface of the bed.

During the unloading process samples are taken by throwing the twentieth, tenth, fifth or third shovel—according to richness of ore—into a wheelbarrow, which, when full, is wheeled to a platform adjoining the sample mill and piled up there. The sample is marked by sticking a peg, with a card attached to it containing the description of the ore, into the top of the pile. Samples of concentrates of rich ores are preserved in numbered bins erected opposite the sample mill, and their tags are nailed on the doorposts of the bins. Samples from wheelbarrows which have been upset must not go to the sample pile, but must be rejected. After a car is unloaded its floor must be kept clean, and also the track, and the sweepings are thrown on the bed.

If a lot of ore is closed which is marked on the bill of lading or ordered by the consignor, the sample is made by spreading it out in a flat, circular pile, breaking up the lumps with a hammer and quartering it down to convenient size. If the ore is hard and tough, the whole sample must be passed through a crusher previous to quartering it down. The reduced sample is then taken to a pair of rolls in the sample mill, and, after crushing it to pea size, quartered down again to about five pounds. This further reduced sample is dried at a temperature of 212° F. on the dryer and then put through the sample grinder. The material from the sample grinder is passed through a 120-mesh brass wire screen, and the remainder is ground by hand on a bucking-board till it is fine enough to pass also through the same sieve. The powder or "pulp" so obtained is now thoroughly mixed on a piece of oilcloth, and from it four bags of stout Manila paper, 6½x3½ inches, holding about eight ounces, are filled. In the United States glass bottles are preferred, and they are certainly much better suited to guard against contamination of the sample, but, as they can not be transmitted through the Mexican mails, and express offices are not plentiful in Mexico, and, finally, because glass is dear, paper bags have become the rule. Three samples are sent to the assay office of the works, and one is given to the representative of the ore vendor. Of the samples sent to the assay office one is destined for the use of the assayer, one for the chemist and the third one for the umpire. The latter and the ore vendor's samples are sealed. After use, the samples pertaining to the works are preserved until the ore has been settled for and gone through the furnaces. Umpire samples are kept longer, unless required to settle differences between purchaser and vendor, in which case the assayer elected by both as umpire receives them.

But it is not the ores alone which the sampler has to look after; there are other materials and secondary products which require sampling—coal, coke, limestone, iron ore, matte, speiss and barrings (furnace accretions)—and bullion purchased from small smelters.

Coal is only sampled when a new kind is received, or when a deterioration in quality is suspected or confirmed; it is analyzed for carbon, ash and volatile matter.

Coke is sampled regularly, moisture samples and laboratory samples being taken from every car arriving at the works. When the last of a shipload has come in, the coke sample is cut down like that of an ore and analyzed for volatile matter, fixed carbon and ash. Sulphur is usually not determined, as the small quantities present in coke do not affect either the smelting process or the product. The volatile matter, however, is supposed to have an important bearing upon the reducing power of coke. Some metallurgists condemn a coke containing over 2% of gaseous matter.

Limestone is sampled and analyzed only once in a great while, or, if a new kind is received which should be unloaded by itself.

Iron ore, pure and simple, was used only in blowing in to the extent of less than a ton. Its contents in iron and silica are known.

Matte is weighed and sampled every month while being run through the mill preparatory to the roasting operation, and again after coming out of the roasters. The matte is designated by the name of the month in which it is produced.

Speiss is weighed for the purpose of the monthly cut-off or inventory taking, but sampled and assayed only when produced in quantity. Its contents do not vary much in one and the same place.

Barrings, after picking out coke, large lumps of limestone and firebrick, are weighed, sampled and thrown on a lead ore bed. The sample is analyzed and assayed the same as an ore.

The sample mill occupies a space of 89 feet in width by 149 feet in length between two sets of tracks, but is hardly large enough for the constantly growing business. It is a double building, covered with an M roof, and has a double wooden floor inside, with steel plate around the crushers and rolls. The tracks along the sides of the building are also planked between the rails, so as to be able to recover any spilled ore.

A narrow part of the gable end facing toward the weigh bridge is partitioned off into five compartments, the first of which contains the motive power; a second the drying oven; a third the bucking room with the sample grinder; a fourth the office of the foreman in charge; and the fifth an area or hall between the latter two. This area is used by the representatives of the ore vendors to look at the final proceedings with their samples, through a window in the partition. Admittance to the bucking room is denied them and all unauthorized persons, to preclude the possibility of tampering with the samples. In the sample mill building there are two 7x10-inch crushers set at convenient distances; and in front of each, facing toward the ore shed, one pair of rolls, 10x16 inches, and another pair 10x20 inches. At the gable end, facing the roasters, there is a set of machinery constituting the "sulphide mill." It consists of a 7x10-inch crusher, a pair of rolls, 14x30 inches, and two cup elevators, one of which lifts the coarse material from the crusher into the hopper of the rolls and the other lifts the fine stuff from under the rolls into a storage bin.

This machinery makes so much dust that it is but seldom used, and then only for ore and tough material. It has no business in a sample mill, but should be in a place entirely by itself.

For matte crushing a ball mill is used, erected next to the sulphide mill on the outside of the building. A machine with 120 steel balls pulverizes from 80 to 100 tons of weathered matte in ten hours fine enough to roast well. With the toughness of the material the efficiency of the mill decreases; of copper matte, with 30% copper, only one ton per hour would go through. Speiss can not be pulverized in it at all; it is simply converted into ellipsoidal balls which revolve like steel balls, and are merely polished, not crushed.

(TO BE CONTINUED.)

An Old Bell.

In the office of C. T. Brown, of the Buckeye M. Co., with office at Socorro, is found what is alleged to be the oldest bell in the United States. This historic bell was made in 1549. In 1680 the church was destroyed by the Indians. In 1734 the bell was dug out of the ruins of an old church at Gran Quivera, an old pueblo and Spanish city, said by several Spanish historians to have exceeded 20,000 in population. From Gran Quivera the bell was brought back to Socorro and hung in the old San Miguel church.

In 1781 this church at Socorro was destroyed by Indians and the people driven south to Isleta, near El Paso. In 1806 a colony of seventy families came from Belen, on the Rio Grande, and resettled Socorro and repaired the old church, which stands to this day. This old bell was again resurrected and placed in the church. The bell weighs 461 pounds. The metal used in it came from a mine in Grant county, called the Santa Rita de Copie. The women added all their jewelry of silver and gold to it. Chippings from the old bell have been assayed and it is found that it is worth over $400 in gold and silver.

This bell was the first to ring on the American continent, and that on the banks of the Rio Grande. Seventy years before the Mayflower sailed into Boston harbor this old bell, with its clear tone, was calling together a brave little band of worshipers with their weapons of defense in one hand and the cross in the other.—New Mexican.

Structural Steel Consolidation.

The organization of the American Bridge Co., with offices in New York City, effects the consolidation of the following concerns who do structural steel work: Berlin Iron & Bridge Co., East Berlin, Conn.; Buffalo Bridge & Iron Works, Buffalo, N. Y.; Detroit Bridge & Iron Co., Detroit, Mich.; Edgemoore Bridge Works, Wilmington, Del.; Elmira Bridge Co., Elmira, N. Y.; Gillette–Herzog Mfg. Co., Minneapolis, Minn.; Groton Bridge Mfg. Co., Groton, N. Y.; Hilton Bridge Construction Co., Albany, N. Y.; Horseheads Bridge Co., Horseheads, N. Y.; Koken Iron Works, St. Louis, Mo.; Keystone Bridge Co., Pittsburg, Pa.; La Fayette Bridge Co., La Fayette, Ind.; Lassig Bridge Works, Chicago, Ill.; American Bridge Works, Chicago, Ill.; New Jersey Steel & Iron Co., Trenton, N. J.; New Columbus Bridge Co., Columbus, O.; Post & McCord, Brooklyn, N. Y.; Pittsburg Bridge Co., Pittsburg, Pa.; A. & P. Roberts, Pencoyd, Pa.; Rochester Bridge & Iron Works, Rochester, N. Y.; Shiffter Bridge & Iron Works, Pittsburg, Pa.; Union Bridge Co., Athens, Pa.; Wrought Iron Bridge Co., Canton, O.; Youngstown Bridge Co., Youngstown, O.; Milwaukee Bridge Co., Milwaukee, Wis. Percival Roberts Jr. is president; Chas. McDonald, vice-president; with Frank Conger, Wm. H. McCord, Chas. M. Jarvis, C. C. Snyder, James Christie, Wm. H. Connell, Chas. C. Price and F. W. Heisler at the head of various departments.

Triplex Electric Sinking Pump.

The new triplex electric sinking pump, illustrated on page 89, produced by the Jeanesville Iron Works Co., Jeanesville, Pa., is claimed by its manufacturers to be satisfactorily susceptible of operation by an electric current direct from a water power situated miles from the point of application; that it produces no heating effect in the shaft, the steam pipe being entirely eliminated, and when the pump is stopped there is no waste of current, and when in use current is consumed in the exact proportion to the work performed.

The design contemplates three single-acting plungers operating from common crank shaft with crank pins placed 120° apart, the resultant action of these three plungers being to produce a continuous and constant stream to the column pipe and tend to reduce to a minimum the shock and jar thereon.

The steel crank shaft is driven by two gears fitted over the discs which form the outside cheeks of the two end cranks, thus designed to relieve the shaft of one-half the strain that would be brought upon it if driven by a single gear at one end.

The motor is on top of the pump frame and connects the crank shaft by gearing to give the desired speed to pump. The pump frame is made to receive any make of motor which is adapted to this kind of work, either direct or three-phase current.

The Cripple Creek Volcano.*

NUMBER III.—CONCLUDED.

Eventually (it may have been several thousand years after the first manifestation of activity) the volcanic energies became wearied, and lava ceased to appear at the surface. The readjustment of the earth's crust, at this particular locality, had been accomplished, and a condition of equilibrium supervened. The lava sank beneath the level of the crater, and. on cooling, plugged up the conduit. Those who are engaged in mining at Cripple Creek are aware of the existence of numerous large cavities underground, particularly in the southern part of Bull bill and the northwestern portion of Battle mountain. In the Logan mine the orifice of a very large cavity was recently encountered while sinking the shaft. The sudden flows of water which have embarrassed some of the mines are due to the unexpected drainage of such openings. It is worthy of note that these especially characterize the trachyte-phonolite and those rock masses which represent the lavas extruded last.

After the volcanic energies had declined, there followed a long period of smothered activity, evidenced by geysers and hot springs. Steam continued to escape, but gently. There was none of the violence of the earlier period. Heated water accompanied the steam, instead of fused rock. The hot lava still existing at greater depth served to give expansive force to the surface waters which found their way, by seepage, through the overlying deposits of volcanic material. The steam and hot water now emitted, at some spots quietly as a thermal spring and elsewhere intermittently as a geyser, probably carried a good deal of mineral matter in solution. A wonderful work is accomplished in this quiet way, because such activities extend over enormous periods of time. Prof. Judd has shown that the hot spring at Bath, England, although an apparently unimportant geological agent, brings daily to the surface 180,000 gallons of water at a constant temperature of 120° F. This spring was doing its duty at the time of the Roman invasion of England, and it is estimated that since that time it has brought up, in solution, enough material to form a good sized volcanic cone.

The Cripple Creek district exhibits abundant evidence of hydrothermal action. This is particularly the case in the northwestern part of the mining area. The breccia of the upper parts of Globe and Ironclad hills, penetrated by the workings of the Deerhorn, Summit, South Park, Plymouth Rock and other mines, is much decomposed, and has a loose, crumbly character. It is seamed to an unusual degree with irregular fractures, lined with secondary minerals, among which crystalline gypsum and amorphous kaolin are the most common. In the Deerhorn shaft there is evidence of a more definite kind. At a depth of 240 feet the shaft cuts into a mass of gypsum, and from that point to the bottom, 575 feet below the surface, it has been sunk in the midst of what appears to be a series of extinct thermal springs.

The workings are very extensive and connect with the adjoining mines. Breccia and tuff compose the prevailing rock. No distinct dikes are visible near the Deerhorn shaft; it is probable, judging from the composition of the breccia at several points, that several intrusions do exist, but that they have been so shattered in place as to be scarcely distinguishable from the original breccia which surrounds them. At the third level, and at the succeeding levels, there are three distinct narrow-pointed cones of compact white gypsum which, at 15 to 25 feet from their apex, graduate into chimney-like masses of breccia cemented by crystalline gypsum. At the sixth level there is a fourth of these occurrences. Others, which do not happen to have been intercepted by the workings of the mine, may exist in the vicinity.

Iron pyrites is found in the gypsum; it occurs as a scattering of coarse crystals in the upper portion, and finely disseminated lower down. The white gypsum carries patches which are stained pink by fluorite. The surrounding breccia is everywhere traversed by color bands due to layers of gypsum, manganese oxides, and iron ocher. Scattered through the vicinity, but parallel to the group of columns above described, there are patches, as well as seams, of fluorite sand, consisting of particles of crystalline silica stained purple by admixture with fluorspar. The upper levels also show bands of a white unctuous clay, named "Chinese talc" by the miners. This is pure kaolin, derived from the decomposition of the feldspar in the andesite fragments composing the bulk of the breccia. The latter is in a crumbly condition, its character being suggested by the fact that in driving the levels only a pick is needed, the ground requiring no blasting. Beyond the central portion, which has structural lines sympathetic to the arrangement of the columns of gypsum, the breccia is still stained and disintegrated for a great distance, and in places exhibits suggestions of the neighborhood of other thermal conduits.

There can be no doubt as to the nature of these masses of gypsum. Thermal springs which have become extinguished are marked by just such accumulations of lime, although the carbonate is, under such circumstances, more common than the sulphate. The flows of hot water encountered in the deep workings of the Comstock carried a notable percentage of gypsum. Last April, while examining certain copper mines near Hawthorne, in Nevada, the writer came across a group of similar vents, marking the site of former thermal springs. The conduits, in this case, occurred in lime shales, and were still open to a considerable depth, as was proved by dropping stones into them. They were surrounded by a compact chimney of carbonate of lime, which had also overspread the enclosing rock.

Recurring to the conditions observed in the Deerhorn shaft, it would seem that the rising hot waters, in their approach to the surface, were unable to maintain a defined channel through the breccia higher than the level marked by the tops of the cones of gypsum. This might be caused, first, by the fact that the vapors ascending above the subterranean springs disintegrated the breccia so as to destroy its cohesion, and changed it from a compact rock to loose material. The most potent factor, however, was probably the diffusion of the ascending waters into the drainage of the surface, the effect of which would be encountered at this horizon. The condition of the breccia and the wide area which has undergone disintegration favor this view.

It is in accord with facts observed in other regions that the vents which permitted the emission of lava flows should be in one part of the volcanic area (in this case the southern portion) while the escape of hot waters which marked the time when the volcanic energies were waning should have occurred in another part, in this case the northern and northeastern. The lava had healed lines of weakness; it had cemented the fractures produced by the earlier paroxysmal efforts of the volcano; and therefore the thermal waters found a better chance of exit elsewhere. With the hot waters which found their way to the surface during the closing period of the volcanic cycle there were emanations of gas. Sulphuretted hydrogen was probably emitted, sulphurous acid gas, and, in all likelihood, carbonic acid gas, at one place or at one time. The volcano had now reached the "solfatara" stage. These acid gases played an important part in altering the volcanic rocks, and were, possibly, a factor in the process of ore deposition which was beginning. The vapor of hydrofluoric acid was also among the agencies at work. This is inferred from the large amount of fluorite, the fluoride of calcium, which occurs all over the district, and more especially in the gold-bearing lodes. Fluorite is not found in the lava of Vesuvius. The action of hydrofluoric acid on feldspars containing lime would form fluorite. It would also convert gypsum in a similar way. Fouque has shown that the action of hydrofluoric acid in the liquid state is to decompose, first, uncrystalline silicates or glasses, then fieldspar and other acid silicates, then quartz, and lastly, basic silicates. Whether the vapor of hydrofluoric acid would act in the same way is uncertain, although it is possible that in this case quartz might be attacked in preference to the feldspar. This is a matter of interest, because in examining specimens of granite which have been converted into ore (by the addition of gold-bearing tellurides) it is observable that the original quartz of the granite has been attacked while the orthoclase remains comparatively fresh.

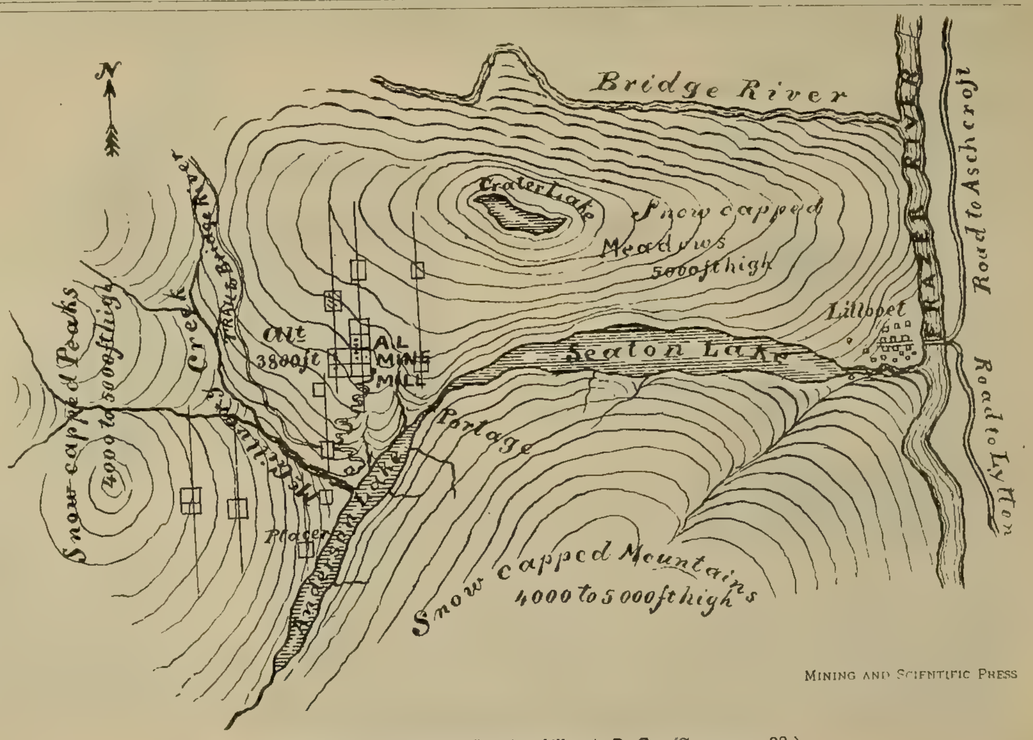
This last stage of the Cripple Creek volcano is of great importance to the mining geology of the region. It extended over an enormous period, coinciding, roughly speaking, with that which is ascribed the first evidence of the existence of the human genus, and it afforded, to an unusual degree, those particular conditions which are considered to favor the deposition of precious ores. During this time, also, the breccia, with its finer portions, the tuff, became solidified. The pressure of the overlying masses of lava which at one time covered it, and the chemical solutions, which deposited fresh crystalline substances in the interspaces, converted the scoriaceous material into a compact mass, which eventually became solid rock as we now see it. The cooling of the intrusive bodies of lava caused them to contract, and thus developed lines of weakness along which the energies of the volcanic center developed fractures permitting the subsequent prolonged circulation of underground waters. The readjustment of this particular portion of the earth's exterior, which followed the cessation of volcanic eruptions, and the partial settling of the entire mass forming the Cripple Creek volcano, must have formed an extensive system of ruptures, which afforded lines of maximum porosity along which the gold-bearing solutions found passageways. Thus the hot waters which are supposed to dissolve out the metals from the deep-seated rocks were permitted to ascend toward the surface, where the release from pressure and the lowering of temperature forced them to precipitate their contents.

The activity of the geysers ceased; the warmth of the water bubbling from the springs gradually diminished; and at length the last vestige of the volcanic fires passed away. The mountain became as cold as the snow which mantled it each winter, and as still as the darkness enshrouding it nightly.

A Note on Hand Concentration Tests.*

By WALTER McDERMOTT.

In making a hand concentration test a good deal of skill is required to obtain a clean separation of mineral from gangue. The nearest to perfect work in this line is done by Cornish tin dressers on a vanning shovel, but few engineers have the practice and skill to obtain equally good results. Granting that the necessary knack is attained of throwing up the coarser particles of mineral from the waste, and of washing the latter back from the finest slime mineral, the difficulty remains of a practical separation of the two products for weighing and assaying. It is usual to wash the light waste off the shovel, placque, pan, batea or other surface employed, and it is here that special skill is required to prevent loss of fine mineral, and a consequent necessity for treating and retreating the tailings. To remove the concentrate from the waste in anything like a clean condition is still more difficult by any of the means usually employed, but Prof. Threlfall has lately called my attention to an exceedingly simple and effective method of doing this. An ordinary glass pipette is drawn down to a fine point, and fitted at the other end with a short piece of rubber tubing, to be held in the mouth, and so allow freedom of motion of the pipette. Having formed a head of mineral, this is sucked up into the pipette through the fine point (while the mineral is kept covered with water), and is then blown out into a separate dish. The operation of forming a fresh head of mineral and removing it by the pipette is repeated, until no more concentration can be effected. An extremely fine line of



MINING AND SCIENTIFIC PRESS

Map of McGillvery Creek Mining District, Lillooet, B. C.—(See page 98.)

---

*Condensed from a paper read at the Washington meeting of the A. I. M. E. by T. A. RICKARD.

*Trans of the Inst. of M and M.

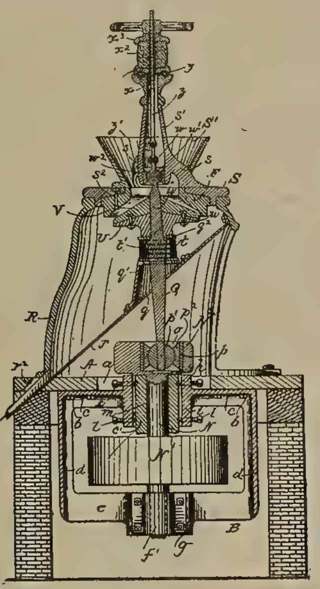
slime mineral can be thus picked up from the waste. The small quantity of waste which will be sucked up with the mineral in removing this can again be readily taken from the concentrates by shaking the latter up with a little water, washing back the waste, and using the pipette on this.

Mining and Metallurgical Patents.

Patents Issued July 17, 1900.

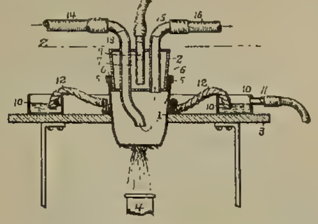
Specially Reported for the MINING AND SCIENTIFIC PRESS.

MACHINE FOR CRUSHING ORES.—No. 653,679; S. W. Kimble, New York, N. Y.



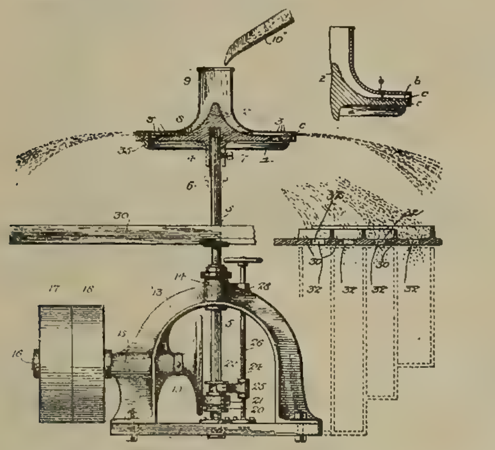
In a crushing machine, a muller crushing face which is of comparatively slight convexity, overhanging inverted mortar whose crushing face is of somewhat greater concavity, intermediate space between crushing faces diminishing in width as it recedes from center, muller shaft yieldingly supported from above and fulcrumed at upper end, means at lower end of shaft for imparting movement of nutation thereto.

COMBUSTION CRUCIBLE.—No. 653,823; P. W. Shimer, Easton, Pa.



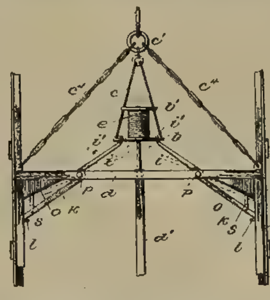
The combination with crucible 1, of stopper 2 closing the mouth of the crucible and bearing inlet and outlet tubes 8, 9, for the circulation of a cooling medium through the stopper, gasket 6 between the stopper and crucible, trough 10 for containing a cooling medium, and wick 12 leading therefrom and passing around the crucible.

CENTRIFUGAL ORE SEPARATOR.—No. 653,792; A. Dasconaguerre, Mexico, Mexico.



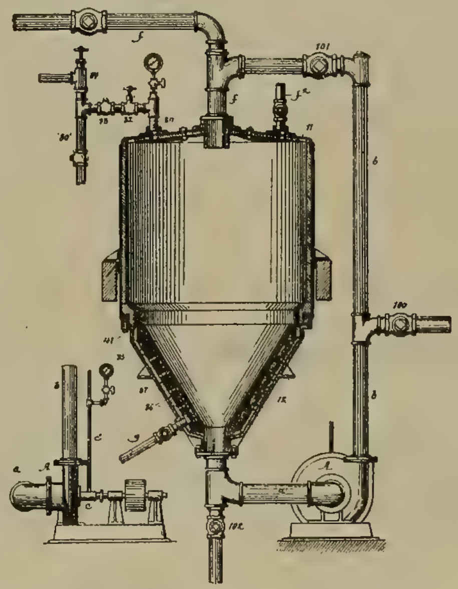
Centrifugal ore separator and concentrator, comprising revolving working surface, having central deflecting portion 2, and plane outer portion 3, in which are sunken tangentially disposed grooves a, thereby forming plane "lands" b on outer portion between grooves; and hood, having inlet, and disposed in proximity to working surface, but out of contact therewith, and conforming in its proximate side substantially to profile of working surface, thereby forming centrifugal air passage c above walls of grooves for blast of air induced by tangentially disposed grooves.

CLUTCH MECHANISM FOR MINE CAGES OR LIFTS.—No. 653,940; R. Schulz, Herne, Germany.



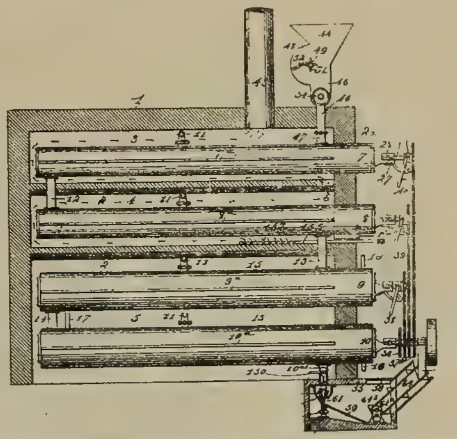
Combination, with cage or lift of corner pockets, hinged flaps beneath corner pockets, buffers located in corner pockets, central pockets, hinged flaps beneath central pockets, buffers located in central pockets and clutch levers pivoted to cage or lift having lower arms adapted to bear against flaps of corner pockets, and an angular crossbar adapted to bear upwardly against hinged flaps.

METALLURGICAL FILTER.—No. 653,684; F. H. Long, Chicago, Ill.



Combination with closed vessel having filter septum and regulated outlet port for filtrate beyond septum, of wash water pipe connected in hydrostatic column with vessel and external centrifugal pump joined at separate sides in closed union with opposite ends of vessel; journal box for pump axle furnished with water column pipe to counterbalance hydrostatic pressure at vessel.

RETORT FURNACE.—No. 654,066; R. E. Lauck, Kansas City, Mo.



Retort furnace, having front end projecting through furnace wall, comprising casing, having inlet port near front end of furnace, and outlet port at rear end, provided with internal bearing socket at rear end and bearing head provided with stuffing box at its front end, provided also with internal stationary comb, partition 21 forward of inlet port, nonconductor of heat filling casing forward of partition, shaft extending through partition and journaled in bearing head, and at its rear end in bearing socket, and provided with skeleton spiral conveyor, teeth of which pass between those of comb, and means to rotate shaft.

Stoping With Machine Drills.

In the issue of September 30, 1899, appeared a paper with the above title, read at the California meeting of the American Institute of Mining Engineers by B. L. Thane, Sumdum, Alaska.

In a communication to the secretary, discussing the paper, V. G. Hills of Cripple Creek, Colo., says: In continuation of the subject of the performance of "baby machine drills," presented by Mr. Thane, I submit the following records of work done with these drills in the Cripple Creek district of Colorado.

Two years ago the Anchoria–Leland mine began to use baby drills, and, to make the experiment more complete, began by purchasing two machines, of the same size, but of different make. The little drills were first used for stoping and upraising, in which they achieved at once an unqualified success. Soon after they began to be used for the smaller branch drifts and prospecting crosscuts, while the large two-man drills were still used for the main drifts. Now they have almost entirely superseded the large drills, since it has been found that they will do any ordinary work in the mine at less cost, both for labor and for powder, per ton of rock broken. The large drills, of course, make more rapid progress; but it is only where time is a specially important factor that they are now used.

The Portland mine, where, until within a year, only the large machines were used, is now using some small drills for stoping, and also for drifting.

Mr. Thane speaks of having two men to operate a baby drill, but in this district the baby machine is always worked by one man without help. Again, in Prof. Christy's postscript, the quoted extract from a letter of Mr. L. T. Seymour, the South African engineer, mentions a "2½-inch Little Giant," as though that were the smallest machine used in that region. These statements leave some doubt as to just what Mr. Thane means by "baby drill." To avoid any such uncertainty as to the present communication, I will say that the large or two-man drill in common use at Cripple Creek has a 3⅛-inch cylinder, while a few mines employ a 3-inch, and a few, in running large tunnels, a 3½-inch drill. What we call a baby drill here has a 2-inch cylinder and uses ⅞-inch steel for "starters" and ¾-inch for the long drills. Such a machine will handle drills 8 feet long, but holes are usually from 4 to 5 feet, and seldom more than 6 feet deep.

In this district these drills are always used with a bar, are commonly spoken of as "one-man drills," and are operated strictly as such. That is to say, the machine man has no help, either to set up or run his drill, does his own loading and blasting, and has to shovel away his own waste sufficiently to make room for his next set-up.

It is with such a drill, thus operated, that the following records were made: Total length of holes drilled in one shift of eight hours, 35 to 45 feet; average, 39 feet.

Of course, the amount of ore broken or the length of level driven in a given time or at a given cost depends on the thickness of vein or the size of headings, as well as the character of rock; and, therefore, the length of the drill holes in a given rock is the only fair test of the efficiency of the drill. But some additional particulars may be interesting. A man driving a drift or crosscut, 4 by 7 feet in section, puts in nine to twelve holes for his shift's work. Records by the month, without any allowance for breakdowns, sickness, holidays, etc., show an average of 4.3 feet to 4.7 feet per day with two shifts. A man frequently makes 3 feet a shift for many days in succession. In making an upraise 4 feet wide by 8 feet long a man averages 2 feet per shift, doing his own temporary timbering. Regular timbermen follow, 10 to 15 feet behind, providing a safe place to store the machine, hose, etc., at blasting time.

Shaft sinking with these little drills is illustrated by the following record: Size of shaft, 17.1 by 8.2 feet; depth of working, 900 to 1000 feet; no water. Two baby drills sank the shaft 5 feet every two days, the machine men working only one and one-half shifts in forty-eight hours, and an equal amount of time being required to remove the waste and put in a 5-foot set of timbers. Five "muckers," working one shift, are required to remove the waste. If any one knows of a record for cheaper sinking in a shaft of that size and depth, I should like to have it reported.

A company furnishing compressed air for general distribution in this district charges $2 per large drill per shift, where only a small number of drills are used. I understand that there is a considerable discount to mines using a large number. By actual test at the Anchoria–Leland mine we have found that a small compressor, which would just operate two 3⅛-inch drills, will run five 2-inch drills. Coal costs from $4.50 to $6 per ton, according to quality.

From the above data the cost of air for drills of different sizes and under different conditions may be estimated.

For intelligent comparison of results in mine working, something of the quality of rock and other conditions must be known. The rock in which the above work was done is a highly indurated and, in general, comparatively seamless andesitic breccia, hardness 6 to 7, specific gravity 2.4 to 2.7. Eight hours is a day's work for miners in the Cripple Creek district.

A Desert Gold Mine.

The Free Gold group, formerly the Golden Cross, is in Cargo Muchacho mountains, 25 miles northwest of Yuma, 14 miles west of the Colorado river in the extreme southeastern corner of California. The group consists of thirty claims; four are being worked—Golden Cross, Golden Crown, Golden Queen and the General Miles. The mines are in the surrounding mountains, the reduction works and the town of Hedges are in a valley 250 yards wide in the form of an amphitheater, opening toward the west and debouching on the Colorado desert. The mountains are of igneous origin, and while not high, present a rugged and serrated outline against the sky. These mines were discovered by Mr. Walters in 1885. Eight years afterward they were owned by Messrs. Young and Johnson, who sold them to the Golden Cross M. Co. for $40,000. The company erected a 40-stamp mill and worked on ore from the Golden Queen with good results. In 1895 the company completed a new 100-stamp mill and enlarged the pipe line which supplies water from the Colorado river. In 1897 the Free Gold M. Co. purchased the property for $1,000,000 and remodeled machinery, etc.

Every mining district has its peculiarities, and this one is not an exception to the general rule. There is but little quartz and the gold is found in micaceous and hornblendic schists and in pegmatite (graphic granite). There is also more or less orthoclase, syenite, diorite, chrysocolla, gneiss, epidote, common granitic rocks, etc., found in connection with the schists and pegmatite, and nearly all carrying some gold. The seams of pegmatite present a peculiar appearance as they traverse, in almost every direction, the dark hornblendic and micaceous formation. Instead of quartz-filled fissures the gold-bearing rock is in large deposits and in some places is quarried. On the day previous to my visit a blast of nearly two tons of powder was discharged which brought down about 150,000 tons of rock from the side of the mountain, which was being reduced in the 100-stamp mill at the rate of 500 tons a day. Owing to the comparative softness of the rock it is rapidly reduced, and it yields an average of $3.10 per ton and at a cost all told of 73 cents. The proprietors claim to be able to manipulate $1 ore at a profit.

The tailings have been accumulating from the time of the erecting of the first stamp mill, and are now estimated at nearly 1,000,000 tons. From the 100-stamp mill they have accumulated to a depth of from 40 to 60 feet. The cyanide plant consists of five percolating tanks, 45 feet diameter, 5 feet deep, each holding 320 tons; two stock tanks for solution, two gold tanks and two sump tanks used for the final deposit for solutions. There are also 200 individual zinc boxes and five pumps. The capacity of the plant is 320 tons daily. The tailings are handled entirely by machinery, are flushed out of the tanks with water and carried outside the camp through pipes. About 500 tons of tailings are deposited daily. By September the company expects to increase the daily capacity of the cyaniding plant to 1000 tons. The tailings from both mills average $3 per ton in value and are cyanided now at a cost of 33 cents, which will be reduced to 30 cents, or less, when the daily capacity is increased to 1000 tons.

There has been much development work done—about 12 miles of shafts, tunnels, drifts, crosscuts, wings, etc. The timbering is square Oregon pine 6x6 and 8x8 inches diameter. In the ledge running northwest and southeast the ore is higher grade than that produced in the other claims, which brings the average to more than $8 per ton; but, owing to the easy method of obtaining the ore, which is now being worked from the south side of the valley, the latter is considered most profitable. The ore is delivered in the mill at a cost of 25 cents per ton; the milling and all further handling costs 48 cents per ton. The output of bullion from these mines, including that produced by the cyaniding plant, is about $70,000 per month. Nearly 170 men are on the payroll, which reaches about $10,000 per month. They are whites, Indians and Mexicans, the latter largely predominating.

The improvements, including buildings, stamp mills, cyaniding plant, engines, crushers, pipe line, machine shops, assay office, etc., cost about $1,000,000. The machinery of nearly all kinds is of the best obtainable. For several years the mines have been in litigation, which it is claimed has cost the company some $400,000, yet these mines have paid all expenses of buildings, machinery, litigation, etc., and are now practically out of debt.

Well-equipped shops for doing all kinds of work needed about the mines are found here, with skilled workmen to conduct them. They include machine shop for repairs, blacksmith shop, carpenter shop, mine-timbering shop where all mine timbers are framed by machinery, driven by steam; all kinds of needed work in wood and iron is done here except castings. A dynamo, capacity 500 fifty-candle power, supplies electric lights for the mines, reduction works and wherever else needed.

The company owns ten engines, one crusher of 1000 tons capacity and two crushers of 200 tons capacity. They also have a complete pumping station at the Colorado river, where a 175 H. P. Corliss engine forces the water through 14 miles of pipe to a reservoir which holds 300,000 gallons, 100 feet above the town. Owing to its extreme dryness, the ore requires about 1000 gallons per ton in reducing it. Wood is used for fuel and is bought by the ton. It is palo fierro or iron wood, procured on the desert. It is as hard and as heavy as lignum vitæ and looks like that wood. It is delivered at the mines for $3.75 a ton.

The stamp mills are among the best and the largest in number of stamps of any in the State. The 100-stamp mill runs day and night. It is said to have lost but eighteen hours in three years. The stamps have 6½ inches drop and crush five tons of ore each per day of twenty-four hours. They are driven by a compound Corliss marine engine of 400 H. P., with four 100 H. P. boilers; an air compressor furnishes power for the drills. The 40-stamp mill has been idle for a time awaiting the removal of the accumulated tailings, when it will be started up again, and the company has in contemplation the addition of another 100-stamp mill, making 240 stamps in all.—Condensed from article by S. Bowers in Los Angeles Herald.

East end of 100 Stamp mill, the largest in Cal Rock crusher and framing shop
Cyanide Plant Free Gold Mining and Milling Co
Hoist and Ore bins at THE GOLDEN CROSS MINES
MINING AND SCIENTIFIC PRESS

Views of the Golden Cross Mill and Mine, San Diego County, Cal *

Copper Alloy for Amalgamating Surface.

At the California meeting of the American Association of Mining Engineers a paper was read on "Plate Amalgamation," by A. J. Clark of Lead, S. D. In discussion of the subject, H. Van F. Furman of Denver, Colo., in a communication to the secretary, says that, in the papers and discussions on copper-plate amalgamation and the accumulation of amalgam on copper plates, he has noted nothing regarding the efficiency of copper alloys as amalgamating surfaces.

He then quotes from T. K. Rose, who has suggested an alloy to be used for amalgamating plates, consisting of copper 60%, zinc 40%. Dr. Rose asserts that this alloy catches the gold well as soon as the plate is amalgamated, not requiring to be covered with gold, or silver, amalgam, before beginning to do good work; that the amalgamated surface is superficial; the mercury does not sink in so far as into the pure copper plate, with the result that it is easier to clean up; but pointing out that, as the alloy holds little mercury, it can not absorb much gold and must be frequently cleaned. Note is made that the mercury on such a plate does not "sicken," which may be due to the electrolytic action of the copper-zinc couple which sets free nascent hydrogen, reducing the compounds of mercury and other metals which have been formed, which would seem to make such a plate suitable for ores containing large amounts of heavy sulphides or arsenides. Claim is made that the verdigris formed on copper plates when grease or other impurities are present in the battery water do not appear when this alloy is used, and that such discolorations as may occur thereon can be better removed by a dilute sulphuric acid than by potassium cyanide. Dr. Rose cites the case of the Saxon Mill, New Zealand, where the copper plates formerly required seven pounds of cyanide, costing $2.80 per month, to keep them clean; while the alloy plates, by which they were replaced, were kept clean by five pounds of sulphuric acid per month, costing 50 cents. He notes, however, that in the treatment of the highly acid ores, which, having been weathered, contain large quantities of soluble sulphates, or, where the battery water contained acids, that the regular copper plate is less affected than the alloy, over which a scum is rapidly formed in such a case. In dressing the new alloy plates the following method is adopted in New Zealand: The surface of the plate is scoured with fine, clean sand; then it is rinsed with water and washed with a dilute (1 to 6) solution of sulphuric acid. Mercury is then applied and rubbed in with a flannel mop, until it wets the surface of the plate (i. e., amalgamates with it) in one or more places, after which the mop is given a circular movement, passing through these spots until the amalgamation of the surface spreads from them over the whole plate.

(TO BE CONTINUED.)

---

* Reproduced from the Los Angeles, Cal., Herald.

California Petroleum.

At a recent meeting of the Pacific Coast Gas Association in San Francisco, State Mineralogist Cooper contributed a paper on California petroleum, that, in addition to the articles furnished by him to the Mining and Scientific Press on the same subject, contains practical information of general value. In this last paper Mr. Cooper directs attention to the fact that petroleum oils from different oil fields of California differ widely in physical characteristics and chemical composition. They may contain, chemically combined, sulphur, oxygen and nitrogen, and in widely varying amounts, while in some rare instances these elements may be absent. Oils in the same stratum and a short distance apart may vary greatly. Frequently a well when it first yields will give an oil of a lighter gravity than that which it will yield when it has been pumped for some time. We may, therefore, look upon California petroleum as containing carbon hydrogen, sulphur, oxygen, nitrogen and other substances in minute quantities; these combinations being great in number and complex. The boiling points and melting points of the bitumens are altered very considerably by the presence of sulphur, oxygen and nitrogen.

California petroleum is a mixture of a large number of hydrocarbons, and a large number of compounds containing hydrocarbons combined with sulphur, oxygen, nitrogen and other elements.

All the hydrocarbons and their compounds with other elements in California crude petroleum are volatile, some such as benzine extremely so, while asphaltum volatilizes with great slowness. Natural gas is a volatile part of petroleum. Like coal, the bitumens, oils and asphaltum, through decomposition, are constantly giving off carbureted hydrogen.

One of the reasons why California petroleum has such a high gravity is because the formation in which it occurs is tilted and broken, permitting the escape of the gases.

When California petroleum is evaporated by atmospheric influences, the sulphur, oxygen and nitrogen compounds remain and are concentrated, and, if the process is continued long enough, solid asphaltum is formed. After asphaltum is formed evaporation takes place with exceeding slowness. Heat accelerates evaporation. The evaporation from an oil tank built under ground and kept at a temperature of 60° Fahr., is far less than from a tank built above the ground and exposed to the sun's rays, which may often reach a temperature of 130° Fahr.

Advantage is taken of the fact that asphaltum is nearly an unalterable gum to make many constructions in which a plastic and unalterable cement is required. Usually California petroleum contains from 5% to 9% of sulphur.

Some wells in California produce oils containing paraffine and are valuable for producing illuminating oil.

On the Laguna Extension, or Zaca rancho, in Santa Barbara county, there are large deposits of bituminous sand exposed upon the surface. On any one of several 20-acre tracts at this place the dimensions of the exposures of the bituminized sand would show that it contains 8,000,000 barrels of heavy petroleum of the consistency of molasses.

To make one barrel of that material must have taken eight barrels of ordinary petroleum before evaporation; so that on each 20-acre tract is now the remains of 64,000,000 barrels of petroleum oil. In California, as elsewhere, there are probabilities of a very small territory producing great quantities of oil.

Unaltered rocks of California cover an area of over 40,000 square miles. Bitumens occur in all geological formations, from the plutonic, metamorphic, or igneous rocks, up to and including the quatenary. It is found saturating strata of sand and seamed shale, and as many as ten beds of shale can be seen on the eroded sides of some of the anticlinal ridges of the Coast Range. These sand beds are very irregular as regards their thickness and the distance intervening between them. Some are a few feet in thickness, while others exceed 400 feet, and the shales are from a few feet to over 500 feet in thickness.

When several sands are to be seen on the side of a mountain, or when they can be traced upon the surface of the earth by their outcrop, if bituminized at all, the bitumen will generally be in the geologically lower beds, and when a sand contains bitumen the underlying sand beds are also liable to contain bitumen.

At the present time nearly all the wells that are being bored are in the vicinity of surface indications, to wit: oil seepages, outcrops of bituminous rock and gas blow-holes, all of which are signs that the reservoirs of petroleum are leaking, owing to insufficient cover. At present the wells are generally shallow, but they will increase in depth in time, as they have done in other fields. The day is not far distant when oil territory will be selected by geologists on account of favorable structure and position, irrespective of surface bitumens. The wells in this territory will have to be drilled to a greater depth, but, when productive, will yield light oil.

The large area and the thickness of the unaltered rock and the great thickness and number of the oil sands in California causes Mr. Cooper to express the belief that the yield of oil in California in future years will be enormous.

A comparison of the consumption of fuel oil with that of coal shows 3.33 barrels of fuel oil to be equivalent to one ton of good imported coal. Figuring oil at $1.40 per barrel and coal at $7.50 per ton in San Francisco, it shows the cost of oil to be $4.66 as against $7.50 for its equivalent in coal. Moreover, the labor required to operate with coal is far greater than with oil, in many instances being nearly double.

The perfect cleanliness of fuel oil and the ease and simplicity of supply and regulation, makes it a most desirable substitute for coal. As long as coal remains at $7.50 per ton in California, it can not be expected that oil will fall below its present price; not, at least, for some time to come.

In the year 1899 there were 1,740,027 tons of coal imported into the State of California; to supplant this 5,792,238 barrels of oil will be required. As the supply becomes more permanent the uses of fuel oil will multiply.

The removal of the gasoline, benzine and illuminating oil leaves an oil with a high flashing point, which would be less dangerous to use in a locomotive and otherwise than a fuel oil of low flashing point. The removal of the water also improves the oil for fuel purposes, as it does not have to be evaporated by the fire.

At present the market value of asphaltum is too high for it to be economically used for either the manufacture of gas or for fuel purposes. The large percentage of sulphur in natural asphaltum or in that obtained as a residue in the distillation of crude petroleum, make them an undesirable fuel. During combustion with oxygen the sulphur combines with the oxygen to form sulphur dioxide. Sulphur dioxide, in absorbing water or the vapor of water, changes to sulphurous acid. By oxidation the sulphurous acid is changed to sulphuric acid, which may lodge on the surface of the boiler and attack the iron, forming sulphate of iron. Through this action the sulphur contained in the asphalt is a cause of corrosion in boilers.

Owing to the presence of sulphur, the fuel value of asphaltum is small when compared with the other hydrocarbons contained in crude petroleum. The laboratory and practice show that the distilling, manipulating and purifying of crude California oil must be totally dissimilar and different from the methods in use in Pennsylvania, Canada and elsewhere. Most of the crude California oil should be distilled twice. From experiments made it would appear that the vapors of the lower hydrocarbons during distillation are contaminated by the decomposition of the sulphur contained in the higher hydrocarbons, such decompositions being caused by heat.

The asphalts obtained by the distillation of California petroleum contain from 4% to 7% of sulphur.

California crude petroleum is composed of a number of hydrocarbons and hydrocarbon compounds mutually dissolved one within the other and having different boiling points. Owing to this they can be fractionally distilled so as to separate them into fractions having the following commercial names and physical characteristics:

Crude California Oil 26° Baume. Distillates Commercial Name.	Approximate Baume.	Specific gravity.	Weight of one gallon in pounds.	Percentage Obtained.
Gasoline	75	0.6820	5.69	3
Benzine	63	0.7253	6.04	4
Illuminating	45	0.8000	6.66	13
Mineral sperm	38	0.8333	5.94	8
Gas distillate	28	0.8860	7.38	21
Light lubricating	26	0.8974	7.48	8
Neutral	23	0.9150	7.62	10
Heavy lubricating	21	0.9271	7.72	5
Valve lubricating	15	0.9655	8.04	4
Asphalt		......	....	11
Loss		......	....	13
Total				100

The following are the percentages of distillates obtained by the first distillation from any crude California oils:

	Per Cent.	Per Cent.
Naphtha	Traces	15.
Illuminating	6	27.
Gas distillate	16	30.
Lubricating	20	52.
Asphalt and loss	7	25.

In the first distillation the following are the temperatures at which the following distillates are distilled:

Crude naphtha	Traces	150° C.
Iluminating distillate	150°	300° C.
Gas distillate	300°	350° C.
Lubricating	350°	....

Owing to the highly complex composition and great diversity of California oils, the above figures are to be considered only suggestive.

Fifty H. P. "Union" Hoist.

The illustration on page 89 shows the latest improved 50 H. P. double-cylinder, single-drum mining hoist made by the Union Gas Engine Co. of San Francisco. One of this size was installed at the Pacific Coast Borax Works near Daggett, Cal., last February, and a duplicate of it has been shipped to the same party, making nine "Union" hoists on their property, the first of which was installed in 1889, is still in use, and is said to have been the first gasoline mining hoist ever built. During the past week a 50 H. P. "Union" hoist was shipped to the Ophir Mining & Milling Co., Stateline, Utah, and one of 25 H. P. to the Vulcan Copper Co., Siegliton, Nev. The new premises of the company at the corner of First and Clementina streets, San Francisco, are already taxed to their utmost capacity by the demand for the "Union" engines for all purposes.

Vaporizing Attachment for Economical Water Supply for Water Jackets of Smelting Furnaces.

Two engravings on page 89 accompany this description of a rectangular and round smelting furnace, respectively, fitted with Nesmith's patent water vaporizing attachment for the economical use of jacket water for smelting furnaces. This appliance was designed originally for a plant that was to operate in a district where great scarcity of water prevailed, and its success from the start for the purpose for which it was made, and the improvement in the even working of the furnace, led to its further advancement. It is manufactured by the Colorado Iron Works Co. of Denver, Colo., who indorse and recommend it for all classes of water-jacketed furnaces, regardless of water supply.

Advantage is taken of the latent heat of steam, which is 966 heat units, 1 pound of water at 212° F. absorbing 966 heat units in vaporizing to steam at 212° F. This data is for sea level. Water at the altitude of 1 mile boils at 202° F. Allowing water to be supplied to the jackets at 62° and discharged at 202°, there has been absorbed by each pound of water but 140° of heat units, which is all that it is possible to get where water instead of steam is discharged from the jackets. If vaporized to steam from initial temperature of 62°, there is for 1 pound of water 140 units to boiling, plus 966 units to steam at 202° indicated temperature, equaling 1106 heat units, carrying off 966 units of heat in steam from each pound of water, without making the jackets any hotter than if they were discharging boiling water, the proportion of gain or water saved thus being 966 heat units: $966 + 140 = 1106 \div 140 = 7.9+$, thus using 7.9 times as much water if discharged boiling from the jackets as would be used if vaporized and discharged as steam, the jacket no hotter in vaporizing the water to steam than by simply discharging boiling water from it, using about one-eighth the amount of water by vaporizing it than would have been used by discharging it boiling from the jackets; and as water is seldom discharged so hot as 202°, the amount required for vaporization will fall below one-eighth that usually used for cooling, and will have kept the jackets at the same temperature in the one case as in the other.

Instead of taking water direct from source of supply direct into jackets, a large circular pipe or tank surrounds the furnace, in connection with or independent of the bustle pipe, which receives the entire supply near its bottom. The lower jackets are connected in their respective positions from the bottom of this tank; the jackets are connected with each other — top, bottom and sides—and the water is discharged from the top of upper jackets into the circular tank at a point about its center and just below the overflow standpipe inside, the tank being three-fifths full of water all the time. The bottom of this tank is above the highest water jacket, making perfect the circulation of water in jackets. A large pipe is open to the atmosphere, through which the steam from the tank is exhausted. The overflow pipe from tank is trapped to prevent the escape of steam on furnace floor, from which a very small stream is allowed to run to waste, visible at all times to workmen as evidence that a sufficient supply of water is being received into the furnace, and also that the appliance is working satisfactorily. A regular water glass indicator is also placed on the tank, showing the water level at top of standpipe overflow inside as a secondary precaution.

This appliance is considered by its makers to demonstrate that about nine-tenths or more of the water usually used in a furnace can be dispensed with, and still further great advantage derived from the uniform, even temperature of the jackets at all times and the diminished liability of their cracking by reason of cold water being discharged into them. The evenness of the working of the furnace under these conditions is marked. The jackets are always full of water at boiling point, but steam is made only in the vaporizing tank, from which it is discharged into a tank for condensation and further use, or to the atmosphere, and which, if the water supply valve is properly adjusted, need be the only water used. Pumping expense is thereby greatly reduced.

In the case of the round furnace, from which one of the engravings is made, the supply water is that only which comes through the cooling chamber of a 44 H. P. gasoline engine, and is received into the tank and thence to furnace at practically the boiling point. The apparatus is considered an important improvement to any class of water-jacketed furnaces.

MINING SUMMARY.

ARIZONA.

MARICOPA COUNTY.

At Kelvin has been made a successful trial test of the Ray Copper Co.'s mill; the concentrates run from 35% to 50%. The railroad is bringing down 300 tons of ore daily.

At the Phœnix mine, near Phœnix, S. Huntington will put in a cyanide plant to consist of two separator tanks and four leaching tanks 30 feet in diameter, having a daily capacity of 125 tons of ore. The ore having passed through the mill will be pumped into the separator tanks by a sand pump. The water will run back to be used again in milling operations, and the contents of the separator tanks will be removed from them at the bottom and carried by means of a car over the leaching tanks and dumped into them.

MOJAVE COUNTY.

(Special Correspondence).—The Tennessee mine is pushing its shaft as fast as possible, hoping to get the mill running as soon as completed and connection made with the main shaft.

Report is that the O'Connor and Minnesota mines and mill, owned by John Barry, which have been large producers and shippers of ores and concentrates, have changed hands.

The Silver Age, operated by Mr. Loy, is reported in ore.

The present month will be the banner month for the Lucky Boy. The whim is in place and the mine is getting ahead of present facilities for packing ore down the mountain.

Mr. McDuffy is getting out ore from the Rainbow for shipment.

Fergusson, Flynn & Fergusson are taking out ore from the Redemption for shipment to the smelter. The ore carries fair values in copper, gold and silver. Fergusson & Sons are the owners of this property, also of the Clyde south extension of same, which they have leased to others, and work will soon begin.

The Watchman Bros. have made a shipment from their property to Kingman. Results were very meager on account of charges on medium-grade ores. They are now preparing to ship in carload lots.

There are other properties working in a small way which may turn out mines in the future. What is wanted here is mining capital, not ranchers, who are afraid to develop unless a prospect gives two dollars for one invested.

Chloride, July 23.

YAVAPAI COUNTY.

The miners employed by the United Verde Co. are preparing to organize a miners' union.

The hours in the United Verde mine, Jerome, have been cut down from ten to eight for all men working underground.

CALIFORNIA.

AMADOR COUNTY.

The Kennedy M. & M. Co. have secured a reduction from the assessment of $169,000 placed upon it by the assessor of $50,000.

Dispatch: At the Mutual mine, between Sutter Creek and Amador City, the shaft is 450 feet deep. A drift is being run to tap the ledge 125 feet farther. ——At the Oneida mine the old and new shafts are connected by a 350-foot upraise. It is thought the stamps will be dropping in the new mill by September. ——W. A. Knapp, Supt. Hepburn or Bellwether mine, expects to soon resume work.

BUTTE COUNTY.

At Forbestown the Gold Bank M. Co. is increasing the mill capacity from forty to sixty stamps. Seventy-six men are employed. Supt. Stow tells the Mercury that to operate the increased mill will require only eighteen more men than now employed and the cost of milling will be reduced 35 cents per ton.

Eastern men have the Miller mine, 2 miles south of Forbestown; superintendent, George Shkoff. A new three-compartment shaft, $4\frac{1}{2}$x$12\frac{1}{2}$ feet, will be sunk 230 feet and drifts run at that depth. He expects to have a 20-stamp mill running within a few months.

CALAVERAS COUNTY.

The Demarest mine at Fourth Crossing is closed till the rains come again.

A strike of unusually rich gold ore is reported at the Angels mine last Wednesday below the 700 level. The ledge is 18 inches wide.

The Del Monte group of mines, recently incorporated, is near Railroad Flat. The group consists of six claims and mill site, equipped with a 10-stamp mill, of which five stamps are in place and have been in operation during the past year. There are five veins crossing this group, showing a width of from 12 inches to 4 feet. The principal work has been done on the Del Monte or Old Prussian Hill claims. The main tunnel is 900 feet in quartz.

EL DORADO COUNTY.

(Special Correspondence). — A recent item got the Union and Schoolgirl mines mixed. The facts are that the Union G. M. Co. owns a large territory—about twelve full mining locations. On the extreme northwest of this property a large and very promising lode or vein of pay ore was discovered last year. It was opened and developed and a 20-stamp mill was erected thereon by the Union Co. It was one-quarter of this property, incorporated as the Schoolgirl mine, that was sold by the Union Co. to Messrs. Williams, Burns & Bixler. It has no connection whatever with the Union mine or its 20-stamp mill.

Placerville, July 25.

The Table Rock mine, on the American river, is being unwatered and reopened by Fuller & Stephens.

The mill at the Boulder has shut down, owing to a scarcity of water.

The shaft at the Mt. Pleasant is unwatered to the 600 level.

At the Omo mine the 10-stamp mill is running. The mine is being developed by tunnels.

The Richmond mine, situated at the forks of the Cosumnes, has suspended operation.

At the Little Gem mine, near Volcanoville, three eight-hour shifts are driving the tunnel on the ledge from the 200-foot level.

On the Alpine, near Georgetown, the shaft is over 120 feet in depth.

The Mt. Pleasant mine, near Grizzly Flats, recently purchased by Brown Bros. of Oleta, is now free of water to the 600-foot level.

At the Clark gravel mine, near Placerville, preparations are being made for a new mill.

Work has been entirely suspended at the Esperanza mine, near Garden Valley, the property of the Garden Valley G. M. Co., the mine filling with water. The company is selling the machinery.

GLENN COUNTY.

One hundred and eighteen oil claims have been filed by the Great Northern Oil Co. in the Stony creek mineral district.

HUMBOLDT COUNTY.

The Sugar Bowl mine, near Hoopa, is sold by J. W. Humphreys to Douglas Bros.

KERN COUNTY.

In J. B. Treadwell's well No. 10, section 3, township 29 south, range 28 east, the drill has struck a flow of gas and oil which shot 70 feet into the air, reaching the top of the derrick.

At Johannesburg ore from the Little Butte mine (twenty tons) gave $2400.

LOS ANGELES COUNTY.

The Los Angeles Land Office reports large numbers of scrip locations being filed since the recent decision of U. S. Circuit Judge Ross favoring that class of locations. The scrippers are filing over lands in the various oil districts where placer oil locations have been made.

MONO COUNTY.

At Bodie the Standard Con. M. Co. has bought the Bodie T. & M. Co.'s property, which includes a 10-stamp mill.

Miner-Index: The bullion yield of the Standard Con. mine of Bodie for the past fiscal month was the largest of any previous month for about three years. The net proceeds in gold coin from the sale of the bullion last month were $45,794.55; expenses, $30,878.88; net profits, $14,915.67. The surplus now on hand in the treasury of the company and invested in U. S. bonds amounts to $158,930.57.

NEVADA COUNTY.

J. E. Doolittle has sued the Gold Run Gravel Co. and had an attachment levied on the company's property for $10,880.59.

The Champion M. Co. of Nevada City will build a new sand plant below its mines at Deer creek under the direction of O. Brown.

In Grass Valley the Tulle Belle is to be developed. J. R. Tyrrell is Sec'y and A. Blackburn Supt. Sinking has begun on a two-compartment shaft.

Union: Haskins and Eldridge have begun work on the Franklin, Lone Star and Goose Neck mines in Willow valley. From a reservoir on the hill above the Franklin water will be conveyed 2000 feet through pipes to the mine. They have the machinery on the old Fountain Head gravel mine on the Washington ridge, which will be used at the Franklin.

PLACER COUNTY.

The R. A. Watson quartz mine at Shady Run has been bonded by a Stockton company and the work of sinking 100 feet begun.

SAN BERNARDINO COUNTY.

Mining Review: Work of every kind at the Copper World mines, the property of the Ivanpah Smelting Co. near Manvel, has been stopped and the men paid off and discharged. J. D. Hanbury, the president of the company, tells the Review that the stoppage is but temporary.

At a recent meeting of the Southwestern Miners' Association in Los Angeles the necessity for the placing of signboards on the roads on the desert, so that the miner, prospector and traveler can tell when he is on the right road, caused a decision to take steps to provide a system of signboards at road crossings, road forks and other points, giving brief directions as to both roads and water.

SAN DIEGO COUNTY.

At a depth of 600 feet the Monarch Oil Co. has found drops of oil on the water brought to the surface with the sand bucket. The drill is still working in a blue shale.

The Owens mine, Julian district, is reported shut down and owners to settle their differences by going to law.

SHASTA COUNTY.

The Mountain Copper Co. will burn crude oil at its Keswick smelting plant. Two carloads have already been received from southern California.

Manager McDermott of the Afterthought mine will put in new pumps and cages at Furnaceville. The shaft is down 200 feet.

SIERRA COUNTY.

Notice of location of water rights is recorded in the recorder's office, in which 20,000 inches of the waters of the North Yuba river are claimed, to be diverted at a point west of Goodyear bar, for domestic use and for generating electric power at Alabama bar, 12 miles below Goodyear bar.

SISKIYOU COUNTY.

R. Van Brunt, near Happy Camp, has made a cleanup of forty days' work and got $8000.

Supt. Josselyn of the Greenhorn Blue Gravel No. 2 mine will soon resume work in the mine. He intends putting in a larger pump.

T. J. Nolton, who has been down at Happy Camp, Seiad and Indian creek, along the lower Klamath, says nothing is doing in the way of mining, all the streams being short of the usual water supply, owing to the slight snowfalls on the mountain summits.

TEHAMA COUNTY.

The Tehama Oil Co. is boring for oil at Red Bluff.

TRINITY COUNTY.

The new works which the Brown Bear Co. are putting up three-quarters of a mile from Deadwood will be in running order by Nov. 15.

TUOLUMNE COUNTY.

Work has been resumed on the dam above Horseshoe Bend, across the Stanislaus river, to turn the water to the flume and ditch to be used by the Melones Co. at their mine 2 miles below.

The assessment of the Columbia Marble Quarry is reduced from $37,500 to $7500.

Independent: On the east belt the Starr King mine is being unwatered; under a $25,000 bond.——The Providence shaft is being sunk from the 700 to the 800 level.——Work is in progress in the Dead Horse mine between the 1400 and 1500 levels on an ore body.——The Seminole property is under a working bond and is a producer.——D. Pennington has bonded his property at the head of the Marlowe diggings to San Francisco men for $18,000. ——At the Blue and White Star mines on the North Fork a tunnel is in 270 feet. The vein is 8 feet wide and averages $9. ——At the Grizzly mine sinking is under contract from the 700 to the 800 level.

YUBA COUNTY.

The Blue Gravel M. & M. Co. has levied an assessment of 5 cents per share, delinquent Aug. 24.

COLORADO.

(Special Correspondence).—A review of the movement of ore during the months of June and July from the various districts of the State, and in the State as a whole, shows a perceptible falling off of shipments, as compared with those of six months ago. The one factor responsible for reduced production in Leadville, Aspen and Creede is the decline in the price of lead. That metal, at the price that prevailed before the decline, constituted the redeeming element in the operation of some of the low-grade properties. In such mines the percentage of silver is low and the recent advance in the price of the latter by no means compensates for the fall in lead. In Aspen district the tonnage has fallen from about 12,000 to a little over 8,000 per month, while in Leadville there is a marked reduction in the tonnage of the siliceous, oxidized and sulphide ores, as well as of zinc-lead sulphides, in which lead values preponderate. About 75,000 to 78,000 tons per month are produced in the latter camp, of which about 30,000 tons are treated by local plants and about 46,000 to 48,000 tons shipped out.

Shipments from the San Juan districts hold very uniform, there being no perceptible falling off from their regular tonnage. The bulk of shipments from that section is in concentrate form, in which lead values are important, but in which gold is chief, as regards the more important producers.

The falling off of Cripple Creek's tonnage of about 33% is due to entirely different causes, as virtually neither lead nor silver are produced there. The smelting ore from that district is now running at the rate of about 8000 or 9000 tons per month, the falling off being due largely to the necessary curtailment on the part of various big mines, pending the installation of new plants of machinery and the delays resulting from various reorganizations and consolidations. The same causes apply to reduced shipments to the chlorination and cyanide plants; and, in addition, it may be cited that, with the rapidly increasing capacity of the mills of that class, miners who have large reserves of milling ore think lower treatment charges and lower freight rates are in sight. WASCOTT.

Denver, July 17.

The Denver & Rio Grande Railway Co. has commenced the construction of a branch from Texas Creek, on main line, 27 miles southward, through West Mountain valley to Silver Cliff, Custer county; thence into Huerfano county. Other branches have been mapped out, which will be built after the completion of the Texas Creek line. A construction company has been organized which will attend to the building of all branch lines of the D. & R. G. system.

CLEAR CREEK COUNTY.

(Special Correspondence).—The ore tonnage shipped from Georgetown is not up to that of a year ago, though the grade continues characteristically high. Information obtained at the samplers indicate that about 700 tons per month are shipped out, which averages about 195 ounces silver, 17% lead and $\frac{16}{100}$ ounce gold. The two distinctly lead mines of the district are the Stevens and the Mendota, the others being more of the nature of gold and silver producers. A recent shipment of Stevens ore ran 73% lead. The Aliunda is keeping up a fair record of lead and silver. The Centennial, a gold, silver, lead and copper property; the Griffith, of same character; Big Indian, silver, gold and copper; Cory City, silver, lead and gold; the Pelican–Dives, Pay Rock, Seven Thirty, Bismarck, Dunderburg and Frosburg, producers of silver, gold and lead, are all operating.

On Democrat mountain the mines working are the Astor–Scepter, Sunburst, Silver Glance, Polar Star, New Boston, Muscovite, Mineral Chief and Smith & Wesson, all silver-lead producers.

In East Argentine district the shippers are gold and silver mines, and comprise the Independence, Johnson, Mendham, Santiago, Commonwealth, Paymaster, World's Fair, Three Nations and Marietta.

In Empire district the Tenth Legion, Gold Dirt, Gold Bug, Conqueror, Gen. Harrison, Empire City, Atlantic and Silver Mountain are active, all shipping at present about 200 tons per month.

At Silver Creek the Jo Reynolds and Nabob yield about fifty tons per month of silver, gold and lead ore.

The Millington, Bellevue–Hudson, Dictator and Lincoln at Lawson ship about fifty tons per month.

Georgetown, July 18.

(Special Correspondence).—The Colorado & California Shareholders' M. & M. Co. now controls several groups of properties, including the Crown Point & Virginia, Franklin and Lady Franklin, as well as the Wilkie mill on Clear creek and the Allen mill on Chicago creek. The Wilkie is operating now at a capacity of about fifty tons per day and the Allen mill will be enlarged to sixty tons, both of which are expected to operate on ores from the group of mines mentioned. The present tonnage handled at the Wilkie mill comes from the Crown Point & Virginia. The lower levels of the latter are expected to be in condition to produce by August. On the Franklin group a tunnel which has been driven 800 feet will be extended 600 feet farther and a shaft will be sunk from the surface. W. H. Knowles is manager of the consolidated mines and mills mentioned.

The following mills are operating near Idaho Springs:

	Tons per day.
Jackson	40
Wilkie	50
Newton	50
Silver Age	30
Elgin (at Freeland)	20
Mattie	15

The new Senator mill near Dumont is well along toward completion. The Mixsell mill will resume operating in a few weeks, or as soon as the dam shall have been rebuilt. The latter was washed out two months ago. WASCOTT.

Idaho Springs, July 19.

EAGLE COUNTY.

The Beldin mine, Battle mountain, above Red Cliff, is to be started up; C. F. Bedell, Supt.

GILPIN COUNTY.

Register-Call: At the Perigo property, operated by the T. L. & M. Co., employment is given to sixty men. Eighty tons of ore are daily treated at the new rapid-drop stamp mill; E. M. Messiter, Supt.——Supt. Bowden has twenty men at the Gold Dirt mine; daily shipments of mill ore to the Peterson mill at Gilpin, twenty-five tons.——H. P. Lowe of Denver has a lease and bond on the National mine, Quartz hill. The shaft, 400 feet deep, will be sunk 200 feet deeper.

GUNNISON COUNTY.

At the Black Copper mine the shaft is to be sunk 200 feet; the vein is 20 feet wide and the ore is silver-bearing gray copper. Manager Young has men developing it.

HINSDALE COUNTY.

Near Lake City the Hiwasse Co. has leased the site of the old Crook smelter and will build a mill thereon, capacity sixty-five tons, and a bucket tramway over 3 miles long.

D. A. Farrell will put a six-drill air compressor in the Lellie mine.

LAKE COUNTY.

(Special Correspondence).—The Rock Hill Con. M. Co. management is drifting from the shaft northwesterly toward the grounds of the Royalty Co., driving into a streak of lead-carbonate ore 15 inches wide.

The Valentine M. Co. work struck porphyry in shaft at 300 feet depth; a drill was sunk from bottom of shaft 150 feet deeper, cutting into lime. The shaft will be sunk to the lime stratum. A third of the stock issue of this company was sold in Leadville for $75,000. They have a five years' lease on about 60 acres on Rock Hill.

The Royalty Co. are pushing work at the two Revenue shafts. At No. 1 drifting goes on and at No. 2 they are sinking.

The Neusitz shaft, near High School building, has reached 150 feet depth, being at present in lake-bedding rock.

The Home Extension M. Co., which has acquired mineral rights of various lot owners to grounds under Harrison avenue, are to sink a shaft on Oak street, between Second and Third streets. It is understood they paid at the rate of $8000 per acre for the mineral rights to the grounds thus located.

Leadville, July 21.

RIO BLANCO COUNTY.

Reports from the gilsonite claims, recently bought by Eastern men from Utah people, are that they have been "jumped," under the contention that they were originally located as placer claims, when in reality the gilsonite is deposited in well-defined fissures. Messrs. McManus of Maine are said to have paid $100,000.

SAGUACHE COUNTY.

Near Crestone, Mgr. Granville of the San Isabel Co. will have the 50-ton mill in operation by Aug. 15. He has men building a tram to carry ore from the mines to the mill. He has on the ground a 6-drill compressor.

SAN MIGUEL COUNTY.

In Telluride district, at the Smuggler mills both plants have a daily capacity of 300 tons.

At the Four Metals M. Co., Turkey Creek basin, Manager Shockley is doing considerable development work and is making good headway in the matter of bringing the property up to its best efforts this season.

D. Scott built a small cyanide plant near Telluride to test the values of the placer ground there.

At the Peck cyanide plant six new tanks of 100 tons capacity each will double the capacity of the plant, giving it 200 tons; thirty-five men are employed.

The Pennsylvania tunnel, driven by the Smuggler-Union, is now in nearly 2000 feet.

The Liberty Bell is employing sixty-five men at the mine; 300 tons ore can be daily treated.

TELLER COUNTY.

The Rocky Mountain G. M. Co. has let a contract for an additional 100 feet of sinking.

The June output of the Independence mine was $500,000.

The Victor G. M. Co. has leased the Victor mine to F. Y. Osgood. He has twenty-five men at work. Since the inception of the mine dividends amounting to $1,155,000 have been paid by the company. The property adjoins the Isabella.

Near Victor the Strong property is having a large gallows-frame put up. The corner posts measure 16 inches by 60 feet. The boiler house is 70 by 100 feet. A 170-foot stack is in place; the single reel is ready to receive a flat cable 2000 feet in length. A 10-inch pump column will be built. The shaft will be sunk from the 800 to the 1000 foot level under Supt. McDonald, Foreman Atkinson and F. Lambert, master mechanic.

The Portland G. M. Co. is now credited with intention to make its latest purchase, the Thomas ranch on the line of the Cripple Creek railroad, a site for the new smelter, the first cost to be $500,000.

The Anchoria-Leland is crosscutting at a depth of 1000 feet.

IDAHO.

BLAINE COUNTY.

By the payment of $4639.47 by Arthur Brown of Salt Lake, Utah, he becomes sole owner of the Red Elephant and all the property of the late G. V. B. Co.

CASSIA COUNTY.

The Black Pine M. Co., 100,000 shares, par value 25 cents, has incorporated. The property consists of the Hatfield group of ten claims in Black Pine district.

IDAHO COUNTY.

The Little Giant property is being worked by its new owners, the Idaho L. G. M. Co. W. H. Hill is general manager, J. J. Bennett Supt. Ten stamps are dropping at the mine. The force is to be increased to thirty-five.

The Silver King is being worked by a Philadelphia company, employing ten men.

The Buffalo Hump Syndicate owns nearly all of a strip of ground, 3500 feet wide, beginning at the head of Lake creek and extending 4 miles down the stream. The syndicate controls the townsite and is doing most of the work. It employs fourteen teams and 220 men. Of the employes 130 are building roads, 30 are carpenters, 40 miners and 20 around the sawmill and at other work. Wages paid are $3 for ordinary, $4 for carpenters and $3.50 to $4 for miners. Board is furnished at $1 a day. A scarcity of men is claimed in all lines of work.

OWYHEE COUNTY.

The DeLamar M. Co.'s annual report for the year ending March 31, 1900, shows:

Amount realized from ore crushed	$466,126 00
Amount realized from shipping ore, mill residues and miscellaneous sources	22,174 00
Total receipts	$488,300 00
Totol working expenses, including mill tunnel cost	301,659 98
Net profit	$96,730 02

The tabulated results of nine years' working since the property was taken over by the company show: Number of tons treated, 345,914; ounces of gold produced, 191,897; ounces of silver, 2,646,743; value of shipping ore sold, $752,722; total receipts from the mines, $6,738,490; amount of dividends paid, $2,352,000; amount of undivided capital, $175,621. The amount paid out in mine expenses during the nine years, $3,847,827.50.

SHOSHONE COUNTY.

Spokane employment agencies say that miners are wanted in the Cœur d'Alenes.

WASHINGTON COUNTY.

F. J. French, manager Blue Jacket, Seven Devils, is shipping copper ore to Salt Lake.

Caswell Bros., on Thunder mountain, in a run of seventy-two hours, with hydraulic power, took out twenty-nine pounds of gold, avoirdupois weight, worth $13 an ounce. They worked an area of 75 feet square and a depth of 3 feet. The material is dug out and slacks, after which it is washed. Below a depth of 3 feet it is too hard to work by this method, but carries as much gold as from the surface to that depth. The extent of this auriferous porphyry is not known. Three tons were crushed in a mill at Warren and yielded $31.10; that amount was taken from the plates.

MONTANA.

MADISON COUNTY.

Near Virginia City the Kearsarge mine is being examined by Butte men.

At Alder Gulch men are working over the old placer tailings. Three steam dredgers are also at work.

The Easton, owned by H. Elling, has about 5000 tons of ore on the dump ready for shipment.

C. D. McLure has twelve patented claims at the head of Alder gulch.

The Bedford mine is being exploited by M. B. Davis.

TETON COUNTY.

A. D. Macdonald of the M. & M. M. Co. says of the copper properties on the ceded strip that Mgr. Essler, operating the property, will have the 100-ton mill running Sept. 1. The property is 50 miles from the Great Northern at Blackfoot station.

NEVADA.

ELKO COUNTY.

A new cyanide plant is to be built at the Murphy group of mines at Bull Run, north of Tuscarora. H. C. Missimer expects to have the crushers going in September. A. H. Smith is local manager of the mines, and has blocked out considerable ore.

ESMERALDA COUNTY.

V. S. Hauser of San Francisco is examining the tailings of the Mt. Diablo and Holmes Cos. with the view of cyaniding the same.

HUMBOLDT COUNTY.

Silver State: The mines of the Glasgow & Western Co. at Copper canyon, Copper basin and Chery creek have been closed down. The company's smelters and mines at Golconda having also been shut down a few days ago, everything indicates that the company has ceased operations in this State indefinitely.

LANDER COUNTY.

C. Gardanier, manager Nevada M. Co., at Galena, has samples from the 150-foot level showing crystalilzed lead and considerable chloride of silver.

LINCOLN COUNTY.

From Stateline the Tribune hears that the mill with which the ores of the McCune properties at Fay are to be cyanided is nearing completion. In the Horseshoe group all the men for whom elbow-room can be found are being employed. The suspension of work at the Homestake group has rendered Deer Lodge almost lifeless; the buildings have been nearly all torn down and rebuilt at Fay. At Stateline the new hoist will soon be placed on the Ophir. Sinking at the Johnny is resumed. Work has been resumed on the Jumbo tunnel, which is to be driven 1000 feet.

J. B. DeLamar will build a plant at DeLamar to treat the 400,000 tons of tailings at the DeLamar mine.

WASHOE COUNTY.

Fifty pounds of ore from the Reno M. Co.'s property, White hill, assayed $83 in gold and two ounces in silver. The Journal reports activity in the prospecting line around Steamboat and on Granite hill. Mgr. Hillhouse of the Reno M. & S. Co. expects his plant by Aug. 15.

NEW MEXICO.

TAOS COUNTY.

Judge A. Royal of Pueblo, Colo., of the Whale mine, near Tres Piedras, has assays in gold and six ounces silver. The Strawberry mine, adjoining the Whale, owned by a Wisconsin company, is milling ore running $8.65 gold per ton.

Six miles east of Bromide prospectors have located a large deposit of asbestos. Thirty miles south of Bromide large mica deposits are being worked by a Cleveland company who are employing forty men.

SIERRA COUNTY.

The Oohoo M. Co. has completed an ore crusher, capacity ten tons daily, operated in connection with a lead jig.

OREGON.

BAKER COUNTY.

The Gold Boy, Black Hawk, Eclipse, Oregon and Keystone-Bell mines are to be consolidated under the management of the Keystone-Bell Con. M. Co., Baker City. The Gold Boy is owned and worked by F. J. Conroy.

GRANT COUNTY.

Granite reports that the Richmond M. & M. Co., owning claims in the Geiser district, has, through E. D. LeClare, manager, bought the 10-stamp mill now on the Don Juan property to be removed to its own property.

The G. C. P. & D. Co. of Colorado Springs and Boston has an option on mines in the Malone district.

JOSEPHINE COUNTY.

At the Elder copper mine, near Waldo, the company is running two tunnels, the lower one of which is expected to tap the lode at a depth of 200 feet. They have six teams hauling ore to Grant's Pass and have sent four carloads to the Selby Smelting Works, Vallejo, Cal.

The Alexander & Bent placer mine on Rogue river, 25 miles below Grants Pass, containing 510 acres of land and extending 3½ miles along an ancient channel, is reported sold to Chicago men for $100,000. The A. & B. mine has been operated at a profit for years. It was described and illustrated at great length in the issue of April 21, 1900. Its water supply is taken out of the west fork of Galice creek, in a 7-mile ditch, and gives a pressure of 350 to 400 feet at the mine. The bank is 80 to 150 feet high, the gold being principally in a stratum of blue gravel at the bedrock, 6 to 12 feet deep. The mine is well equipped with pipe and giants, a sawmill furnishing the necessary flume lumber.

UNION COUNTY.

The Tallmadge placers at Sparta are being worked. There are two giants in operation and eighteen men employed.

SOUTH DAKOTA.

LAWRENCE COUNTY.

From west of Greenmont station gold ore is being shipped by the Portland M. Co. of Deadwood to Kansas City.

G. D. Waugh of the Portland M. Co., Deadwood, has "a new secret process" and is going to "revolutionize the whole mining interests of the Black Hills" therewith.

UTAH.

SALT LAKE COUNTY.

The Highland Boy at Bingham has shipped copper, gold and silver bullion to the refinery at Perth Amboy, New Jersey, since June 13, 1899, a total of about 700,000 pounds. Assuming that this has brought the company an average of 16 cents a pound, the Tribune figures the gross earning of the Highland Boy Co. during the past thirteen months to have reached a total of over $1,100,000, or an average of $90,000 per month. Jos. Dederich has the contract for the erection of the steel structure, this part of the enlargement alone requiring nearly 1,000,000 pounds of steel, the delivery of which is promised in September.

TOOELE COUNTY.

The Mercur and Golden Gate consolidated on the 21st under the laws of New Jersey; H. A. Cohen, president and general manager; J. Dern, vice-president; G. Dern, treasurer; W. H. Cunningham, secretary.

WASHINGTON.

OKANOGAN COUNTY.

In Loomis the Black Bear keeps five stamps going; the fifteen additional stamps now on the ground will be put in place. A wire tram from mine to mill is projected.

The Palmer Mountain Tunnel Co. is taking ore from vein No. 20½, showing free gold.

At Silver the American Flag mine is hauling ore to the Red Shirt mill to ascertain the kind of material best adapted to treat the ore. Manager Stewart says that as soon as this question is determined a mill will be put in.

SNOHOMISH COUNTY.

A construction train on the Everett & Monte Cristo Railroad is at Monte Cristo, taking in supplies and machinery to be used in repairing the concentrator. Shipments from Monte Cristo will begin about Aug. 15

FOREIGN.

BRITISH COLUMBIA.

(Special Correspondence).—The Anderderson Lake or McGillvery Creek mining camp, on the northwest side of Anderson lake, 10 miles from its eastern end, in Lillooet district, is a promising quartz mining section. (See map, page 93.) Many claims have been located and much prospecting work done, principally by local men, who are trying to cover too much ground for the capital at their disposal. The Anderson Lake M. Co.'s property is opened by tunnels, the lower tunnel in over 300 feet. The ledge averages 10 feet wide. There are two upraises, one 100 feet, the other 150 feet, both in pay ore; 250 feet higher up the mountain is tunnel No. 2, and 250 feet higher tunnel No. 3. Fifty feet below the level of the lower or main tunnel is a ditch, furnishing water power for a 10-stamp mill. The rock is delivered from the cars in the lower tunnel into an ore bin, thence by the tramway in self-dumping cars onto the grizzly and to the rock crusher and ore bin at the mill, thence by automatic ore feeders to the mortars and out over 4x16-foot silvered copper amalgamation plates. There are no concentrators in yet. The building is large enough for twenty stamps. Ten stamps are now dropping; mortar blocks are set for ten more, and the power, rock crusher, etc., of sufficient capacity to run the additional stamps, so that the cost of doubling the capacity of the mill will not be great. Two and one-half tons per stamp are worked daily. The altitude of the mill is 3400 feet; lower tunnel of mine, 3850 feet—3100 feet above the lake. The mine is reached from the lake by a zigzag sled trail, 4½ miles long. All machinery and supplies have to be sledded or packed up this trail. The average temperature in the mill in daytime during June was 47° F., and much cooler at night. The temperature of the water used in the mill is 45° F. The company has engaged a superintendent from Butte, Montana. The lakes are about 1 mile wide and over 20 miles long each. The banks are mountains 5000 or 6000 feet high, almost vertical in places, here and there ribbed with dashing, foaming streams coming from the snow, looking like ribbons 1 foot wide, where they first appear high up on the mountain sides. There are quartz claims in the vertical cliffs along the lakes that can only be reached by boats. This is the Yosemite of the North.

Anderson Lake, July 10.

The Britannia copper property on Howe sound, operated by H. C. Walters, is bonded by the B. A. Corporation, which owns the Le Roi and War Eagle mines. The figure of purchase is placed at $1,500,000; first payment of $50,000 falls due August 17th, and on the 17th days of each month thereafter for six months $50,000 is to be paid. For the next succeeding three months the payments will be $100,000 each. At the expiration of twelve months the bond will be cancelled by the payment of the remaining $900,000. Until the 17th of August the B. A. Corporation has merely an option upon the property, the bond not being a working one. Upon the payment of the first $50,000 the sale will be practically completed. Meanwhile the engineers of the B. A. Corporation will examine the property.

H. W. C. Jackson of the Rossland board of trade says the mines of Rossland at the present time are giving employment to 1200 men (eight-hour shifts) at an average wage of nearly $100 per month, and the shipments of ore are averaging over 4500 tons per week, of an average value of $16.50 per ton, at an average profit, clear of all expenses, including development, of $8.50 per ton. By the first of December he estimates that about 2500 men will be employed in the mines of Rossland and the average shipment 14,000 tons per week. The present population of Rossland is about 8000.

NEW ZEALAND.

A gold dredging boom is reported. Many claims on the West Coast have been floated; the yield of 1187 ounces for a week reported by one dredger company will give further impetus to speculation.

SOUTH AFRICA.

There were 12,314 white mining employes in the Transvaal in 1898. The average salary paid amounted to £321 11s, or £26 10s a month. The average includes the higher salaries paid. A report by the State mining engineer for 1898 gives the following averages as the monthly payments in that year for the various classes specified:

	Average Monthly Salary.		
	£	s	d
General managers.......	96	7	0
Mine "	41	18	0
Battery "	41	16	0
Mechanical engineers....	43	3	0
Surveyors (mine)........	31	0	0
Draughtsmen...........	28	2	0
Electricians.............	26	9	0
Secretaries..............	36	3	0
Mine clerks.............	22	3	0
Miners and trammers...	22	13	0
Foremen................	30	9	0
Pitmen..................	19	5	0
Engine drivers..........	29	6	0
Fitters..................	26	3	0
Assayers................	28	9	0
Amalgamators..........	23	14	0
Cyanide men............	24	7	0

It is thought that by Jan. 1, 1901, work will be resumed. This is a sanguine view. There will be less difficulty in securing white labor than in getting native black labor, the war having demoralized all existing arrangements.

SPAIN.

The Spanish Council has approved the contract with the Rothschilds for the sale of the product of the Almaden quicksilver mines on commission for ten years—1.25% on the sale price above £8 sterling per flask, instead of 2% on the sale price above £6 sterling.

THE KLONDIKE.

The steamship Amur, from the Klondike, brought nearly $1,000,000 in gold dust and ninety passengers, some of whom estimate the year's output of the Klondike at $25,000,000. The claims are now being worked summer and winter. There is still some grumbling over the 10% royalty, which the miners say makes it impossible to work some of the richest claims at a profit.

Obituary.

H. G. BLASDEL, the first Governor of the State of Nevada, died at his residence in Oakland, Cal., on the 26th inst., in the 75th year of his age. Deceased was a pioneer on this coast, a man of unusual ability, of herculean stature and great vitality. He was known and respected by many who admired him for his sterling qualities. He was not great, but good; not fast, but sure; not brilliant, but solid. He was a good citizen, a faithful officer, an honest trustee and a true friend, whether in the shadow of struggle or the sunshine of victory.

Personal.

J. P. EVANS of the Colorado Iron Works is in Arizona.

P. A. MCKENZIE succeeds R. G. Legg as Supt. Dexter G. M. Co., Tuscarora, Nevada.

W. B. SHORT is the new superintendent of the smelter for the Dyer Co. near Vernal, Utah.

VICTOR M. CLEMENT has established his permanent headquarters at Salt Lake City, Utah.

W. S. KEYES has returned to San Francisco from a professional visit to British Columbia and Utah.

R. G. DAVIDSON is manager Buena Vista mine, Sonora, Mexico, operated by an English company.

CALIFORNIA STATE MINERALOGIST COOPER has returned to San Francisco from southern California.

A. C. STOCK has been appointed manager of the Rhodes Marsh Salt & Borax Works, Hawthorne, Nevada.

E. M. BIND of San Francisco has gone to Durango, Mexico, where he reports having secured some good properties.

H. P. WATERMAN of the Hendrie & Bolthoff Mfg. & Supply Co., Denver, Colo., recently returned from California.

THEO. F. VAN WAGENEN has returned to Denver, Colo., from an extended itinerary through Arizona and southern California.

GEO. H. KISLINGBURY of Berkeley, Cal., goes to Mexico to examine mining property. He is credited with having been tendered a position near Paris, France, by J. B. DeLamar.

D. E. BIGELOW has returned to San Francisco from Weaver, Arizona, where he put in a 40-stamp mill built by the Union Iron Works for the Octave M. Co. The entire establishment cost $125,000.

N. C. RAY of Coulterville, Cal., is talked of there for the legislature. Though unacquainted with his politics, which is immaterial, the fact that he is a prominent mining engineer makes this paper suggest that members of that profession in the California legislature would be good for the mining industry, and, possibly, good for the legislature.

Commercial Paragraphs.

THE Crown G. M. Co.'s new process for sizing and concentrating dry ores can be seen at the works, No. 23 Stevenson street, San Francisco. This is a new and scientific system for handling dry and refractory ores that deserves the careful attention of practical mining men. An inspection is invited.

THE plant of the Colorado Iron Works at Denver, Colo., was considerably damaged by fire on the 15th inst.; but, with the exception of the steam hammer and forging department, work was not seriously interrupted. President Nesmith states that the steam hammer and forging equipment will be thoroughly replaced by August and that a steel and brick fireproof building will at once replace the wooden building destroyed.

THE Gillette-Herzog Mfg. Co., now a part of the American Bridge Co. consolidation, have the contract to furnish and erect the structural steel for the smelter of the Santa Fe G. & C. Co. at San Pedro, N. M., which will include a power-house and blower-house. The same company also have contracts for similar work for the Rocky Mountain smelter at Florence, Colo. Their Denver representative also reports the erection of a steel gallows-frame for the Copper Queen Co. at Bisbee, Ariz.

GEO. W. PENNINGTON & SONS, manufacturers of the Pennington steel shoes and dies, are now in their new works at the corner of Montgomery and Chestnut Sts., San Francisco, Cal. They have put in two of the largest steam hammers west of the Rocky mountains and several of smaller size. This more than doubles their former capacity and also enables them to handle a larger class of forgings than heretofore. The steel shoes and dies made by this firm are of high quality and in extensive use. The old works at 218–220 Folsom St. are retained as a branch of the new works.

THE Thornton N. Motley Co. of 43 St. John St., New York City, licensees for eastern United States and foreign countries for the manufacture and sale of the Jackson hand-power rock drill, report orders booked week before last for drills from France, Nova Scotia, Mexico and two South American countries. Recent foreign sales include the following: Bogota, Colombia, two drills; Santiago, Cuba, one drill; Brussels, Belgium, one drill; Paris, France, one drill; Progresso, Mexico, one drill; Perth, West Australia, one drill; Tegucigalpa, Honduras, one drill. One drill was also shipped to each of the following points: Thomas, W. Va.; Buffalo, N. Y.; Dayton, Tenn.

List of U. S. Patents for Pacific Coast Inventors.

REPORTED BY DEWEY, STRONG & CO.,
PIONEER PATENT SOLICITORS
FOR PACIFIC COAST.

FOR THE WEEK ENDING JULY 17, 1900.

653,838.—EDUCATIONAL DEVICE—L. G. Belond, Stockton, Cal.

653,653.—REIN HOLDER—M. Bohnert, San Diego, Cal.

653,839.—IRONING BOARD—Wm. O. Bowman, Fairfield, Cal.

853,842.—SYRINGE—A. J. Brown, Oakland, Cal.

653,859.—PACKING—M. Bulkley, Oakland, Cal.

653,860.—PUPPET VALVE—M. Bulkley, Oakland, Cal.

653,861.—SHIP'S ANCHOR—J. Callow, New Kamilchi, Wash.

653,661.—ROPE FASTENING—C. A. Conger, Oakland, Cal.

653,800.—COLLAR STIFFENER—E. R. Gould, Spokane, Wash.

653,772.—TACK DRIVER—G. W. Hobbs, Los Angeles, Cal.

653,817.—HARVESTER LOCK—M. G. Morgan, Dixon, Cal.

654,096.—TELEPHONE MOUTHPIECE—T. R. Owen, Los Angeles, Cal.

653,779.—POCKET GUN—R. M. G. Phillips, Los Angeles, Cal.

653,694.—CAR FENDER—G. B. Quarrier, Los Angeles, Cal.

653,847.—COIN EXHIBITOR—J. M. Ricketts, San Jose, Cal.

653,886.—NEEDLE—Lottie A. Roberts, S. F.

653,706.—TUBE GRINDER—Scott & Hightower, S. F.

653,705.—METAL BENDER—Scott & Hightower, S. F.

653,972.—SHIPPING CRATE—Z. T. Stocks, Everett, Wash.

653,758.—HAY STACKER—L. Stubblefield, Echo, Ogn.

654,078.—WINDOW SHADE HANGER—H. H. Stratton, S. F.

653,833.—SEEDER—A. V. Wilbur, Stockton, Cal.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

TRAVELING HARVESTER.—No. 653,465. July 10, 1900. Daniel Best, San Leandro, Cal. The object of this invention is to provide improvements in that class of machines known as traveling harvesters, in which the grain is cut, delivered to the thrashing cylinder, thrashed, separated and cleaned in continuous operations. The ininvention consists in improved means for connecting the header portion with the thrashing machine frame, and in means for transmitting power from the driving parts of a thrashing machine portion to drive the sickle carrying belt or draper reel and various parts of the header mechanism. The connection between the header frame and the thrashing machine frame is effected by means of hooks upon one part and pins upon the adjacent part with which they engage and means for retaining them normally in position, but by which they can be easily released to disengage and separate the parts. In order to transmit power from the thrashing machine portion to the header to drive the sickle reel belts, etc., I employ a flexible belt or chain transmission with suitable guide and direction pulleys or sprockets so that whatever the change is in position between the two parts of the machine, the power will always be properly transmitted from one part to the other.

SAFETY LOCK FOR HARVESTERS.—No. 653,817. July 17, 1900. M. G. Morgan, Dixon, Cal. The object of this invention is to render harvesters and like large traveling machinery safe against accidents by reason of runaways. The invention consists of shoes with devices by which they are normally suspended in front of the main bearing wheels. A lever or like mechanism is connected with the suspending devices, so that if the team attempts to run away or the machine becomes unmanageable, these shoes may be dropped upon the ground in front of the wheels which run up on the shoes, so that the whole machine is supported upon the shoes and the wheels cannot revolve. In order to hold the shoes in place beneath the wheels they are connected with some part of the frame by stout chains which are only long enough to allow the wheels to roll up on the shoes where the latter are held in place.

Latest Market Reports.

SAN FRANCISCO, July 26, 1900.

SILVER—Per oz., Troy: London, 27¾d (standard ounce, 925 fine); New York, bar silver, 60¼c (1000 fine); San Francisco, 60¼c; Mexican dollars, 49c.

The Secretary of the Treasury has issued an order authorizing the mint at San Francisco and the assay office at Seattle to pay all depositors of gold bullion who desire it by drafts on Chicago or New York. It is thought that $20,000,000 will be so paid during the remainder of the year.

COPPER.—New York: Lake, 1 to 3 casks, 16.50 cash; carload lots, 16.25; Electrolytic, 1 to 3 casks, 16.35; carload lots, 16.12½; Casting, 1 to 3 casks, 16.25; carload lots, 16.00. San Francisco: 17. Mill copper plates, 20c; bars, 22@23c.

LEAD.—New York, $4.00; Salt Lake City, 3.87½; St. Louis, $3.95; San Francisco $5.00, carload lots; 5½c 1000 to 4000 lbs.; pipe 6¾, sheet 7½, bar 6c. London, £17 12s 6d = 3.82½c per ℔.

The prices of the American Smelting & Refining Co., for shipment before August 1, seller's option, 50-ton lots, are:

Delivered.	Desilverized.	Corroding.
St. Louis	$3 95	$4 05
Chicago	3 95	4 05
Cincinnati	4 00	4 10
Pittsburg........	4 05	4 15
Philadelphia.....	4 05	4 15
New York........	4 00	4 15
Boston	4 07½	4 17½

On carload lots 5c. per 100 ℔s. higher.

SPELTER. — New York, $4.30; St. Louis, $4.20; San Francisco, ton lots, 5c; 100-lb lots, 5¼c.

ANTIMONY. — New York, 10c; San Francisco, 1000-lb lots, 12c; 300 to 500 lbs., 13@14c; 100-lb lots, 15@18c.

IRON. — Pittsburg, pig, No. 2, foundry, $16.00; gray forge, $15.00; San Francisco, bar, per lb., 3c. in small quantities.

STEEL. — Billets, Pittsburg, $21.50; bars, 1.25; San Francisco, bar, 8c to 15c per lb.

QUICKSILVER. — New York, $51.00; London, £9 10s; San Francisco, local, $51.00 ꝑ flask of 76½ ℔s.; Export, $47.

MAGNESIUM.—New York, $3.00 ꝑ ℔.; San Francisco, $4.00.

ZINC.—San Francisco, 5½c; slab, 6c; bar, 7¾c.

SOLDER. — Half-and-half, 100-℔. lots, 21½c; San Francisco, Plumbers', 100-℔. lots, 18¼c.

BABBITT METAL.— San Francisco, No. 1, 10c.

TIN.—New York, pig, $32.75; San Francisco, ton lots, 34c; 1000 ℔s., 32c; 500 ℔s., 35c; less, 36c; bar tin, ꝑ ℔, 40c.

ASSAY LITHARGE.—San Francisco, 10c ꝑ ℔.

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 30c to 35c.

PLATINUM.— San Francisco, crude, $17 ꝑ oz.; New York, $18.25; manufactured, $19.50@22.00.

BISMUTH.—New York, ꝑ ℔., $1.60 50-℔ lots; San Francisco, $2.50 to $2.75 ℔ lots.

NICKEL.—New York, 50@60c ꝑ ℔.

TUNGSTEN.—New York, ꝑ ℔., 95c; San Francisco, $1.15.

FERRO-TUNGSTEN. — New York, 37%, 35c; San Francisco, 65c (60%).

FERRO-MANGANESE. — Pittsburg, 80%, domestic, $88.

CHEMICALS.—Cyanide of potassium, 98%-99%, jobbing, 32½@34½c ꝑ ℔.; carloads, 31@32c; in 10-℔. tins, 40c; sulphuric acid, 66% B, 2c ꝑ ℔.; soda ash, $1.60 ꝑ 100 ℔s. 58%; hyposulphite of soda, 2¾@3c ꝑ ℔.; blue vitriol, 5½@6c ꝑ ℔.; borax, concentrated, 7@8c ꝑ ℔.; chlorate of potash, 12@13c; roll sulphur, 6c; alum, $1.90@2.00; flour sulphur, French, 2¼@2½c; California refined, 1¾@2c; nitric acid, in carboys, 8c ꝑ ℔.; caustic soda, in drums, 3@4c ꝑ ℔.; Cal. s. soda, bbls., $1.00; sks, 95c ꝑ 100 ℔s.; chloride of lime, spot, $2.35@2.50; nitrate of potash, in kegs, 8c; caustic potash, 10c in 40-℔. tins.

OILS.—Linseed, pure, boiled, bbl., 79c; cs., 84c; raw, bbl., 77c; cs., 82c. Deodorized Stove Gasoline, bulk, 16c; do., cs., 22c; 86° Gasoline, bulk, 21c; do., cs., 27c; 63° Naphtha or Benzine, deodorized, in bulk, per gal., 15½c; do., in cs., 21½c; Lard Oil, Extra Winter Strained, bbl., 60c; cs., 65c; No. 1 bbl., 49½c; cs., 54½c; Neatsfoot Oil, coopers' bbls., 60c; extra bbls., 55c; cs., 60c; No. 1 bbl., 52½c; cs., 57½c.

POWDER.—F. o. b. San Francisco: No. 1. 70% nitro-glycerine, per ℔., in carload lots, 15¼c; less than one ton, 17¼c. No. 1*, 60%, carload lots, 13¼c; less than one ton, 15¼c. No. 1** 50%, carload lots, 11¾c; less than one ton, 13¾c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9½c; less than one ton, 11½c. No. 2** 30% carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9.

FUSE.—Triple tape, $3.60 per 1000 feet; double tape, $2.95; single tape, $2.35;

Hemp, \$2.55; Cement No. 2, \$2.95; Cement No. 1, \$2.35.

PHOSPHORUS.—F. o. b. New York or Philadelphia, 45@50c ℔ ℔.

CANDLES.—Granite 6s, 16 oz., 40s., 11¾c ℔ set; 14 oz., 40s., 10½c.

COAL. — San Francisco, coast, yard prices: Wellington, \$9; Seattle, \$7.00; Coos Bay, \$5.50; Southfield, \$9.00. Cargo lots, Eastern and foreign: Wallsend, \$8.00; Brymbo, \$7.50; Pennsylvania, hd., \$14.00; Scotch, \$8; Cumberland, \$12; Cannel, \$9.50; Welsh Anthracite, \$12.00; Rock Springs, \$8.50; Colorado Anthracite, \$14.50. Coke, \$16 per ton in bulk; \$18 in sacks.

NAILS.—List prices per keg: No. 20d to 60d, wire, \$3.70; cut, \$3.70; 10d to 16d, wire, \$3.75; cut, \$3.75; 8d, wire, \$3.80; cut, \$3.80; 6d and 7d, wire, \$3.90; cut, \$3.90; 4d and 5d, wire, \$4; cut, \$4; 3d, wire, \$4.15; cut, \$4.15; 2d, wire, \$4.40; cut, \$4.40. Special rates on carload lots.

San Francisco Stock Board Sales.

SAN FRANCISCO, July 26, 1900.

9:30 A. M. SESSION.

100 Caledonia....73c	100 Silver Hill..50c
150 Caledonia....72c	100 Standard..\$4 25
300 H. & N......22c	200 Utah........09c
100 Silver Hill...49c	100 Y Jacket....21c

2:30 P. M. SESSION.

200 G. & C.....22c	200 Standard..\$4 30
200 Overman....08c	

Catalogues Received.

THE S. H. Supply Co., Denver, Colo., have issued a carefully prepared catalogue (No. 27) giving cuts, descriptions and prices of machines, tools and supplies which they have for sale, and which pertain mainly to mine and mill equipment.

THE 1900 "catalog" of the Keystone Driller Co., received this week, is in reality a treatise on drilling, in plain language, well illustrated, and so put before the reader as to thoroughly convince him that the people who put out that "catalog" know what they are talking about, and, probably, know something about how a good drilling machine should be made. In several ways this "catalog" is the best trade treatise received at this office this month. In some regards it is a model. Anyone who has any notion of drilling a hole in the ground for any purpose would do well to send for a copy to the Keystone Driller Co., Beaver Falls, Pa.

Recently Declared Mining Dividends.

Quincy M. Co., Michigan, semi-annual dividend \$4 per share....Aug. 15
Vindicator Con. G. M. Co., Colorado, \$55,000....................July 25
Centennial-Eureka, Utah, \$1 per share, \$100,000....................July 20
Mammoth, Utah, \$20,000..........Aug. 1
Gold Coin M. Co., Colorado, 2 cents per share, \$20,000...............July 15

WANTED.

A Rich Placer proposition, adapted to working by Railroad Steam Shovel, or Dry Land Excavator. Description, with price and terms, to receive attention must be accompanied by reliable reports and references.

Address: EDWARD N. BREITUNG,
MARQUETTE, MICH.

Quicksilver

—FOR SALE BY—
The Eureka Company,
OF SAN FRANCISCO.
ROOM 1, - - 320 SANSOME STREET,
SAN FRANCISCO.

AIR COMPRESSORS,
Rock Drills,
Coal Cutters,
Lift Pump, Pohle
and Stone Channelers.
Catalogues.
The INGERSOLL-SERGEANT Drill Co.,
Havemeyer Building, NEW YORK.
San Francisco Agents, PARKE & LACY CO.,
203 Fremont Street.

THE CALIFORNIA DEBRIS COMMISSION, having received applications to mine by the hydraulic process from F. E. Thomas, in the Gold Run Placer Claim, near Quincy, Plumas Co., to deposit tailings on a flat; from Walter C. Robinson, in the Deadwood Hill Mine, near Meadow Valley, Plumas Co., to deposit tailings in Deadwood Creek; from W. B. Meek, in the Indian Hill Mine, near Camptonville, Yuba Co., to deposit tailings in Indian Creek; from the La Porte Consolidated Gold Mining Co., in the Dutch Mine, near La Porte, Plumas Co., to deposit tailings in Rabbit Creek; from J. T. Birmingham, in the Strawberry Mine, at Strawberry Valley, Yuba Co., to deposit tailings in a worked-out pit; and from C. M. Jurgenson, in the Garden City Mine, near Gibsonville, Sierra Co., to deposit tailings in a ravine, gives notice that a meeting will be held at Room 59, Flood Building, San Francisco, Cal., on August 13, 1900, at 1:30 P. M.

FRED C. MILES,
CISCO, PLACER CO., CAL.
COPPER AND GOLD PROSPECTS.
A GOING GOLD PROPERTY.

SAVE THE DROPS

MILLIONS OF DOLLARS are annually spent for lubricating oil and over half of it is carelessly wasted.

CROSS OIL FILTERS will save the waste. It means 50%.

Can we send you one on approval?

We pay the freight if not satisfactory.

Catalogue

THE BURT MFG. CO.,
Akron, Ohio, U. S. A.
Largest Mfrs. of Oil Filters in the World.

Quicksilver
For Sale in Lots to Suit.
REDINGTON & COMPANY, Wholesale Druggists, 23-25-27 Second Street, San Francisco.

SITUATIONS WANTED.

WANTED.—A SITUATION BY A COMPETENT Assayer, Surveyor, Draughtsman and Bookkeeper, with good references. Address L. R., this office.

ASSAYER – CHEMIST desires appointment. Four years chief assayer in present situation—one of the largest gold-silver mines. Highest testimonials. Address Assayer, Mining and Scientific Press.

Experienced Assayer, Cyanide Operator, Surveyor, and generally experienced around mine, is open for engagement. Also A1 Bookkeeper. Address S. W. T., this office.

Chemist and Metallurgist, engaged exclusively in cyanide since 1891, is open to engagement. Address H. B., care of Mining and Scientific Press.

WANTED—SITUATION AS MANAGER OF producing or developing property. Twelve years' experience in gold mining and milling, copper mining and smelting. Address C. H., care of Mining and Scientific Press.

Engineer and Metallurgist, graduate Freiberg, with years of experience in mining, smelting, exploration and ore treatment methods, with most exceptional references, seeks position. No objection to go anywhere. Speaks five languages. Fearless, energetic and temperate. Mexico, Alaska, or South America. Address MINERO, this office.

An Experienced, Aggressive Mining Engineer and Metallurgist, technical graduate, eighteen years' practical experience in the United States and Canada as manager and consulting engineer of mines and mills, is open to engagement as manager, superintendent or chemist. Thoroughly understands economic mining and reduction of gold and silver ores. Not afraid of a hard proposition. Can leave present position with month's notice. Correspondence solicited and references exchanged. Address KARL NEITZEL, Camp McKinney, B. C.

CYANIDING.

Have had charge of five mills and worked in every part of process from shoveling to laboratory work. Test ores and outline process for treating them. For three years treated SLIMES successfully. Wish a position after July 10. Have studied to excel. References as to character and ability.

Address K. C. N., Boise, Idaho, Box 3.

WANTED.

WANTED.—A CHEMIST AND ASSAYER FULLY conversant with the latest and most economical methods of cyaniding; also an Assistant Assayer and Chemist. State salary expected and forward testimonials. Address "Extraction," care of Mining and Scientific Press.

WANTED--A Developed Low Grade Free Milling Proposition.

Address, with full particulars and terms, B. W., Box 82, Buena Vista, Colorado.

TO MINING EXPERTS.

WANTED.—A proposition containing magnetic pyrites (Fe_7 S_8 to Fe_{11} to S_{12}).

Address THOS. L. NEAL, Attorney, Lankershim Block, Los Angeles, Cal.

REFRACTORY ORES WANTED.

1000 TONS or more which will assay \$75.00 Gold per ton and over, delivered free of charge at San Francisco, Cal. Correspondence solicited.

C. J. TALLON,
308 MARKET STREET, SAN FRANCISCO, CAL.

WE BUY very rich Ores, Dental Scraps, Tellurium Ores, Mill Wastes, Jewelers' Sweeps, Gold Retorts, Old Iron Retorts, Base Amalgam, Quicksilver, Amalgamated Plates, Gold and Silver, Old Slags.

A. M. DONALDSON & CO.,
ASSAYERS AND WASTE PRODUCT SMELTERS,
1661 Larimer St., Denver, Colo.
Write for Donaldson's Assayers' Slag Hammer.

FOR SALE.

FOR SALE --- Developed Zinc-Lead-Silver Property. Texas.

Two trunk lines. 700 acres. 8100 feet on vein. Splendid concentrating proposition. 1500 feet development. Mine average: Zinc, 17.66%; lead, 9.57%; silver, 7.35 ozs.; gold, .04 ozs. Price, \$30,000. Principals only. H. B. RUNKLE, El Paso, Texas.

FOR SALE.
ENGINES:
8 h. p. N. Y. Safety; 6x10 Rice Horizontal; 10x16 Hendie & Meyer; and others.
THE S. H. SUPPLY CO.
WRITE FOR CATALOGUE OF MINING MACHINERY AND SUPPLIES.
22nd and Larimer Sts., DENVER, COLO.

5
Gold Quartz Claims
In Compact Body, Together With
10-STAMP
Quartz Mill and Mill Site
FOR SALE.

Situated on Dog Creek, Shasta Co., California, six miles from Delta Station, on the Shasta Division of the Southern Pacific Railroad, thirty-eight miles from Redding. Mines in good condition for inspection. Will be sold outright, or bonded for a sale after thorough inspection and experting. Property acquired by foreclosure of mortgage. Owner can not handle it.

C. C. BUSH, Trustee,
Address: REDDING, CAL.

SECOND-HAND MACHINERY For Sale.
Boilers, Engines, Heaters, Pumps, Tanks, Steam Pipe, all sizes, Shafting, Pulleys Boxes, Hangers, Gears, Belting, etc. Iron and Wood Working Machinery, all kinds, all makes. We make a specialty of Saw Mill Supplies. Our prices are low and all goods are guaranteed as represented. Let us know your wants and we will please you.
Harris Machinery Co.,
1042 Washington Ave., S. E., Minneapolis, Minn.

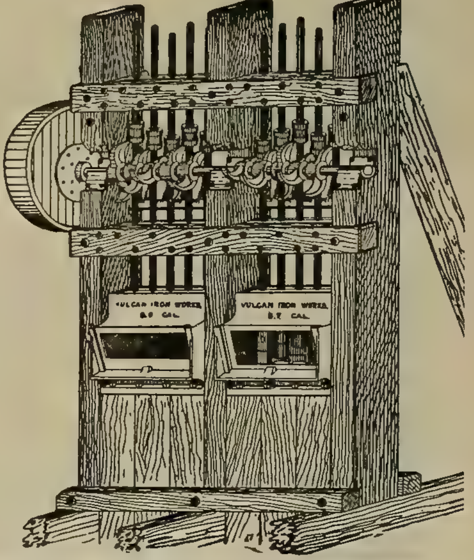
Hydraulic Pipe FOR SALE CHEAP.
1500 feet of 10⅝-inch Casing weighing 27 lbs. to the foot, with Flanges, or Screws and Sockets; in lots to suit. Immediate delivery. Correspondence solicited.
C. J. TALLON,
308 Market Street,........San Francisco, Cal.

ASSAY OFFICE FOR SALE.
An old established and completely equipped Assay Office and Chemical Laboratory, doing a good business in Denver, Colo.; power plant with crushing and grinding apparatus in connection. Good business reasons for selling. Bargain if sold at once. Address Q 641, Mining and Scientific Press.

FOR SALE.
BIG COPPER MINE
In Shasta county. A south extension of Iron mountain. Croppings 700 feet wide; 600 to 800 feet of backs. Four miles from Sacramento river and railroad. Address C. D., this office.

BENJAMIN T. LLOYD,
STOCKS, BONDS AND MINES.
Have immediate customers for well-developed Gold and Copper Properties.
P. O. Box 608, SALT LAKE CITY, UTAH.

Mining Machinery.
Stamp Mills
Of the Latest Improved Design for
Gold Milling.
VULCAN
WIRE ROPEWAYS
For Conveying Ore, Etc.
Vulcan Iron Works,
Office: 505 Mission Street,
San Francisco, Cal.


VULCAN IRON WORKS S.F. CAL.
VULCAN IRON WORKS S.F. CAL.

WEST COAST OF MEXICO.
WÖHLER, BARTNING Suc's, Mazatlan (Sinaloa), Mex.
Bankers, Importers, Exporters and Commission Merchants.
Representatives and Agents of the principal Mining Companies in the State of Sinaloa and the dependencies of the Pacific coast in the States of Durango, Chihuahua, Sonora, Lower California and Jalisco.
ORE BUYERS AND EXPORTERS. - MINING SUPPLIES.

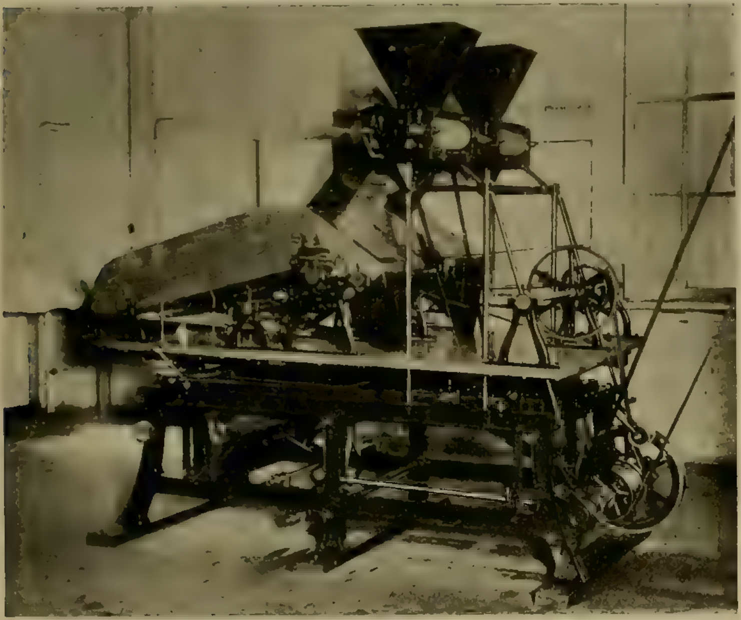
T.P. G.W.P. J.P. E.P.
PENNINGTON
TRADE MARK
SAN FRANCISCO, CAL.
OUR SPECIALTIES ARE:
Hammered Steel Shoes and Dies,
Cam, Crank and Steamboat Shafts,
Rock-Breaker Plates,
Connecting Rods, Well-Boring Tools,
General Blacksmithing.
Correspondence Solicited, and Circulars Mailed Upon Request.
GEO. W. PENNINGTON & SONS,
218 and 220 Folsom St.,...........San Francisco, Cal.

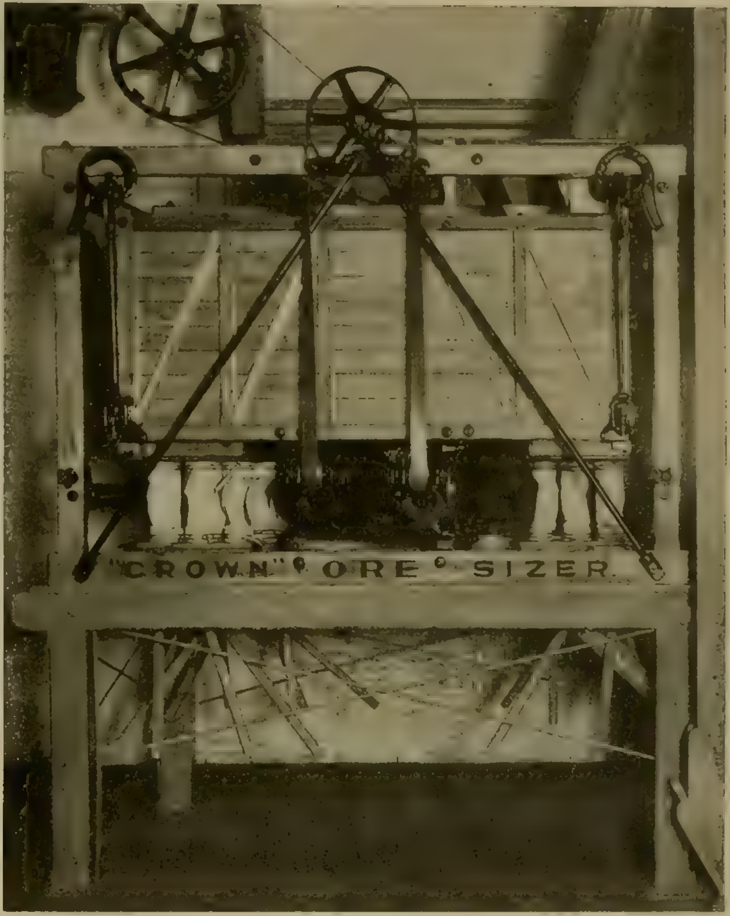
GENERAL PHOTO-ENGRAVING CO.
[SUCCESSORS TO DEWEY ENGRAVING CO.]
FINE ZINCOGRAPHS, HALF-TONES, AND DESIGNING.
ENGRAVINGS OF MACHINERY OUR SPECIALTY.
SEND FOR SAMPLES AND PRICES.
TELEPHONE BLACK 1466.
NO. 536 CLAY STREET,
SAN FRANCISCO, CAL

CROWN GOLD MILLING CO.

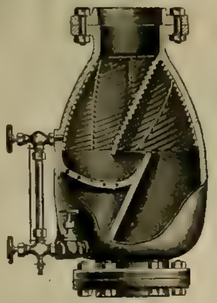
Manufacturers of the "CROWN" CONCENTRATOR and CROWN ORE SIZER. A dry process of sizing and concentrating ore, sand or gravel. Designed to accord fully with the laws of specific gravity, and especially adapted to refractory ore or localities where there is no water.

☞ The chief claims for the Crown Concentrator are that it occupies less floor space and has nearly four times the capacity of any wet concentrator; that it will concentrate ores containing base and refractory metals that ordinarily slime and carry off values; that it effects a saving of values far above the ordinary methods of concentration.





Works, 23 Stevenson St. Office, 230 Post St. SAN FRANCISCO, CAL.



Ever Know an Engine Has Lungs?

The cylinder of an engine corresponds with lung action and in some ways is afflicted with lung trouble. For instance, too much moisture in the steam cylinder will cause more trouble than a damp atmosphere to a consumptive.

Vertical. Sizes 1½ to 12 in. AUSTIN Separators **Horizontal. Sizes 1½ to 12 in.**

Are the proper medicine. They eliminate all moisture and ensure the greatest efficiency to the engine. Shipped on 30 days' trial to responsible parties anywhere in the United States and freight paid both ways if not satisfactory.

SEND FOR OUR NEW CATALOGUE.

AUSTIN SEPARATOR CO.,
27 W. Woodbridge St., DETROIT, MICH., U. S. A.

ERICSSON SWEDISH TELEPHONES

Seem to possess almost human Intelligence. They respond to every requirement in a smooth, positive fashion that shows what a perfect telephone can do. Besides this they have unequalled strength and durability. Their reputation as *"STANDARD OF THE WORLD"* is built on merit. Is the best too good for you?

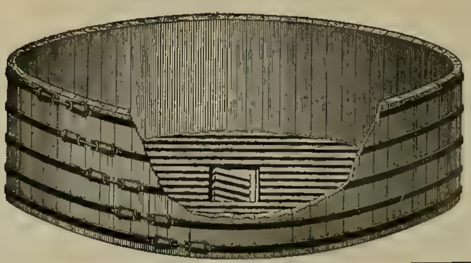
ERICSSON TELEPHONE CO. *296 BROADWAY NEW YORK.*

THE CAL. ANTI-CALORIC COMPANY,

Tel. Main 5752. Office, 217-219 Mission St., San Francisco, Cal.

Sole Manufacturers of ANTI-CALORIC SECTIONAL COVERINGS AND BLOCKS FOR BOILERS. ANTI-CALORIC PLASTER for Boilers, Domes, Pipes, Heaters, Etc., — the Best and Cheapest Insulating Plaster in the Market. Send for Samples and Prices. Factory, Potrero.

FOR CYANIDE PLANTS OR MINING — TANKS OF ANY DESCRIPTION.

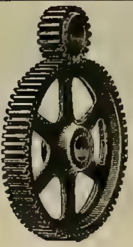


Write to

PACIFIC TANK CO.,

348 E. 2nd Street, Los Angeles.
35 Beale Street, San Francisco.

Illustrated Catalogue Mailed Free.



P. T. TAYLOR & CO.,

525 MISSION ST., SAN FRANCISCO, CAL.

GEAR WHEELS, GEAR CUTTING,

ALL DESCRIPTIONS UP TO 50 INCHES.

GEARS FOR AUTOMOBILES A SPECIALTY.

FULL INFORMATION BY MAIL.

THE BUCYRUS COMPANY,

DESIGNERS AND BUILDERS OF

DREDGES, STEAM SHOVELS, EXCAVATING MACHINERY, WRECKING CARS, LOCOMOTIVE CRANES, PILE DRIVERS, CENTRIFUGAL PUMPS, WITH SIMPLE, COMPOUND OR TRIPLE EXPANSION ENGINES,

MACHINERY FOR PLACER MINING.

SOUTH MILWAUKEE, WISCONSIN.

SMOOTH-ON TRADE MARK CASTINGS.

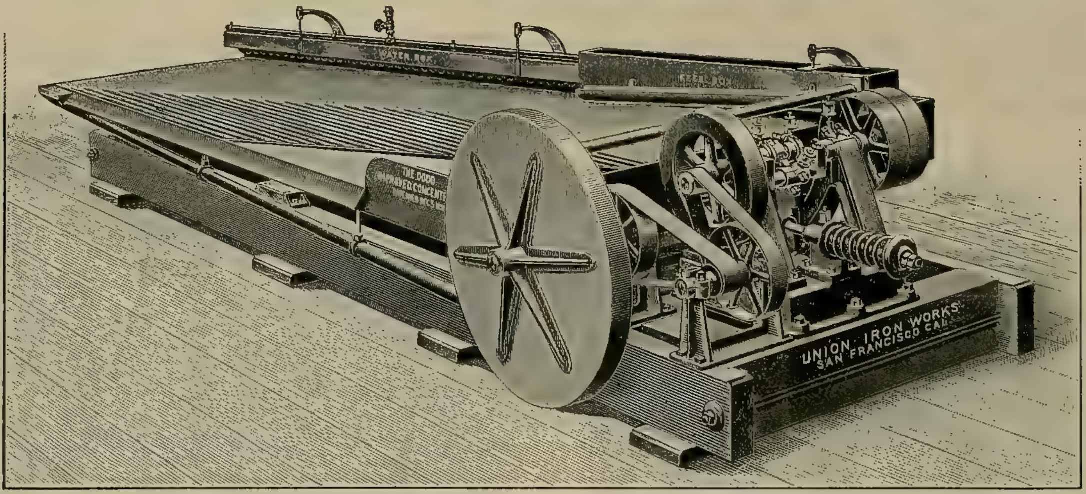
An iron cement for repairing leaks or fractures in steam or hydraulic work. When hard it will withstand a red heat, steam, water or oil, and expands and contracts with heat and cold the same as iron, insuring a tight joint at all temperatures. Difficult flange connections can easily be made with Smooth-On, as it adapts itself to the flanged faces whether parallel or not. Connections are easily taken apart. Unequaled for boiler patching, and repairing blemishes in iron castings. Write for catalogue and prices. Sole proprietors and manufacturers: Smooth-On Mfg. Co., Jersey City, N. J., U. S. A.

MESSRS. MADISON, BRUCE & SELLERS,

34-36 STEUART ST., SAN FRANCISCO, CAL......................AGENTS FOR PACIFIC COAST.

UNION IRON WORKS,

222 Market Street, San Francisco, Cal.



Patented Dec. 5, 1899; May 29, 1900.

THE DODD CONCENTRATING TABLE,

which we illustrate herewith, is the latest and most improved machine of this class now made.

This type of machine is so well known that little or no description is required. It is specially adapted for ores carrying a heavy percentage of sulphurets; has a large capacity and effects a clean separation.

The operating mechanism can be easily adjusted to meet the requirements of any character or condition of ore; it is simple, durable and efficient, and gives universal satisfaction.

For further particulars, address UNION IRON WORKS, San Francisco, Cal.

STEAM LOCOMOBILE FREIGHTING TRAIN.

CAPACITY OF WAGONS 16 TONS EACH, or total freight carrying capacity of train 50 tons.

CAPACITY OF ENGINE, 50 H. P.

THESE WAGONS ARE ESPECIALLY DESIGNED FOR STEAM FREIGHTING.

CAPACITY OF TRAIN, 50 TONS.

"The Daniel Best" 50-Horse Power Traction Engine.

The most powerful and only Successful and Practicable Road Engine in the world. Eighty of them in use on this Coast. They are being Successfully and Profitably Employed in Hauling Logs, Lumber, Ore, Salt, Borax and other kinds of freight.

The work is being done **FIFTY PER CENT** Cheaper than it is possible to do with Animal Power. They can be operated over any ordinary road where it is practicable to use mules or horses, doing the same work. They can ascend grades as much as 10% to 20%, hauling their loads of 35 to 40 tons, depending upon the condition of the roads; loads may be increased to even greater amount on a firm and moderately level road.

Send for descriptive Circulars and Price List of Engines and Wagons. We solicit correspondence. No trouble to answer questions.

Estimates made for complete Steam Freighting Outfits. Address

THE BEST MANUFACTURING CO.,
San Leandro, Cal., U. S. A.

RISDON IRON WORKS,
SAN FRANCISCO, CALIFORNIA.

Cable: "Risdon's." Code: A. B. C. & Leiber's.

MANUFACTURERS OF

Gold Dredging Machinery
And COMPLETE EQUIPMENT for Placer Mines
OUR SPECIALTY.

We build **GOLD DREDGES COMPLETE IN RUNNING ORDER** to handle 2500 cubic yards per day at a cost of 3 cents per cubic yard.

We excavate 50 feet below water, 20 feet above water and handle boulders up to one ton weight.

Send for Dredging Catalogue No. 17.

——WE ALSO BUILD——

All kinds of Mining, Milling, Concentrating, Pumping, Air Compressing, Hydraulic, Water Wheel and Hoisting Machinery.

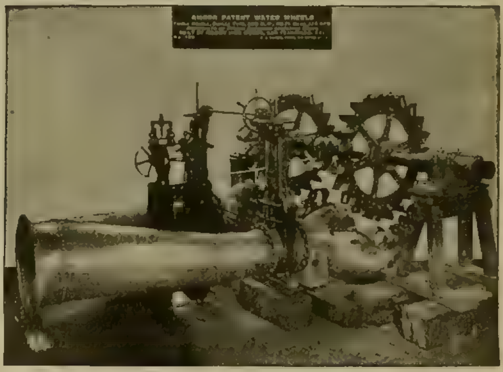
EVANS HYDRAULIC GRAVEL ELEVATORS.

We publish sixteen catalogues. Write for one in the line you are interested in.

TANGENTIAL WATER WHEELS
MANUFACTURED BY
RISDON IRON WORKS,
SAN FRANCISCO, CALIFORNIA.

We build Water Wheels for any head and for any power. Complete electrical power generator wheels a specialty. Large wheels up to 50 feet diameter for driving compressors.

SEND FOR CATALOGUE NO. 4.

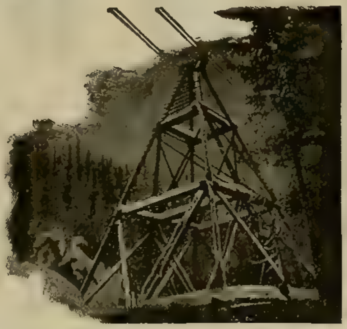


THE MINE AND SMELTER SUPPLY CO.,
DENVER, - - COLORADO.
Mining and Milling Machinery and Supplies.

We beg to call your attention to

THE FINLAYSON PATENT WIRE ROPE TRAMWAY—

the latest and best system of double-rope automatic aerial tramway in the market.
If interested in the most economical system of transporting ores from mine to mill and to shipping stations, send for our special tramway catalogue.

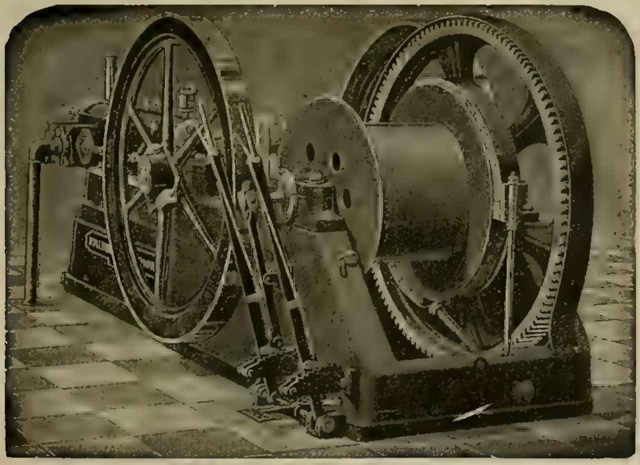


We carry a complete stock of Machinery and Supplies for immediate delivery.

Send for our special catalogues on Mining Machinery, Milling Machinery, Wilfley Concentrators, Tramways, Power Transmission Machinery, Machine Tools, Etc.

THE MINE AND SMELTER SUPPLY CO.,......................Denver, Colorado.
THE MINE AND SMELTER SUPPLY CO.,................Salt Lake City, Utah
THE MEXICO MINE AND SMELTER SUPPLY CO.,
No. 16 San Francisco St., City of Mexico.

BOILERS, ENGINES, STEAM HOISTERS, ELECTRIC HOISTERS, ROLLS, CRUSHERS, WILFLEY TABLES, CARS, CAGES, ORE BUCKETS, RAIL, PIPE, FITTINGS, BELTING, ETC., ETC.



FAIRBANKS-MORSE
GASOLINE-DISTILLATE GEARED HOISTER.

An efficient and reliable combination of a Fairbanks-Morse Gasoline-Distillate Engine on the same base with a Friction Hoist. Modern and up to date. We publish a special catalogue describing our Hoister which we gladly mail prospective purchasers.

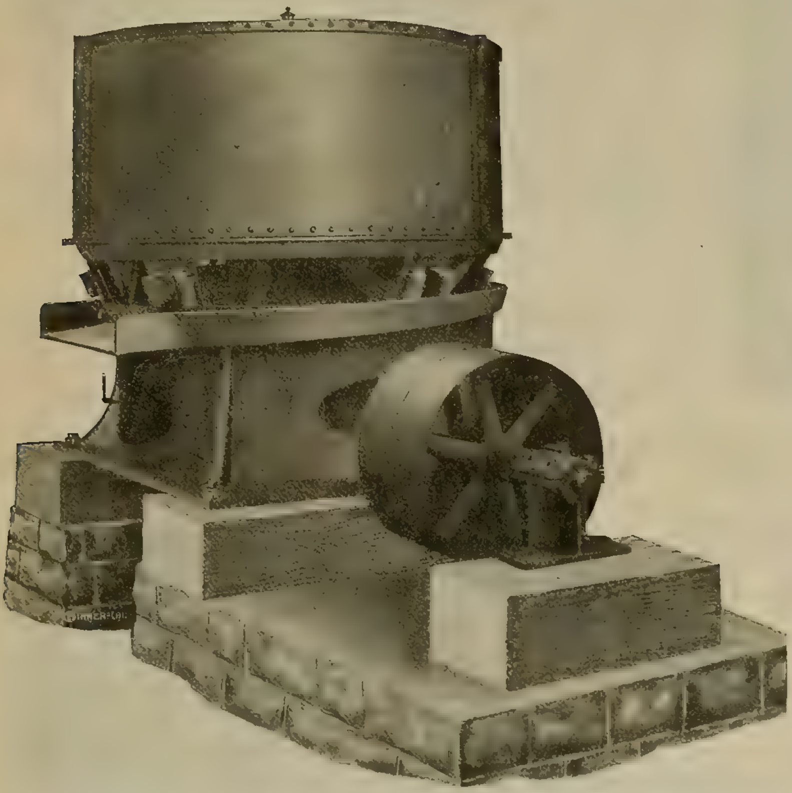
FAIRBANKS-MORSE GASOLINE-DISTILLATE ENGINES.
ALL SIZES UP TO AND INCLUDING 54 HORSE POWER.
For Pumping, Milling, Lighting, Air Compressors, Etc.

FOR CATALOGUES AND FULL INFORMATION, ADDRESS
FAIRBANKS, MORSE & CO.,
310 MARKET ST., SAN FRANCISCO, CAL.
201 N. LOS ANGELES ST., LOS ANGELES, CAL.
FIRST AND STARK STS. PORTLAND, OGN.
1600 SEVENTEENTH ST., DENVER, COL.
FRANKLIN AND MONROE STS., CHICAGO, ILL.

GATES IRON WORKS,

SOLE MANUFACTURERS OF THE

BRADLEY CHILIAN MILL,



Unsurpassed for regrinding tailings or for other fine pulverizing.
ALL KINDS OF HIGH GRADE MINING MACHINERY.
650 Elston Ave., CHICAGO.

THE

Pelton Water Wheel Company

Gives exclusive attention to the development and utilization of water powers by the most modern, economic and improved methods. An experience of more than fifteen years, involving both the theory and practice of hydraulic engineering as relates to power development in its widest range of application, is at the service of its customers.

Nine Thousand Wheels Now Running,

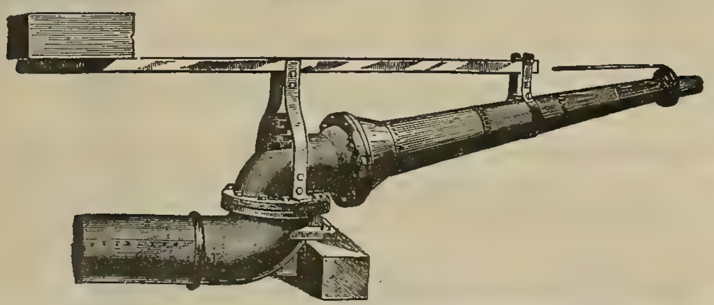
Averaging some 700,000 H. P.

ELECTRIC POWER TRANSMISSION.

Pelton wheels afford the most reliable and efficient power for such service and are running the majority of stations of this character in the United States, as well as most foreign countries. Highest efficiency and absolute regulation guaranteed under the most extreme variations of load.

The Pelton Water Wheel Company,
121 & 123 MAIN STREET, SAN FRANCISCO, CAL.

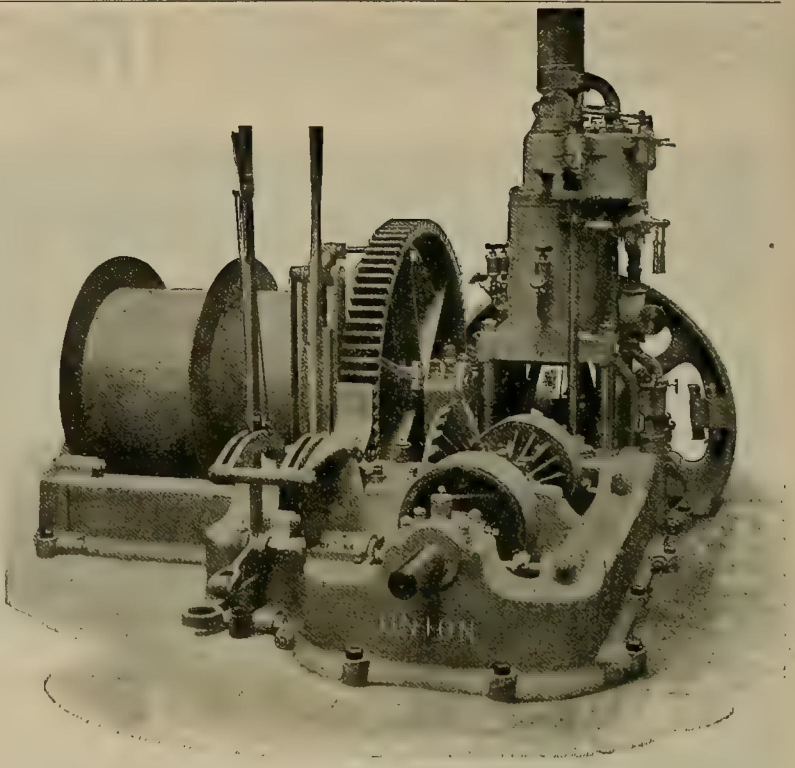
Double-Jointed Ball-Bearing Hydraulic Giants.



The above presents an improved **Double-Jointed Ball-Bearing Hydraulic Giant** which we build. The improvement consists of the introduction of a **Ball Bearing** by which the pressure of the water is reduced to a minimum and the direction of the nozzle changed at will with ease.

Catalogues and prices of our specialties of HYDRAULIC MINING MACHINERY furnished upon application. **JOSHUA HENDY MACHINE WORKS, 38 to 44 Fremont St., San Francisco. Cal.**

DEWEY, STRONG & CO., Patent Solicitors, 330 Market St., San Francisco, Cal.



The above illustrates the "Union" 25 H. P. double cylinder divided drum mining hoist for double compartment shaft. Cages and cars balance each other, therefore power is only used to raise ore; cost of hoisting ore is therefore reduced to the minimum. Made in sections for mountain transportation.

THE UNION GAS ENGINE CO.

—BUILD THE—

"Union" Gas Engines,

Which use either MANUFACTURED or NATURAL GAS, ORDINARY STOVE GASOLINE (NAPHTHA or BENZINE), DISTILLATE or KEROSENE.

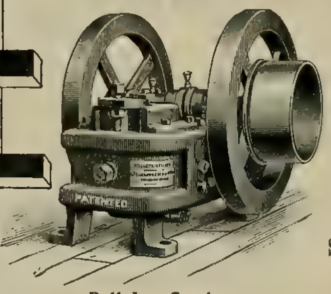
STATIONARY ENGINES for All Kinds of Work, Built in Sizes from 3 to 200 h. p.
"UNION" COMBINED HOISTS in Sizes from 2 to 40 h. p.
"UNION" COMBINED COMPRESSORS—20, 30, 40 h. p.
HOISTS and COMPRESSORS Can Be Built in Larger Sizes to Order.
"UNION" MARINE ENGINES, 4 to 200 h. p., of Single, Double and Four-Cylinder Types.
TEN YEARS' EXPERIENCE Building Gas and Oil Engines.
"UNION" ENGINES Are In Use All Over the United States.
"UNION" ENGINES Are Simple, Durable and Economical.

Office, 244 First Street. Works, Corner First and Clementina Streets. SAN FRANCISCO, CAL.

The ONLY

FINE CRUSHER

OF HARD ROCK.



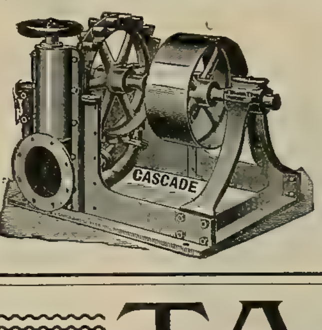
Reduces to Gravel and Sand.

Does as fine work as Breaker and two sets of rolls.

STURTEVANT MILL CO.
113 CLAYTON ST.
BOSTON, MASS.

SEND FOR CIRCULAR. Roll Jaw Crusher.

TURBINE AND CASCADE WATER WHEEL



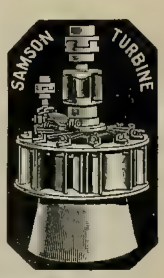
Adapted to all Heads from

3 Feet to 2000 Feet.

Our experience of 38 YEARS building Water Wheels enables us to suit every requirement of Water Power Plants. We guarantee satisfaction.

State your Head and requirements. Send for pamphlet.

JAMES LEFFEL & CO.
SPRINGFIELD, OHIO, U. S. A.



TANKS!

LUMBER AND HOUSE FINISH.
TANKS FOR WATER, WINE OR OIL.

Jig Frames, Jig Screens, Zinc Boxes,

and Tanks of Every Description for Mining Purposes.

WRITE FOR ESTIMATES ON YOUR WANTS.

THE EXCELSIOR REDWOOD CO.,
FOURTH AND CHANNEL STREETS,
SAN FRANCISCO, CAL.

C. A. HOOPER & CO., Agents,
204 Front Street, San Francisco, Cal.

NO TROUBLE TO OPERATE--A BOY COULD RUN IT.

TO ASSAYERS:

This is our DOUBLE MUFFLE FURNACE, No. 37. The lower muffle is 10x16x6 inches, and will hold eight 20-gramme crucibles. The upper muffle is 6x12x4 inches.

One Cary burner, size 2 1-4 inches, heats both muffles simultaneously.

Starting with a cold furnace and burner, the first batch of eight crucibles can be poured in less than one hour from time of lighting match, and same cupelled in one hour and a half.

When furnace has become thoroughly heated, melts may be made every twenty minutes and cupellations every twenty-five minutes.

Further particulars on request to

F. W. BRAUN & CO.,
Modern Appliances for Assayers,
LOS ANGELES, CAL.

RELIANCE ORE CRUSHERS

(BLAKE STYLE.)

FOR SILVER, LEAD AND COPPER ORES.

COMPLETE LINE OF SMELTER TOOLS.

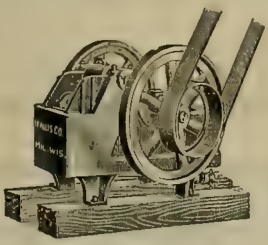
CHLORINATION AND CYANIDE PLANTS.

COLLOM AND HARTZ JIGS.

HYDRAULIC CLASSIFIERS.

RELIANCE VANNER.

Single and Double Deck SLIME TABLES.



AIR COMPRESSORS AND HOISTING ENGINES.

THE EDWARD P. ALLIS COMPANY,

RELIANCE WORKS,
MILWAUKEE, - WIS.

Are You Confronted With a Difficult Ore-Separating Problem?

THE WETHERILL MAGNETIC SEPARATING PROCESS
may prove the solution. Apply to Wetherill Separating Company, 52 Broadway, N. Y.

SHOES and DIES
of SUPERIOR quality and at prices 20 to 30% lower than any other maker.
FURNISHED BY
ARTHUR KOPPEL,
66 Broad St., N. Y. City.
Write for Particulars.

MINING CARS of every description.
PORTABLE RAILWAYS,
Rolling Stock, Railway Outfits for Mines of every description.
Export Work a specialty.
ARTHUR KOPPEL,
66 Broad St , N. Y. City.
Send for Catalogue and Estimates.

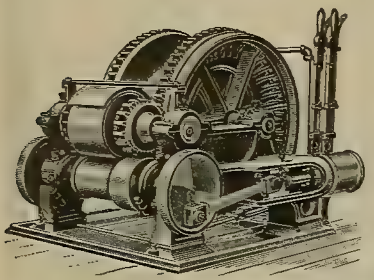
Pacific Coast Agents, BAKER & HAMILTON, SAN FRANCISCO and SACRAMENTO.

P&B Building Paper..

A perfect insulation for cold storage houses and refrigerators.
Unequaled in residence construction.
A protection against heat, cold, dampness, dust, draught and vermin.
Demand it of your dealer — you need it in your buildings.
Paraffine Paint Co— 116 Battery, San Francisco

WE MAKE A SPECIALTY OF

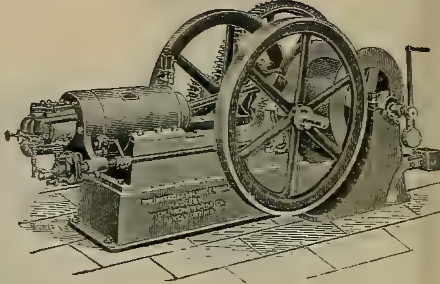
HIGH GRADE HOISTING MACHINERY



DESIGNED FOR

STEAM, COMPRESSED AIR,
ELECTRICITY AND GASOLINE.

ALL STYLES. ALL SIZES.



Our Line of Patterns Contains Something Exactly Suited to Your Requirements.
WE SOLICIT YOUR CORRESPONDENCE.

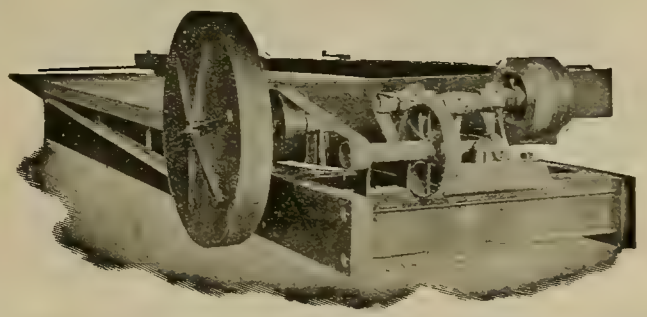
The Hendrie & Bolthoff M'f'g & Supply Co.
DENVER, - - - - - - COLORADO.

No. 38.

Sole Pacific Coast Agents and Builders of the Celebrated

WILFLEY CONCENTRATOR.

Over 2000 in Use.



KEPT IN STOCK READY FOR SHIPMENT.
The Wilfley Table is fully covered by U. S. patents Nos. 580,338 and 590,675. Infringements will be prosecuted to the full extent of the law.

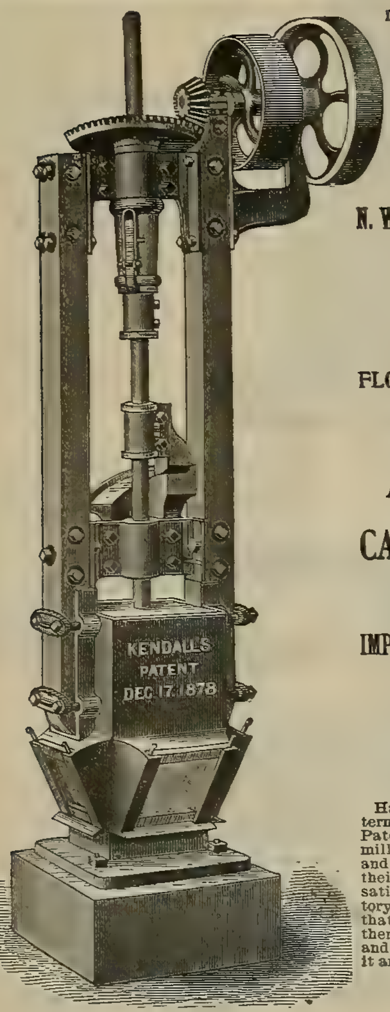
PRICE, $450, F. O. B., San Francisco.

THE WILFLEY CONCENTRATORS HAVE LARGE CAPACITY, EASY ADJUSTMENT, ARE SIMPLE IN CONSTRUCTION, AND NOT LIABLE TO WEAR.

WHITE, ROGERS & CO.,
Constructing Engineers and Contractors,
OFFICES, 306 PINE STREET, - - SAN FRANCISCO, CAL.

: : WE FURNISH AND ERECT : :

- Modern Stamp Mills for Gold Ores,
- Modern Stamp Mills for Silver Ores,
- Dry Crushing and Roasting Stamp Mills,
- Cyanide Tanks and Machinery,
- Chlorination Works and Machinery,
- Copper and Silver and Lead Smelters,
- Complete Concentration Plants and Machinery,
- Direct Connected Hoisting Engines,
- Geared Hoisting Engines,
- Friction Hoisting Engines,
- Portable Hoisting Engines,
- Electric Hoisters,
- Wilfley Concentrators,
- Machinery and Supplies of all kinds and for all Mining Purposes.



L. C. MARSHUTZ. T. G. CANTRELL.

NATIONAL IRON WORKS,
N. W. Cor. Main & Howard Sts., San Francisco.

MANUFACTURERS OF
STATIONARY AND COMPOUND
ENGINES,
FLOUR, SUGAR, AND QUARTZ MILL
MACHINERY.

AMALGAMATING MACHINES.

CASTINGS AND FORGINGS
OF EVERY DESCRIPTION.
All work tested and guaranteed.

IMPROVED PORTABLE HOISTING ENGINES

Sole Manufacturers of

Kendall's Patent Quartz Mills.

Having renewed our contract on more advantageous terms with Mr. S. Kendall for the manufacture of his Patent Quartz Mill, we are enabled to offer these mills at **Greatly Reduced Prices.** Having made and sold these mills for the past 16 years, we know their merits, and know that they have given perfect satisfaction to purchasers, as numbers of commendatory testimonials prove. We feel confident, therefore, that at the prices we are now prepared to offer them, there is placed within the reach of all a light, cheap and durable mill that will do all that is claimed for it and give entire satisfaction.

MARSHUTZ & CANTRELL.

Send for Circulars and Price List.

SCREENING MACHINERY FOR ALL PURPOSES.

VIBRATORY, SHAKING, REVOLVING, STATIONARY AND MECHANICAL HAND SCREENS FOR ALL MATERIALS.

SCREENS SPECIALLY ADAPTED FOR MINING PURPOSES.

COMPLETE PLANTS ERECTED.

SEND FOR DESCRIPTIVE MATTER.

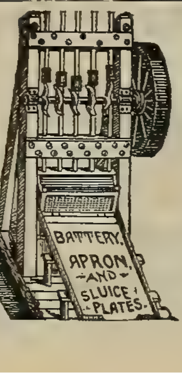
WESTERN MACHINERY & SUPPLY CO., Engineers and General Machinists,
161 La Salle Street, CHICAGO.

WHY NOT PUT IN YOUR OWN PLANT FOR DEPOSITING SILVER ON YOUR AMALGAM PLATES

WE FURNISH DYNAMOS & COMPLETE EQUIPMENT FOR THIS WORK.

WRITE FOR PARTICULARS

THE HANSON & VAN WINKLE Co.
CHICAGO. NEWARK N. J. NEW YORK.



To Gold Miners!

Silver Plated Copper Amalgamating Plates
For Saving Gold in Quartz and Placer Mining.

ONLY BEST COPPER AND REFINED SILVER USED. OLD MINING PLATES BOUGHT OR TAKEN IN EXCHANGE FOR NEW PLATES. GOLD EXTRACTED FROM OLD PLATES AT A MODERATE COST. OLD PLATES REPLATED. GOLD, SILVER, NICKEL, COPPER AND BRASS PLATING.

Denniston San Francisco Plating Works,
652 Mission Street, Cor. Annie, San Francisco, Cal.
E. G. DENNISTON, ... Proprietor.

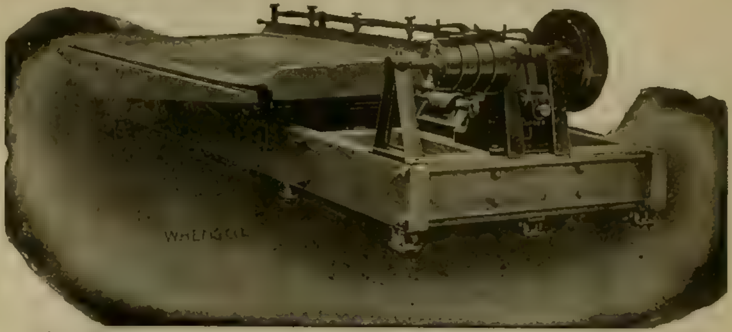
——:Send for Circular.:——

THE : CAMMETT : CONCENTRATOR.

Designed with some Regard for the Laws of Concentration.

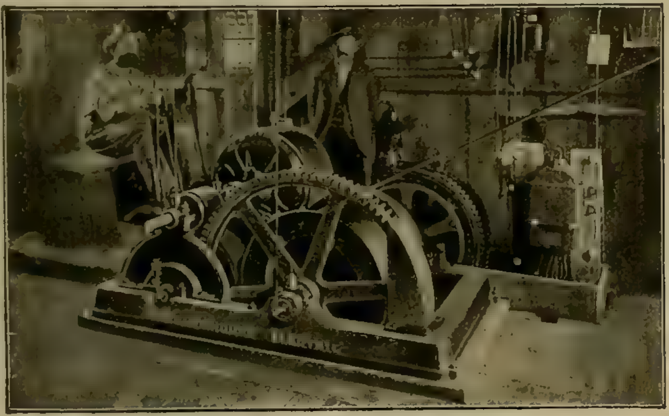
From **The Denver Evening Post**, July 15th, 1900

* * * "Now about concentrating tables. Here's a fellow who says there's nothing equal to the Wilfley, and I am trying to convince him that old man Woodbury over in California makes the finest table in the world." "No, sir," said his comrade, "you're way off. I've tried the CAMMETT too thoroughly to believe there's anything made to equal it."



Manufactured Under U. S. Patent No. 632,892; Dated Sept. 12, 1899.

Denver Engineering Works,---Shepard & Searing,---Sole Manufacturers,
30th and Blake Streets, - - - - DENVER, COLORADO.



POLYPHASE INDUCTION MOTOR OPERATING MINE HOIST.

Westinghouse

Polyphase Induction Motors

Supplied with current from Westinghouse Generators Operate in nearly all the Cripple Creek Mines.

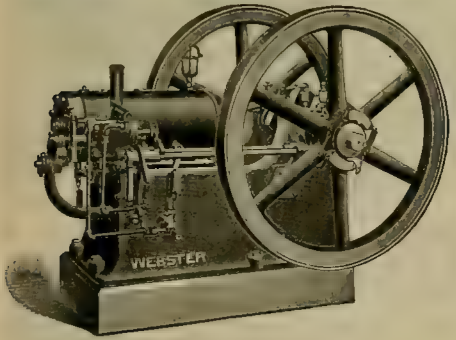
Westinghouse Electric
& Manufacturing Co.

Mills Building,
San Francisco.

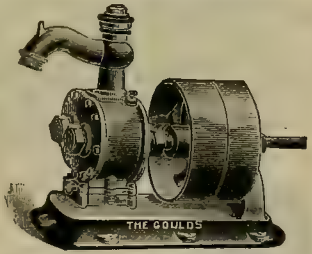
Pittsburg, Pa.

All Principal Cities
in U. S. and Canada.

65-B



WEBSTER GASOLINE ENGINES.



ROTARY PUMPS.

Send for Our Large Catalogue, Mailed Free.

We carry a full line of Gasoline Engines.

Pumps for all depths of wells—for Hand, Wind Mill use, Power Pumps, Electric Pumps. Irrigating Pumps of all capacities. Mining Pumps. Tanks. Iron Pipes. Pipe Fittings. Brass Goods. Tools, Etc. Send for Catalogue, sent free.

WOODIN & LITTLE,
312-314 MARKET STREET,..........SAN FRANCISCO, CAL.

ELECTRICAL

Standard of the World.

MINING APPARATUS.

Electric Mine Pump.

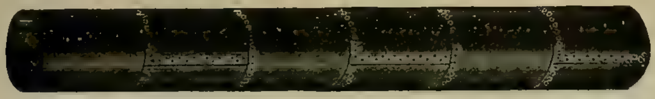
HOISTS, PUMPS, LOCOMOTIVES.

MOTORS FOR STAMP MILLS.

General Electric Company,

SAN FRANCISCO, CAL., Claus Spreckels Building. DENVER, COLO., Kittredge Building.
PORTLAND, OR., Worcester Building. SALT LAKE CITY, UTAH, Templeton Building.

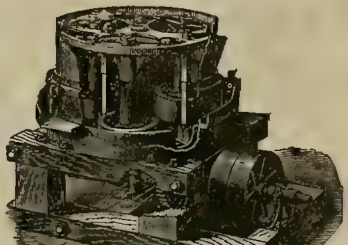
RIVETED IRON AND STEEL PIPE



FOR HYDRAULIC MINES, IRRIGATION AND POWER PLANTS. Manufactured from the best grades of IRON or STEEL by MODERN MACHINERY.

AGENTS FOR THE Celebrated CANTON STEEL.

Schaw, Ingram, Batcher & Co.,
539 Mission St., SAN FRANCISCO.
211 to 219 J St., SACRAMENTO.



Centrifugal Roller Quartz Mill.

F. A. HUNTINGTON,
—Manufacturer of—
CENTRIFUGAL
Roller Quartz Mills.

CONCENTRATORS and ORE CRUSHERS.
Mining Machinery of Every Description.
Steam Engines, Shingle Machines.
Room 1, 3d Floor, Mills Building,
SAN FRANCISCO, CAL.

TO SECURE GOOD RESULTS BUY

JESSOP'S STEEL

FOR TOOLS, MINING DRILLS, ETC.

Chief American Office,
91 John St., New York, N. Y.

Wm. Jessop & Sons, Ltd.
Manufactory, Sheffield, England.

I. WILLARD BEAM, Agent,
29 MAIN STREET,
SAN FRANCISCO, CAL.

PIPE BARGAINS.

Suitable for Water Mains, Mining; Irrigation, Air, Oil, etc, etc. New Spiral Welded Asphalted Steel Pipe with any style coupling desired.

460 ft. 6-in. 3,480 ft. 10-in. 1,828 ft. 14-in. 1,077 ft. 18-in.
50,000 " 8 " 2,428 " 12 " 520 " 16 " 1,623 " 24 "

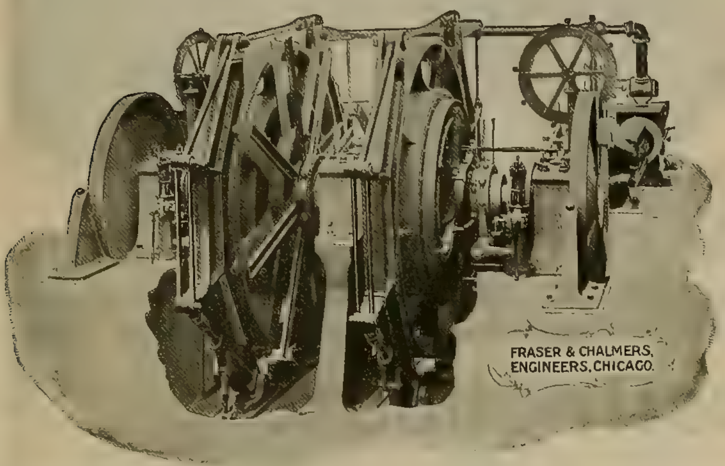
All Sizes Wrought Pipe, Well Casing and Straight Riveted Pipe in Stock. Equipment of All Kinds for Mine, Railroad and Contractors' Outfits. Write for Prices and Particulars.

BOWES & CO., 23 Lake St., Chicago, Ill.

HOISTING ENGINES
IN GREAT VARIETY
ARE DESCRIBED IN
FRASER & CHALMERS
NEW EDITION
CATALOGUE NO. 2.

When you are thinking about
putting in a new hoist
Get their catalogue,
Get their quotations,
Give them a fair opportunity to
supply you with a fine machine.

Fraser & Chalmers,
Chicago, Ill.



CABLE
HOIST CONVEYORS.

Laurent-Cherry Patent System,
requiring no Fall Rope Carriers;
and others.
MANUFACTURED BY
THE TRENTON IRON CO.,
TRENTON, N. J.

Engineers and Contractors and Sole Licensees in North America for the Bleichert System of Wire Rope Tramways. Also, Wire Rope Equipments for Surface and Underground Haulage, etc.

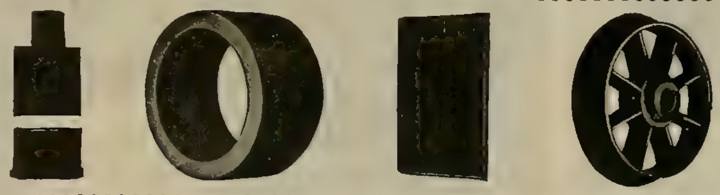
NEW YORK OFFICE—Cooper, Hewitt & Co., 17 Burling Slip.
CHICAGO OFFICE—1114 Monadnock Building.

For Particulars, Address **NEWTON M. BELL, Agent, 308 Market St., San Francisco.**

A full stock of the Trenton Iron Co.'s Wire Ropes, made from "SPECIAL" Crucible and Plough Steel, carried in San Francisco.

Cable Hoist Conveyor at St. Paul, Minn.

HARD TOUGH



TAYLOR IRON AND STEEL COMPANY,
HIGH BRIDGE, NEW JERSEY, U. S. A.

Sole Licensees in America under the HADFIELD System and Patents for
MANGANESE STEEL,

Best Metal Known for Roll Shells, Stamp Shoes and Dies, Crusher Plates and Side Liners, Toggles and Toggle Bearings, Gyratory Cones and Concaves, or Liners, Mine Car Wheels, Coal Crushing Rolls, Etc.

PACIFIC COAST PARTIES INTERESTED PLEASE ADDRESS PARKE & LACY CO., SAN FRANCISCO, CAL.
WRITE FOR INFORMATION AND PRICES.

Established 1865. NOTICE TO GOLD MINERS. Incorporated 1890.

Silver-Plated Copper Amalgamated Plates
FOR SAVING GOLD
IN QUARTZ, GRAVEL OR BEACH MINING. MADE OF BEST SOFT LAKE SUPERIOR COPPER.
AT REDUCED PRICES.

Our Plates are guaranteed, and by actual experience are proved, the best in weight of Silver and durability. Old Mining plates replated, bought, or gold separated. THOUSANDS OF ORDERS FILLED.

SAN FRANCISCO NOVELTY AND PLATING WORKS,
☞SEND FOR CIRCULARS. Telephone Main 976. 68, 70, 72, 74 and 76 FIRST STREET,
COR. MISSION, SAN FRANCISCO, CAL.

The Best Yet!

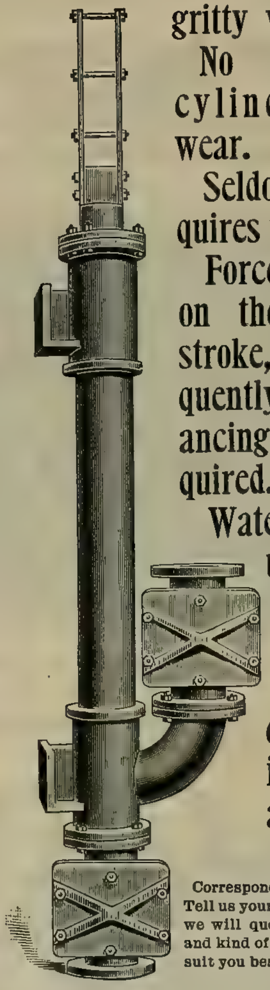
That is what they say about our new Jack-head Plunger Pump. Especially adapted for pumping very muddy or gritty water.

No smooth cylinder to wear.

Seldom requires packing.

Forces water on the down stroke, consequently no balancing bob required.

Water column can be perfectly and inexpensively balanced.



Correspondence solicited. Tell us your conditions and we will quote you on size and kind of pump that will suit you best.

W. T. GARRATT & CO.,
Cor. Fremont and Natoma Sts.,
SAN FRANCISCO, CAL.

THE MINES OF
Eastern Oregon
Which are now attracting so much attention are reached only by the lines of the
OREGON RAILROAD
& NAVIGATION CO.
For Descriptive Pamphlets, Through Rates, Etc., Address
E. C. WARD, Gen. Agt.,
630 Market Street, San Francisco.

COLORADO'S GOLD

Output for 1899 is unequaled by any State in the Union. Cripple Creek, Leadville, and all the important mining towns are reached by

THE COLORADO &
SOUTHERN RY...

For copies of our publications on the Swandyke and Pine Creek Gold Districts, or our pamphlet "Hints to Prospectors," address
T. E. FISHER, GEN. PASS. AGT.,
DENVER, COLO.

DEWEY, STRONG & CO.
SCIENTIFIC PRESS
PATENTS
PATENT AGENCY
330 MARKET ST. S.F.

SELBY SMELTING AND LEAD CO.,

REFINERS OF GOLD AND SILVER BARS, GOLD DUST, ETC.

Buyers of Gold, Silver, Lead and Copper Ores, Gold Concentrates, Lead Bullion, Cyanide Product, Etc.

ORE AND BULLION ASSAYERS.

Works at VALLEJO JUNCTION, CAL. Office, 416 MONTGOMERY ST., SAN FRANCISCO, CAL.

CHAS. C. MOORE & CO.,

...ENGINEERS AND DEALERS IN...

HAMILTON CORLISS ENGINES, N. Y. SAFETY AUTOMATIC ENGINES, BABCOCK & WILCOX BOILERS, McINTOSH & SEYMOUR ENGINES, GREEN'S ECONOMIZERS, HOPPES LIVE STEAM PURIFIERS, WHEELER CONDENSERS, BARNARD-WHEELER COOLING TOWERS, EDMISTON FEED WATER FILTERS, BUNDY STEAM TRAPS, SNOW STEAM PUMPS, QUIMBY SCREW PUMPS, GOUBERT FEED WATER HEATERS, STRATTON STEAM SEPARATORS, SPENCER DAMPER REGULATORS, HYATT ROLLER BEARINGS.

Contracts for Installation of Power Plants, Any Capacity.

SEND FOR CATALOGUES AND FULL INFORMATION.

32 FIRST STREET, SAN FRANCISCO, CAL.

SEATTLE BRANCH.............313 FIRST AVE. SOUTH.
LOS ANGELES BRANCH.........103 SOUTH BROADWAY.

THE COLORADO IRON WORKS CO.,

DENVER, COLORADO.

Manufacturers of HIGH CLASS

Ore Milling Equipments.

WE ARE THE ORIGINATORS
—OF THE—
Narrow Face, Large Diameter, High Speed
CRUSHING ROLLS.

ADAMANTINE SHOES AND DIES.

CHROME CAST STEEL.

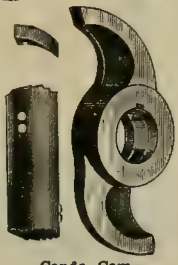
CANDA Improved Self-Locking CAMS.

TAPPETS, BOSSES, ROLL SHELLS AND CRUSHER PLATES.

These castings are extensively used in all the mining States and Territories of North and South America. Guaranteed to prove better and cheaper than any others. Orders solicited subject to the above conditions. When ordering, send sketch with exact dimensions. Send for Illustrated Circular.

Manufactured by **CHROME STEEL WORKS,** Brooklyn, N. Y.

H. D. & H. W. MORRIS,
AGENTS,
Room 194 Crocker Building, San Francisco, Cal.



Canda Cam.

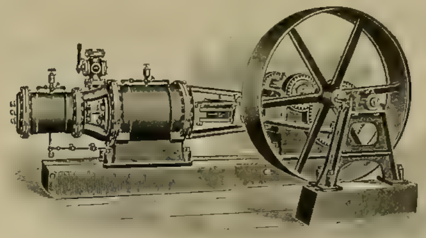
SECOND-HAND MACHINERY

SPECIALTIES:
PULLEYS, SHAFTING,
BELTING, BOXES,
BOILERS, ENGINES,
HOISTERS,
STAMP MILLS,
RAILS, CABLE,
and all but little used.

THE S. S. MACHINERY CO.,
Sixth and Market Sts.,
Denver, Colo.

Write or Ask for Descriptive Circulars.

WHY NOT have our catalogues, specifications and prices before you purchase AIR DRILLS OR COMPRESSORS?



Our guarantees are strong; our customers are satisfied. We can satisfy YOU.

J. Geo. Leyner,
729 Seventeenth St.,
DENVER, COLO.

FLINT & LOMAX,

DENVER, COLO.

ELECTRICAL AND MECHANICAL ENGINEERS.

—DEALERS IN—

BOILERS, ENGINES, DYNAMOS, MOTORS, ICE MACHINERY, SHAFTING, HANGERS, BELTING, PULLEYS, and

ELECTRICAL SUPPLIES OF EVERY KIND.

OPERATING MACHINE, PATTERN, BLACKSMITH AND PLATING SHOPS. MAKERS OF SPECIAL APPARATUS TO ORDER.

CARY SPRING WORKS,

240 & 242 WEST 29th STREET, NEW YORK, U. S. A.

Telephone, 3346—38th St.

WIRE SPRINGS
OF EVERY DESCRIPTION.

MANUFACTURERS OF
All kinds of ROUND AND FLAT WIRE, TEMPERED AND UNTEMPERED.
SPRINGS
For Machinery, Rolling Shutters, Motors, Etc.

MUSIC BOX AND FINE SPRINGS OUR SPECIALTY.

MACHINERY BARGAINS.

I have some splendid Air Compressors, Hoisting Engines, Rock Drills, Rock Crushers, Channeling Machines, Steam Pumps, Boilers, Steam Shovels, Locomotives and Relaying Rails, all in splendid condition. Send for printed list and specify your requirements. I can save you money. WILLIS SHAW, 627 New York Life Building, CHICAGO.

PROFESSIONAL CARDS.

R. H. POSTLETHWAITE, M.I.E.E.
Hydraulic Mining Engineer.
River Dredging for Gold a Specialty.
1315 Leavenworth St........San Francisco, Cal.

THEO. F. VAN WAGENEN, E. M.
Consulting Mining and Hydraulic Engineer.
1508 Fillmore St., DENVER, COLO.

D. B. HUNTLEY,
Mining Engineer and Metallurgist,
De Lamar, Owyhee Co., Idaho.

BERNARD MACDONALD,
Consulting Mining Engineer.
General Manager British America Corporation, Ltd., Rossland, B. C.

DRAPER & McLEOD,
Assayers, Chemists, and Mining Engineers,
1736 CHAMPA STREET,
DENVER........................... ....COLORADO.

JOHN DWYER, Mining Engineer,
MEXICO.
Address 762–17th Street......East Oakland, Cal.

RICKARD & FROST,
ASSAYERS, 1752 Champa St., Denver, Colo. Formerly assayers at Argo smelter. **Specimen, Control and Umpire Work.** Prompt attention given to all mail and express samples.

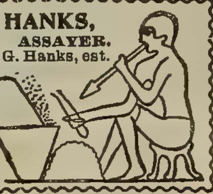
Established 1879.
CHAS. B. GIBSON,
Chemist, Metallurgist and Mining Engineer,
81 CLARK ST., CHICAGO, ILL.

E. H. BENJAMIN, Mining Engineer.
A. M. HUNT, Mechanical & Hydraulic Engineer.
WYNN MEREDITH, Electrical Engineer.
EXPERT EXAMINATIONS. ADVISORY REPORTS.
CONSTRUCTION SUPERVISION
331 Pine Street,...........San Francisco, Cal.
Telephone Main 1870. Cable Address "Edben."

JOHN W. GRAY,
Mining and Hydraulic Work.

Prospecting Operations and Exploration Work.
Examinations, Surveys, Development, Equipment of Mines, Gold-Bearing Gravels, and Water Supplies.
923 Linden St.,...................Oakland, Cal.
Cable "Espra." Correspondence invited.

ABBOT A. HANKS,
CHEMIST AND ASSAYER.
Successor to Henry G. Hanks, est. 1866. The supervision of sampling of ores shipped to San Francisco a specialty.
—531—
California Street,
San Francisco.



RICHARD A. PEREZ, E. M.
Assayer and Analytical Chemist,
120 North Main St., - Los Angeles, Cal.

S. W. TYLER,
Mining and Metallurgical Engineer,
6 Windsor Hotel Block.
Cable: Retyl, Denver. DENVER. COLORADO.

The SPOKANE BUREAU OF MINING,
N. E. LINSLEY, Manager.
SPOKANE, : : WASHINGTON.
Consulting Mining and Milling Engineer.
Will Examine and Report on Mines.

W. J. ADAMS, E. M.,
Mining Engineer and Metallurgist.
Graduate of Columbia School of Mines.
Author of "Hints on Amalgamation," etc., etc.
ROOM 14, 434 CALIFORNIA STREET,
SAN FRANCISCO, CAL.

CLARENCE HERSEY,
Assayer and Chemist,
(Established 1879.) LEADVILLE, COLO.
Gold, Silver and Lead....................$1.00.
Any two of above 75c; any one of above 50c.
Copper analysis..................................$1.00.
Platinum, Nickel or Tin, each...............$5.00.
Twenty-one years successful experience in the mining metropolis of Colorado.
Write for mailing envelopes and price list.

ALMARIN B. PAUL, M. E.,
ROOM 27, CROCKER BUILDING, SAN FRANCISCO.
Will act as AGENT for the sale of RELIABLE Mining Property. SPECIAL AGENT FOR
MacArthur-Forrest Cyanide Process
for California north of and including Mono, Madera and Merced counties; also for State of Nevada. Will act as agent for Eastern parties owning mining interests in California.

F. H, HARVEY,
GALT, CAL.,
Mining and Metallurgical Work in All Branches.
Assays, Chemical Analysis of Ores and experiments on rebellious ores for treatment by cyanide or other processes. Surveys and reports upon mining properties.

L. W. TATUM. Consulting Mining Engineer and Metallurgist.
Genl. Mgr. Providencia Mining & Milling Co.,
DOLORES HIDALGO Gto. MEXICO.
Is prepared to examine mines and mills and undertake the supervision of mine development or milling operations, making visits at stated intervals as case may require, **anywhere in Mexico.**
High Class References. Codes: Bedford McNeill, Moreing & Neal, A. B. C. 4th Ed. and Liebers.

Simonds & Wainwright,
Mining Engineers,
Assayers and Chemists,
159 Front Street,
NEW YORK.

DAVIDGE & DAVIDGE, Attorneys and Counsellors at Law, Corcoran Building, Washington, D. C. Practice in the Supreme Court of the United States, the Court of Claims, the Courts of the District of Columbia, and the General Land Office. Western Union Code.

Geo. W. Schneider, E. M.,
Mining Engineer,
U. S. Deputy Mineral Surveyor.
Mineral Properties examined and reported on.
Central City, Colorado.

A. F. WUENSCH, M. E.
Inspection and Valuation of Mines.
Ref. D. H. Moffat, Pres. 1st Nat'l Bank, Denver.
827 Equitable Bldg...................Denver, Colo.

WM. VAN SLOOTEN,
Consulting Mining Engineer and Metallurgist.
Cable address: "Yadoplata."
35 WALL STREET........... ....NEW YORK, N. Y.

R. J. WALTER,
1452 Blake St., DENVER, COLO.
Mining Engineer and Metallurgist.
Reports on mining properties.
Assay office and chemical laboratory. Established in Colorado 1879.

SAM'L A. RANK,
MINING ENGINEER,
U. S. DEPUTY MINERAL SURVEYOR.
Mine Examinations and Reports.
514 Cooper Building,
DENVER ....COLORADO.

EDWARD L. HAFF,
MINING ENGINEER,
U. S. DEPUTY MINERAL SURVEYOR.
Mine Examinations and Reports.
National Annex Block,
P. O. Box 21. CRIPPLE CREEK, COLO.

FRANK C. MANDELL,
MINING ENGINEER,
U. S. Deputy Mineral Surveyor for Idaho and Oregon.
Mine Examinations, Surveys and Reports.
HAILEY, IDAHO.

ERNEST H. SIMONDS,
Late Instructor in Assaying, University of California.
ASSAYS AND ANALYSES.
LABORATORY TESTS OF ORES.
Special Attention Given to the Instruction of Students.
521 Sacramento St., Cor. Leidesdorff. S. F., Cal.

RALPH E. STEVENS,
ATTORNEY AND COUNSELOR,
43–44 Jacobson Building, **DENVER, COLO.**
Special attention to examination of titles. Corporation, commercial, mining law. Collections receive prompt attention. Notary in office. Refers to Denver representative of Mining and Scientific Press.

FRED H. BROWN,
Electrical Mining Expert.
Inventor of the Electro-Geodetic Mineral Locator. Patented March 20, 1900.

Will electrically survey mines and lands for mineral; furnish charts showing run of ore, extensions, pay streaks, and their approximate depth from surface.

References include scientific men, and miners for whom we have located rich mines.

Address, 1025 West 7th St.,
LOS ANGELES, CAL.

W. C. WYNKOOP, M. E.
Woodbury (Cochiti District), New Mexico.
Economic Geology and Mine Examinations.

COBB & HESSELMEYER,
Designing and Consulting
MECHANICAL AND HYDRAULIC ENGINEERS.
421 Market St., Cor. First St.,
Telephone BLACK 3882....San Francisco, Cal.

School of Practical Mining, Civil,
Mechanical and Electrical Engineering.
Surveying, Architecture, Drawing, Assaying, Cyanide Process and Metallurgy.
933 Market St., S. F., Cal. OPEN ALL YEAR.
A. VAN DER NAILLEN, President
Assaying of Ores, $25; Bullion and Chlorination Assay, $25; Blowpipe Assay, $10. Full course of Assaying, $50. Established 1864.
☞ Send for Circular.

DANIEL G. JEWETT,
Metallurgist and Assayer.
Specialty: The Mining and Smelting of Copper or Lead Ores.
P. O. BOX 5, GUFFEY, PARK CO., COLO.

MINERS' ASSAY OFFICE.
(JNO. HARRIGAN)
10 Stevenson Street, - San Francisco, Cal.
Telephone Clay 972.
Assaying, Analyses, Sampling, Grinding and Pulverizing of all kinds.
Practical Working Tests of Ore by all Processes. Mining Machinery Bought and Sold. Check Assays. Instructions given in Assaying. All Work Guaranteed. **Mines Examined, Sampled and Reported on by M. P. BOAG, M. E. and Cyanide Expert.**

LOUIS FALKENAU,
STATE ASSAY OFFICE,
434 California St., near Montgomery.
Analysis of Ores, Metals, Soils, Waters, Industrial Products, Foods, Medicines, etc., etc.
Court Experting in all branches of Chemical Technology. Working Tests of Ores and Investigation of Metallurgical and Manufacturing Processes. Consultations on all questions of applied chemistry. Instructions given in assaying and all branches of chemistry.

RELIABLE ASSAYS.

Gold................	$ .50	Gold and Silver....	$ .75
Lead	.50	Gold, silver, copper	1 50

Samples by mail receive prompt attention.
Rich Ores and Bullion Bought.
OGDEN ASSAY CO.,
1429-16th St., Denver, Colo.

HENRY E. WOOD,
ASSAYER,
1734 Arapahoe St., DENVER, COLO.
Ore Tested in Carload Lots.
Write for Circular.

JAMES ANGUS SNEDAKER,
Mining Engineer,
721–722 Equitable Building, Denver, Colo., U. S. A.

CHAS. BUTTERS & CO., Limited.

E. S. LEAVER, Manager.

Ore Testing Works,
Chemical and Metallurgical Laboratory,
Assay Office,

DOOLY BLOCK, - SALT LAKE CITY, UTAH.

Telephone, MAIN 5104. ——✦ESTABLISHED 1869.✦—— A. H. WARD.
Cable Address, LUCKWARD.

C. A. LUCKHARDT CO.,

NEVADA METALLURGICAL WORKS,
71 & 73 STEVENSON STREET, - - - - SAN FRANCISCO, CAL.

Assaying, Analyses, Sampling.

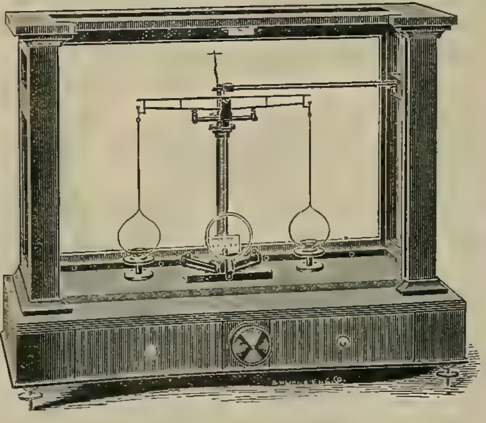
PRACTICAL WORKING TESTS OF ORE BY ALL PROCESSES.
STAMP MILL AND CONCENTRATOR IN OPERATION ON PREMISES.

Thomas Price & Son,

Assay Office, Sampling Works

And Chemical Laboratory.

526 Sacramento Street, San Francisco, Cal.



No. 045 Button Balance.

Sensibility 1-50 Milligramme.

This balance was designed with a view to furnishing an accurate and reliable balance for silver button and moderately accurate gold button work.

It has all the latest improvements and is an up-to-date balance in every particular.

If you anticipate buying and want a good balance at a moderate price, write us for particulars; you will be surprised to find how cheaply this balance can be purchased.

For complete description of this and other balances write for catalogue A to

Wm. Ainsworth & Sons,

(Successors to WM. AINSWORTH.)

Denver, Colorado, U. S. A.

PACIFIC COAST AGENTS:

JOHN TAYLOR & CO., 63 First St., San Francisco, Cal.
F. W. BRAUN & CO., Los Angeles, Cal.

Samples by Mail or Express Will Receive Prompt Attention.

ALBERT I. GOODELL,
ASSAYER AND CHEMIST,
1430 Stout Street......................DENVER, COLO.

J. W. RICHARDS,
(Late of Aspen, Colo.)
ASSAYER AND CHEMIST. 1754 Champa Street, DENVER, COLO.
Ore Shippers' Agent. Write for Terms.

MILL PLANS.
Cyanide, Concentration, Smelting, Sampling
F. D. BAKER, Mech. Eng., DENVER.

HERMANN J. VAN DIEREN,
Assayer and Metallurgist,
1407 Seventeenth St., DENVER, COLO.
Stamp Mill and Reduction Works: 19th St. and Platte River.

Buyer of every description of Ores and Precious Stones. Rights for sale for process of treating refractory gold ores; also process for treating low grade copper ores. Write for particulars.

Independent Assay Office.
ESTABLISHED 1866.
D. W. Reckhart, E. M., Proprietor.
Agent for Ore Shippers.
Assays and Chemical Analysis.
Mines Examined and Reported Upon.
BULLION WORK A SPECIALTY
P. O. Box 88. Office and Laboratory:
Cor. SAN FRANCISCO & CHIHUAHUA Sts.
EL PASO, TEXAS.

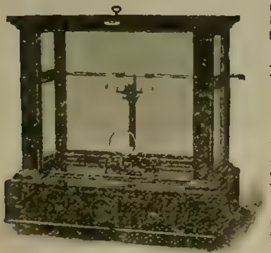
ALVIN PHILLIPS & CO.,
Chemists, Mining and Metallurgical Engineers,
1761 MARKET STREET,
DENVER, - COLO.

Complete Ore-Testing Works — capacity ten pounds to two tons. Modern Methods of Lixiviation, Cyanide and Chlorination. Concentration on Bartlett Table. Assaying and Bullion Refining Chemical Analyses of Oils, Coal, Water, and all solutions. WRITE FOR PRICES.

Hoskins' Patent Hydro Carbon Blow-Pipe and Assay Furnaces.

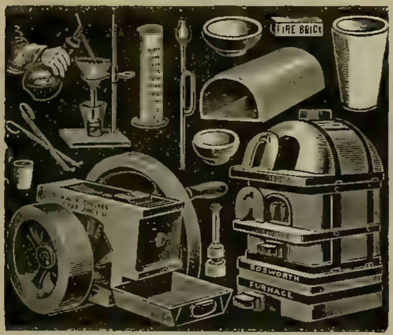
No dust. No ashes. Cheap, effective, economical, portable and automatic.

SEND FOR PRICE LIST TO
W. HOSKINS, 81 South Clark St., Room 55, CHICAGO, ILL.



SMITH & THOMPSON,
Manufacturers of Fine
ASSAY BALANCES.
Write for Catalogue.
2219 Stout St.,
Denver, Colo.

THE DENVER FIRE CLAY CO.,
1742 to 1746 Champa St., DENVER, COLO.



Manufacturers, Importers and Dealers in
Chemicals, Apparatus and Assayers' Supplies
Fire Brick and Tile.
Sole Agents for the "AINSWORTH BALANCES."
WRITE FOR CATALOGUES.

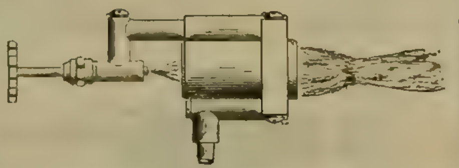
THE ROESSLER & HASSLACHER CHEMICAL CO.,
100 William Street, New York.

CYANIDE
Peroxide of Sodium
Hyposulphite of Soda
Chloride of Lime
Sulphide of Iron
And Other Chemicals for Mining Purposes.

Keep Your Boilers Clean While They Are New. You Know What to Use;

IF NOT, WRITE TO
DEARBORN DRUG & CHEMICAL WORKS,
Offices and Laboratories:
29, 30, 31, 32 and 33 Rialto Bldg. - - - CHICAGO, ILL.

Taylor's Coal Oil and Gasoline Burner
(PATENTED)



A new heating burner for Assayers and Chemists, or for brazing, in which coal oil at 33 deg. to 45 deg., Beaume and 150 deg. fire test, or gasoline at 74 deg. test can be used for fuel. Adapted to crucible, muffle and brazing work. Price $6. For sale by

JOHN TAYLOR & CO.,
63 FIRST STREET,
SAN FRANCISCO, CAL.

MINE AND MILL SUPPLIES.
Importers and Manufacturers of Assayers' Materials, Chemicals and Acids, Etc.
CATALOGUE ON APPLICATION.

IMPROVED BONE ASH.

It is 100% better than Bone Ash now being used; will absorb more lead, will never crack or split in the Muffle, can be dropped before or after using without breaking. Cupels can be made and used at once; no drying required. Excessive heat has no effect on them. Will stand shipping any distance. It takes up none of the precious metals in cupeling. Cupels much quicker. Once used always used. Sold under a positive guarantee or money refunded. Now being used by all smelters and assayers who have tried it.

Price of Improved Bone Ash, $60.00 per ton; $3.50 per 100 lbs.; or manufactured Cupels, $1.50 per hundred.

CUMMINGS & SWEARS, Sole Mfrs.,
Telephone Clay 972. 10 STEVENSON ST., SAN FRANCISCO, CAL.
For Sale by Justinian Caire Co., Dealers in Assay Goods and Mining Supplies, 521-523 Market St.

PIONEER REDUCTION CO.
Established 1858. Nevada City, Cal.
Buyers of Gold, Silver and Copper Ores and Concentrates.
HIGHEST PRICES PAID FOR COPPER ORES.
WRITE FOR RATES.

ESTABLISHED 1856.
Controls AND Check Assays
(A SPECIALTY.)
MARINER & HOSKINS,
ASSAYERS AND CHEMISTS,
Mining Engineers and Metallurgists.
81 South Clark Street.
Rooms 51-55,
CHICAGO, ILLINOIS.
SEND SAMPLES BY MAIL OR EXPRESS.
MAILING SACKS ON APPLICATION. : :

ST. LOUIS SAMPLING & TESTING WORKS,
1225 and 1227 Spruce St.,
ST. LOUIS, MO.

The Largest and Most Complete Ore Testing Works in Existence for Making all Kinds of Practical Working Tests of Ore, etc, to Determine the Most Suitable Method of Treatment.

PLANT FOR COAL WASHING, COKING AND STEAMING TESTS OF FUELS. ASSAYS, ANALYSES, CHEMICAL AND PHYSICAL INVESTIGATIONS OF ALL KINDS. MINERAL PROPERTIES, MINES AND METALLURGICAL PROCESSES EXAMINED AND REPORTED UPON. CORRESPONDENCE SOLICITED.

MINING HOISTS.
Engines, Boilers,
Saw Mills, Hoe Saws,
Mill Supplies.
TATUM & BOWEN,
34-36 Fremont Street, San Francisco, Cal. 29-35 First Street, Portland, Or.

TELEPHONE MAIN 5303
Union PHOTO-ENGRAVING CO.
DESIGNING
HALF-TONES
ZINC ETCHING
523 MARKET ST
SAN FRANCISCO, CAL.

"CRACK PROOF"
PURE RUBBER BOOTS
Are the CHEAPEST because
They Are the Most Durable.
Beware of Imitations.

GOLD SEAL, BADGER AND PIONEER
Belting, Packing and Hose.

RUBBER FACTORY IN SAN FRANCISCO.
Valves, Gaskets Etc., Made to Order.

GOODYEAR RUBBER CO.
R. H. PEASE, Vice-Pres't and Manager,
Nos. 573, 575, 577, 579 MARKET ST., San Francisco.
Nos. 73, 75 FIRST ST., Portland, Or.

A BORE HOLE
is the cheapest, quickest, most direct, and most effective way to test lands for minerals, oil, gas, salt, sulphur, borax, water, etc.

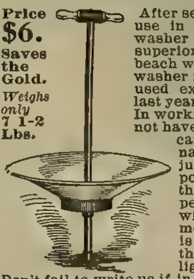
THE STAR DRILLING MACHINES

excel for these uses. They will drill a hole through anything to any depth from 250 to 2500 feet. The only machines made that are absolutely without annoying springs. They are simple, powerful and efficient. Easy to handle at work or on the road. Used in every State and Territory and in many foreign countries.

We also make full line of drill tool-bits, reamers, sand pumps, spuds, etc., etc. Write for illustrated free catalogue.

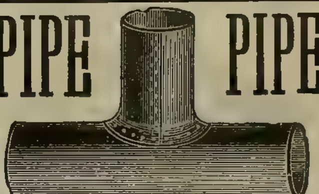
Star Drilling Machine Co.,
Akron, Ohio.

THE LITTLE ALASKA GOLD WASHER.
Price $6.
Saves the Gold.
Weighs only 7 1-2 Lbs.



After several years' practical use in different fields, our washer has established its superiority over all placer or beach washers. It is just the washer for Cape Nome; it was used extensively in Alaska last year with every success. In working the operator does not have to wet his hands and can stand in an upright natural position. It is just the washer for the poor man who has not the money to put in expensive machinery. It will do the work of ten men with gold pans. It is just the washer for the prospector, being light and easy to pack. Don't fail to write us if in need of a washer; we can save you *time*, *labor* and *money*. RUSSELL & KINSEY, 1237 Magnolia Ave., Los Angeles, Cal.

PIPE PIPE



PIPE for Hydraulic Power and Irrigation.
OIL STORAGE TANKS.
GENERAL SHEET IRON WORK.
Lacy Manufacturing Co.,
LOS ANGELES.

HEALD'S
BUSINESS COLLEGE.
24 Post Street, - - - San Francisco.

MINING AND CIVIL ENGINEERING DEPARTMENT: Mathematics, Draughting, Strength of Material, Chemistry, Assaying, Blow-Pipe Analysis, Geology, Mineralogy, Surveying, etc., under the direction of Prof. O. H. Packer, an engineer of national reputation.

ELECTRICAL DEPARTMENT: Theory and Practice; Construction.

BUSINESS: Bookkeeping, Shorthand, Typing, Modern Languages, etc.

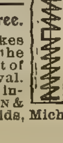
Twenty teachers; individual instruction; can enter at any time; Catalogue and Journal free.

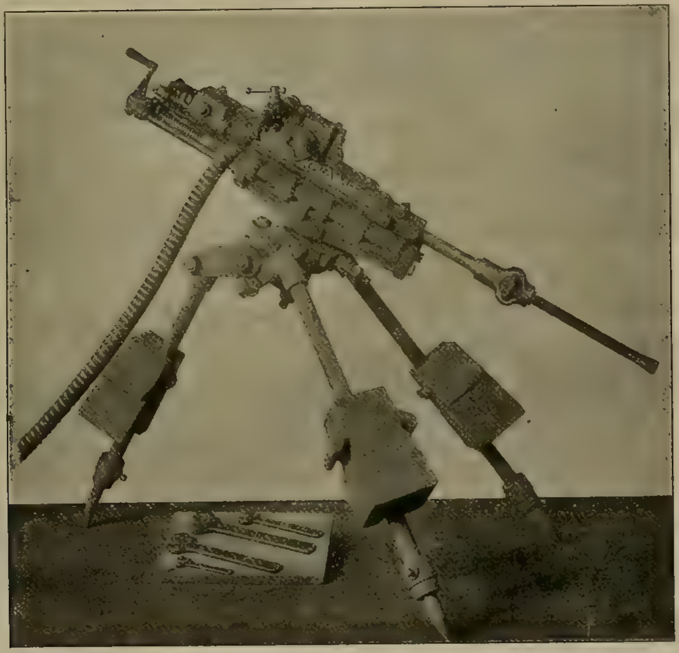
Notice the Shape of
GLOBE BOX---THE BEST BABBITT.

J. M. HAYDEN & CO.
GLOBE METAL
GRAND RAPIDS MICH.
THE BEST BABBITT.

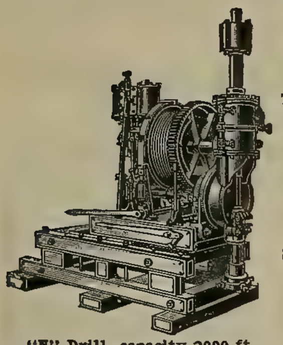
Send for trial order, Ladle free.

The Globe wire lace makes the smoothest joint, runs the stillest and lasts the longest of any lacing. Sent on approval. Write us for booklet with instructions, etc. J. M. HAYDEN & Co., 58 Pearl St., Grand Rapids, Mich.





"GIANT" DRILLS AND COMPRESSORS
ARE THE BEST.
"GIANT" BABY DRILLS CHEAPEN MINING.
WRITE US FOR PARTICULARS.
THE COMPRESSED AIR MACHINERY CO., 11-13 First St., San Francisco, Cal.



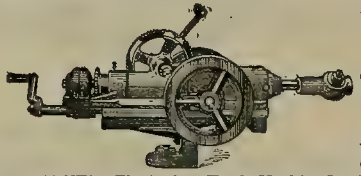
SULLIVAN
Diamond Core Drills
FOR PROSPECTING. Catalogue 29.
The most extensive line of sizes and styles ever offered.
CONTRACTORS FOR PROSPECTING WITH DIAMOND DRILL.
ROCK DRILLS
FOR MINING. Catalogue 30.
Superior valve and ratchet motions. The highest possible grade.
Send for Our New Catalogues.
Sullivan Machinery Co.,
New York. Pittsburg. Claremont, N. H.
Main Office, CHICAGO....................54 to 60 N. CLINTON ST.
Western Office, DENVER.................332 SEVENTEENTH ST.
Pacific Agency, SAN FRANCISCO, HENSHAW, BULKLEY & CO.
"N" Drill, capacity 2000 ft.
Cable Address, Diamond, Chicago.
Codes: A. B. C., 4th Edition.
Postal Directory.
Western Union.
Liebers.

Established 1837.
I. C. Yawger,
Successor to VICTOR BISHOP & CO.
IMPORTER OF CARBONS FOR DIAMOND DRILLS.
21 Maiden Lane, - NEW YORK.

DIAMOND DRILLS
FOR PROSPECTING.
AMERICAN DIAMOND ROCK DRILL CO.
120 LIBERTY ST N.Y.

THEODOR LEXOW, 14 JOHN STREET, N. Y.
......Importer of......
CARBONS
(BLACK DIAMONDS)
For DIAMOND DRILLS and all Mechanical Purposes.
HENRY DEMMERT.

RAND ROCK DRILLS and Drill Mountings.
HIGHEST DEGREE OF PERFECTION ATTAINED. ∴ INDISPENSABLE IN MINING, TUNNELING & EXCAVATING.
AIR —AND— Gas COMPRESSORS.
STANDARD TYPES! SPECIAL PATTERNS! ALL SIZES!
RAND DRILL CO., 100 BROADWAY, New York, U. S. A.
San Francisco Office: 223 First St.
1328 Monadnock Blk., CHICAGO, ILL.



THE JACKSON HAND POWER ROCK DRILL.
Works in Any Rock, in Any Position.
Write for Circulars and References.
THE JACKSON DRILL & M'F'G CO.,
1756 Larimer Street, DENVER, COLO.
Sole Licensees for all Foreign Countries and Eastern United States: THORNTON N. MOTLEY COMPANY (INC.), 43 John St., New York.
AGENTS: The Joshua Hendy Machine Works, 38 Fremont St., San Francisco, Cal.; Chas. B. Boothe & Co., 126 So. Los Angeles St., Los Angeles, Cal.

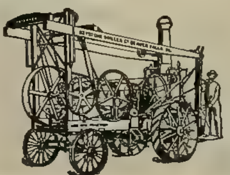
FIRTH'S DRILL STEEL,
16 cents per pound.
The best drill steel on the market. Has no equal for hard rock drilling. Miners cannot afford to use an inferior steel when FIRTH'S can be bought at the above price.
Abner Doble Company, Gen. Agts.,
Fremont and Howard Sts., SAN FRANCISCO, CAL.

THE Best None Too Good
When in Hard Rock.

CANTON DRILL STEEL.

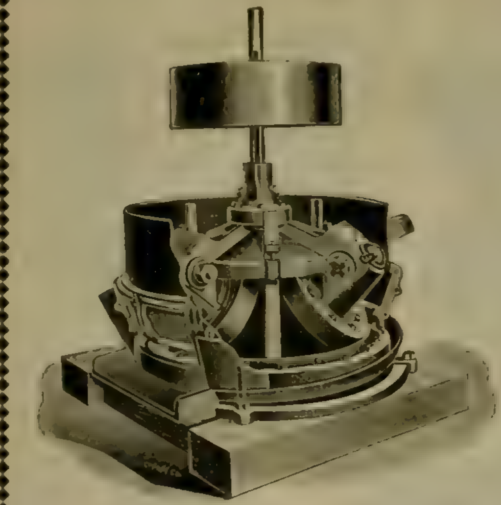
UNEQUALED IN ROCK-CUTTING QUALITIES. Ask Your Dealer for CANTON Brands.
—— FOR SALE IN CALIFORNIA BY ——
SCHAW, INGRAM, BATCHER & CO., Sacramento — San Francisco.
HARPER & REYNOLDS CO., Los Angeles.

WE HAVE MOVED TO LARGER QUARTERS.
TRUAX
CARS ALWAYS IN STOCK TO FILL RUSH ORDERS.
ORE CARS
WE MAKE CARS FOR YOUR CAGE AND SKIPS FOR YOUR INCLINE SHAFT.
SEND FOR PAMPHLET AND REFERENCES.
Truax Mfg. Co., 69 STEVENSON ST., S. F.



Prospecting Machinery.
Multitudes in use for testing for minerals. Sizes and equipments to suit any and all conditions. Unexcelled for Placer Testing, Oil Wells, Water Wells, testing for Lead and Zinc, Iron and Coal; goes through anything; brings up everything. Large sizes drill as much as 1500 feet. In use all over the world. Every purchaser pleased. Used on boats for testing river and lake beds. Water no hindrance. No skilled labor required.
KEYSTONE DRILLER CO., Beaver Falls, Pa., U. S. A.

BULLOCK DIAMOND DRILLS
If you are interested in prospecting send for our new Diamond Drill Catalogue (No. 33).
BULLOCK MINING MACHINERY
PORTABLE HOISTS—Send for our new Catalogue (No. 40). CHAMPION MINE VENTILATORS—Send for our new Catalogue (No. 35).
HOISTING AND HAULAGE PLANTS, ORE CARS, SKIPS, CAGES, ETC., ETC.
PARKE & LACY CO., Agent, 21 & 23 Fremont St., San Francisco, Cal.
M. C. BULLOCK MFG. CO., 1172 West Lake St., Chicago, Ill., U. S. A.



THE GRIFFIN

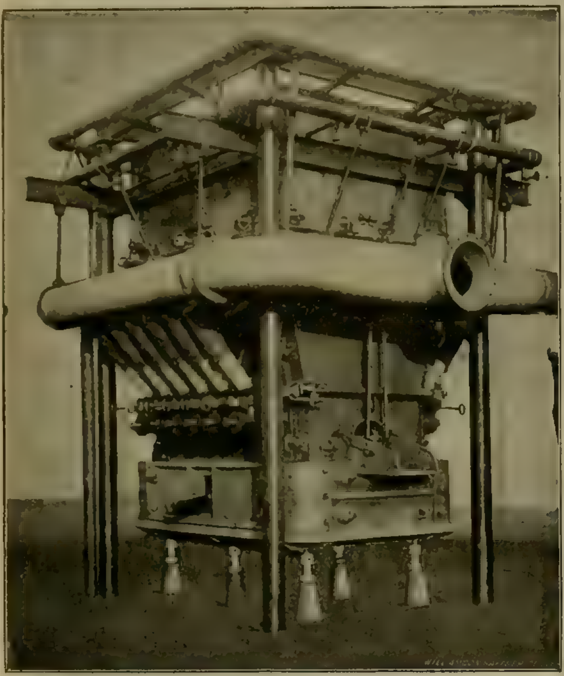
THREE ROLLER

ORE MILL.

The Griffin Three Roller Ore Mill is a simply constructed Mill, suitable for working all kinds of ores that require uniformly fine crushing by the wet process. This Mill is a modification of the well-known Chilian Mill, but the rollers run upon a crushing ring or die, which is inclined inwardly at an angle of about 30 degrees, the rollers themselves also being inclined to the central shaft of the Mill, thus utilizing the centrifugal force, as well as the weight of the rollers themselves as a crushing agent. The Griffin Three Roller Ore Mill is therefore a Mill of great strength, and has few wearing parts. We construct these Mills with extreme care, using only the best of raw materials, which are most carefully worked by men who are specialists as mill builders. We sell the Griffin Ore Mill on its determined merits, and will gladly supply full information regarding it to any one.

SEND FOR FREE ILLUSTRATED AND DESCRIPTIVE CATALOGUE TO

Bradley Pulverizer Co., Boston, Mass.



A MODERN COPPER SMELTER.

THE COLORADO IRON WORKS CO.

ESTABLISHED 1860. DENVER, COLO.

—MANUFACTURERS OF—

Smelting Furnaces and Equipments

: : : FOR THE TREATMENT OF : : :

Gold, Silver, Lead and Copper Ores.

We build furnaces to drawings and specifications, and furnish drawings and full instructions for erecting.

We erect all furnaces at our works and carefully mark every piece before shipping. By this means, trouble in erecting at the smelting plant is entirely avoided.

We contract to build and equip smelting plants complete, of any required tonnage capacity above forty tons per day, at any desired location and put them into successful operation under guarantee. We contract to smelt a thousand tons of ore, more or less, before turning the plant over as completed under the guarantee

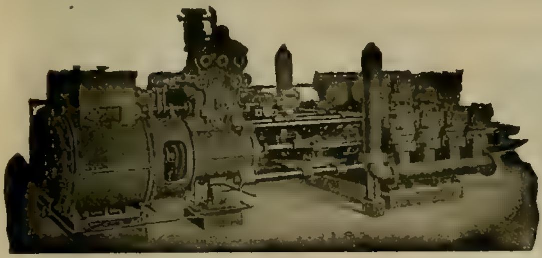
We have in the past built more Blast Furnaces for smelting the ores of the valuable and the precious metals—gold, silver, lead and copper—than any other manufacturing concern on the American continent, and in the past year of 1899 we built more such furnaces than all others combined.

(SEE PAGE 109.)

The Best MINE PUMPS in the World.

COMPOUND CONDENSING AND TRIPLE EXPANSION STATION PUMPS.

We carry in our Denver store a stock of Improved Pattern Sinkers and Duplex Station Pumps, with duplicate parts for repairs.



Write for Catalogue and Estimates.

Jeanesville Iron Works Co.,
JEANESVILLE, PA

Western Office,
Columbia Hotel Building,
1328 17th St.
Denver, Colo.
Telephone 2298 A.
A. MIDDLEBROOK, Manager.

THE MARION STEAM SHOVEL CO.,

Steam Shovels
Dredges and
Traction Dredges

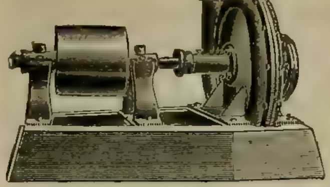
Suitable for all kinds of Excavating Work, making a specialty of

PLACER MINING MACHINES,

separate or self-contained, either as a dry land excavator or floating dredge.

The Marion Steam Shovel Co.
MARION, OHIO.

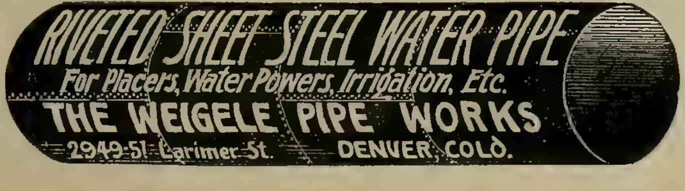
GEO. W. BARNHART, No. 4 Sutter St., San Francisco, Cal.



CENTRIFUGAL PUMPS

COMPLETE PUMPING PLANTS INSTALLED.

JOHN WIGMORE & SONS CO.,
117-123 S. Los Angeles St, LOS ANGELES, CAL.


RIVETED SHEET STEEL WATER PIPE
For Placers, Water Powers, Irrigation, Etc.
THE WEIGELE PIPE WORKS
2949-51 Larimer St. DENVER, COLO.

STEEL RAILS, TRACK FIXTURES,
PRODUCT PENNSYLVANIA STEEL COMPANY.

BAR, SHEET AND BOILER STEEL,
STRUCTURAL MATERIAL,
Cold Rolled Shafting.

GEORGE W. GIBBS COMPANY,
33-39 Fremont Street, 38-40 Beale Street,
CORRESPONDENCE SOLICITED. SAN FRANCISCO, CAL.

SULPHURIC ACID

MANUFACTURED BY
THE WESTERN CHEMICAL CO.
DENVER, COLO.

For Chlorination, Refining and other processes. Also Muriatic and Nitric Acids, Blue Vitriol, Copperas Commercial and C. P. Our chemically pure Acids and Ammonia are guaranteed perfect.

Founded by Mathew Carey, 1785.

HENRY CAREY BAIRD & CO.,
INDUSTRIAL PUBLISHERS, BOOKSELLERS & IMPORTERS,
810 Walnut St., Philadelphia, Pa., U. S. A.

☞ *Our New and Revised Catalogue of Practical and Scientific Books, 92 pages, 8vo; a Catalogue of Books on Steam and the Steam Engine, Machinery, etc.; a Catalogue of Books on Sanitary Science, Gas Fitting, Plumbing, etc., and our other Catalogues and Circulars, the whole covering every branch of Science applied to the Arts, sent free and free of postage to any one in any part of the world who will furnish his address.*

Valuable Books for Prospectors and Miners.

Orton.—Underground Treasures: How and Where to Find Them. A Key for the Ready Determination of all the Useful Minerals within the United States. By James Orton, A. M., late Professor of Natural History in Vassar College, N. Y.; etc. Illustrated.................................**$1.50**

Osborn.—The Prospector's Field Book and Guide in the Search for and Easy Determination of Ores and other Useful Minerals. By Prof. H. S. Osborn, LL.D. Author of "A Practical Manual of Minerals, Mines and Mining." Illustrated by 58 engravings. Fourth edition, revised and enlarged. 315 pages, 12mo. Price.............................**$1.50**

Osborn.—A Practical Manual of Minerals, Mines and Mining: Comprising Suggestions as to Localities and the Associations of all the Useful Minerals. Full descriptions of the Most Effective Methods of Both the Qualitative and Quantitative Analyses of Each of these Minerals and Hints upon the Various Operations of Mining, including Architecture and Construction. By Prof. H. S. Osborn, LL.D. Illustrated by 171 engravings. Second edition, revised and enlarged. 393 pages. 8vo. Price.......................................**$4 50**

☞ *The above or any of our Books sent by mail, at publication prices, free of postage to any address in the world.*

☞ *Illustrated circulars of the above Books, showing full Tables of Contents, will be sent free to any one who will furnish his address.*

HENRY CAREY BAIRD & CO.,
INDUSTRIAL PUBLISHERS, BOOKSELLERS & IMPORTERS,
810 Walnut St., Philadelphia, Pa., U. S. A.

Notice of Application for Dissolution.

In the Superior Court in and for the City and County of San Francisco, State of California.

In the Matter of the Voluntary Dissolution of the South Paloma Gold Mining Company, Limited. (a corporation.)

Notice is hereby given that the South Paloma Gold Mining Company, Limited, a corporation created and existing under the laws of the State of California, has presented to the Superior Court of the City and County of San Francisco, State of California, a petition praying for a judgment and decree declaring the said corporation dissolved according to law; and that said application will be heard on TUESDAY, the 31st day of July, 1900, at 10 o'clock of said day, or as soon thereafter as counsel can be heard, at the court room of said Superior Court, Department No. 3 thereof, at the New City Hall, in the city and county aforesaid.

Witness my hand and the seal of said Court the 25th day of June, A. D. 1900.

{SEAL.}

WM. A. DEANE,
Clerk.
By JOSEPH RIORDAN,
Deputy Clerk.

WRIGHT & LUKENS,
Attorneys for Petitioner,
222 Sansome Street.

DELINQUENT SALE NOTICE.

CALIFORNIA BORAX COMPANY. — Location of principal place of business, San Francisco, California; location of works, San Bernardino County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 3) levied on the 25th day of May, 1900, the several amounts set opposite the names of the respective shareholders, as follows:

Name.	No. Cert.	No. Shares.	Amt.
J. L. Tisdale.....................	34	2	$4 00
J. L. Tisdale.....................	35	2	4 00
H. P. Cartier.....................	67	5	10 00
J. J. Gunn........................	85	4	8 00
Geo. H. Folsom, Trustee.......	101	20	40 00
Luther J. Holton, Trustee......	107	10	20 00
F. E. Densmore...................	108	25	50 00

And in accordance with law, and an order from the Board of Directors, made on the 25th day of May, 1900, so many shares of each parcel of such stock as may be necessary, will be sold at public auction at No. 310 Pine street, rooms 35 and 36, San Francisco, California, on MONDAY, the 30th day of July, 1900, at the hour of 12 o'clock M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

J. W. PEW, Secretary.

Office—No. 310 Pine street, rooms 35 and 36, San Francisco, California.

DENVER & RIO GRANDE R.R.
SCENIC LINE OF THE WORLD

The Mining Man's Favorite Route

BETWEEN

Denver, Colorado Springs, Pueblo and Florence, Cripple Creek, Leadville, Glenwood Springs, Aspen, Gunnison, Lake City, Creede, Durango, Silverton, Telluride and Ouray,

Reaching all the Mining, Milling, Cyaniding, Chlorinating and Smelting centers in Colorado and Utah, and all mining points in California, British Columbia and the Pacific Northwest by close connections and a perfect system of through car service.

Pullman Palace and Tourist Sleeping Cars between Denver and San Francisco and Los Angeles, and Pullman Palace and Tourist Sleeping Cars and Free Reclining Chair Cars between Denver and Portland. : : A Perfect Dining Car Service on All Through Trains. : :

For Illustrated Pamphlet, address

W. J. SHOTWELL,
G. A. D. & R. G. R. R.,
126 California St.,
San Francisco, Cal.

S. K. HOOPER,
G. P. & T. A.,
Denver,
Colo.

MICHIGAN COLLEGE OF MINES.

An Engineering School with unique location, giving it unusual facilities. Distinctive methods of instruction. Special courses. For catalogue giving occupation of graduates, address

F. W. McNAIR, President, Houghton, Mich.

ASSESSMENT NOTICES.

MARIPOSA COMMERCIAL AND MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Mariposa County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 11th day of July, 1900, an assessment (No. 17) of Ten ($10) Dollars per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 320 Sansome street, room 24, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 14th day of August, 1900, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 4th day of September, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

JOSEPH H. MOOSER, Secretary.

Office—320 Sansome street, room 24, San Francisco, California.

SIERRA NEVADA SILVER MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Virginia Mining District, Storey County, State of Nevada.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 9th day of July, 1900, an assessment (No. 119) of fifteen cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Room 14, Nevada block, No. 309 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on Tuesday, the 14th day of August, 1900, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 3d day of September, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

E. L. PARKER, Secretary.

Office—Room 14, Nevada block, No. 309 Montgomery street, San Francisco, California.

MAMMOTH GARFIELD GOLD MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Shasta County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 5th day of June, 1900, an assessment of seventeen and one-half (17½) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Rooms 54 and 59, No. 120 Sutter St., San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 4th day of August, 1900, will be delinquent and advertised for sale at public auction; and unless payment be made before, will be sold on TUESDAY, the 2nd day of October, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

SAM W. CHEYNEY, Secretary.

Office—Rooms 54 and 59, No. 120 Sutter St., San Francisco, California.

EUREKA CONSOLIDATED DRIFT MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Placer County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 29th day of May, 1900, an assessment (No. 25) of one cent per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Room 31, No. 214 Pine street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 30th day of June, 1900, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on SATURDAY, the 21st day of July, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

GEO. W. DIXON, Secretary.

Office—Room 31, No. 214 Pine street, San Francisco, California.

POSTPONEMENT.

The date of the delinquency of the foregoing assessment (No. 25) has been postponed to MONDAY, the 16th day of July, 1900, and the day of sale from the 21st day of July, 1900, to TUESDAY, the 7th day of August, 1900.

By order of the Board of Directors.

GEO. W. DIXON, Secretary.

Office—Room 31, No. 214 Pine street, San Francisco, California.

POSTPONEMENT.

The date of the delinquency of the foregoing assessment (No. 25) has been postponed to MONDAY, the 30th day of July, 1900, and the day of sale from the 7th day of August, 1900, to TUESDAY, the 21st day of August, 1900.

By order of the Board of Directors.

GEO. W. DIXON, Secretary.

Office—Room 31, No. 214 Pine street, San Francisco, California.

THE JEFFREY MFG. COMPANY,

COLUMBUS, OHIO, U. S. A.

ELEVATING-CONVEYING MACHINERY.

JEFFREY SPECIAL MALLEABLE ORE BUCKETS for extraordinary heavy usage.

Chains,
Sprocket Wheels,
Buckets,
Dredges,
Coal Washers,
Boots,
Bolts,
Spiral Conveyors,
Cable Conveyors,
Crushers,
Hoists,
Dump Cars,
Skip Cars,
Sheaves,
Screens.

Western Branch, Equitable Bldg., Denver, Colo.
Frank R. Field, Representative.

SPIRAL SAND PUMPS.

For Pumping Sand, Slimes, Tailings and Crushed Ores.

The Cheapest and Most Durable Pump on the Market. Manufactured by J. H. Frenier & Son.

Represented by M. S. HAUSER,
12 Front Street..............San Francisco, Cal.

The "Stop for Repairs" to Mining Machinery,

Especially if it is a conveying plant, is a considerable item of expense. Many of these expensive pauses are made to repair or adjust faulty belting. To economize in this respect, use the

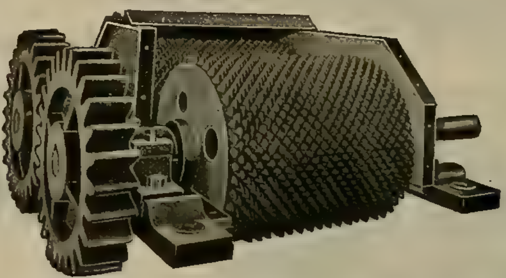
LEVIATHAN
CONVEYOR BELT.

It is not only adapted to the heaviest service, but will run under any conditions in underground, drippings, extreme heat or cold.

IT WILL OUTLIVE ANY OTHER BELTING.

MAIN BELTING COMPANY,
1225-41 Carpenter Street, Philadelphia.
55-57 Market St., Chicago. 120 Pearl St., Boston.
SEND FOR PRICE LISTS AND SAMPLE.

LINK-BELT ELEVATORS —AND— CONVEYORS.



BREAKER ROLLS,
PICKING TABLES,
MALLEABLE IRON BUCKETS,
SHAFTING, PULLEYS,
GEARING, CLUTCHES, Etc.

Catalogue Upon Application.

LINK-BELT MACHINERY CO.,
Engineers, Founders, Machinists,
CHICAGO, U. S. A.
DENVER, 1328 17th St.,
A. E. LINDROOTH, Manager.

PICKING BELTS

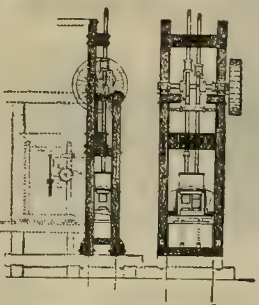
are now supplanting

SORTING TABLES

of wood and iron.

Fully Described in Our New Catalogue.

ROBINS CONVEYING BELT CO.,
Park Row Building, NEW YORK.



MODERN MINING MACHINERY.

QUARTZ MILLS of any capacity,
IN UNITS OF TWO AND FIVE STAMPS.

Acme Amalgamators for CAPE NOME

and other placer mining. Successfully applied to quartz mills in addition to or displacing plates.

SUCCESSFUL GRAVEL MILL RECENTLY IMPROVED.

Special Gold Dredging Pumps and Machinery. Concentrators, Feeders, Rock Breakers and Power Plants.

Largest manufacturers of Irrigation and Reclamation Pumps in the United States.

Catalogues: No. 20, Pumps; No. 22, Cape Nome; No. 25, Mining.

KROGH MANUFACTURING CO.,
9-17 Stevenson St. and 134-136 Main St., SAN FRANCISCO, CAL.

McFARLANE & CO.,

1734 FIFTEENTH ST., DENVER, COLO.

Mining and Milling Machinery.

STAMP AND CONCENTRATING MILLS BUILT AND ERECTED.

STEAM AND ELECTRIC HOISTS, CRUSHERS, ROLLS, REVOLVING SCREENS, JIGS. ORE CARS, CYANIDE TANKS, CORNISH PUMPS, CORLISS ENGINES.

TRADE MARK.

(M'ARTHUR-FORREST PROCESS.)

CYANIDE PROCESS.

The MacArthur-Forrest Cyanide Process is the Best

For the Treatment of Refractory and Low Grade Gold and Silver Ores and Tailings. We are the Originators of the Cyanide Treatment, and have kept up with the times in all Improvements in Cyanide Methods.

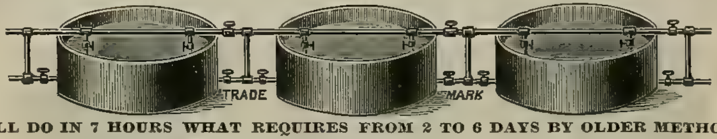
Successful Plants in Operation in all Western Mining States.

Samples Assayed and Fully Reported Upon. Properties Examined Designs Furnished. For Terms and Particulars, Address

The Gold and Silver Extraction Co. of America, Ltd.
GEO. A. ANDERSON, General Manager,
Testing Works: 1716 Blake Street, Denver, Colo. 208-210 McPhee Building, Denver, Colo.
ALMARIN B. PAUL, Agent, 27 Crocker Building, San Francisco, Cal.

"PNEUMATIC" CYANIDE PROCESS.

(Patented in U. S., So. African Republic, New Zealand, Victoria, New So. Wales, So. Australia.)

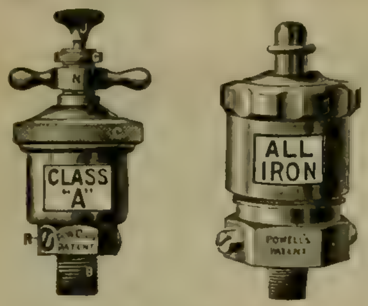


WILL DO IN 7 HOURS WHAT REQUIRES FROM 2 TO 6 DAYS BY OLDER METHODS.

SEND FOR PAMPHLET.

THE PNEUMATIC CYANIDE PROCESS CO., 306 Boston Bldg., Denver, Colo.

POWELL'S GREASE CUPS.



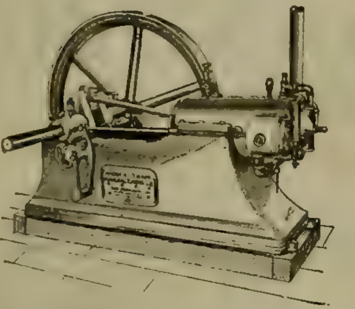
Large Variety. For Every Requirement.

FEED adjustable the **entire length** of Cup.

CUT-OFF in base regulates the flow.

Any Supply House on the Pacific coast can furnish them.

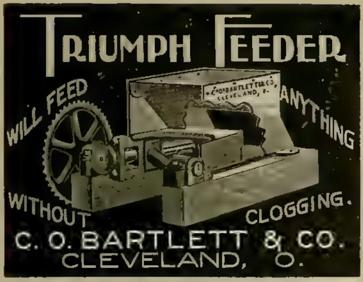
The Wm. Powell Co., Cincinnati, O.
Manufacturers.



Distillate Engines and Hoists.

Air Compressors.

HADWEN SWAIN MFG. CO.,
215-217 SPEAR ST., SAN FRANCISCO, CAL.
CATALOGUES MAILED.


TRIUMPH FEEDER
WILL FEED ANYTHING
WITHOUT CLOGGING.
C. O. BARTLETT & CO.
CLEVELAND, O.

PRICE, $50.00.

INVENTORS, Take Notice!

L. PETERSON, MODEL MAKER,

544A MISSION STREET, bet. First and Second Sts., SAN FRANCISCO. Experimental machinery and all kinds of models. Tin and brasswork. All communications *strictly confidential.*

QUARTZ SCREENS

A specialty. Round, slot or burred slot holes. Genuine Russia Iron, Homogeneous Steel, Cast Steel or American planished Iron, Zinc, Copper or Brass Screens for all purposes. CALIFORNIA PERFORATING SCREEN Co., 145 and 147 Beale St., S. F.

Mining Screens

A SPECIALTY.

Diagonal Slot,
Straight "
Burred "
Round Holes.

In American planished or Russian iron or steel for all purposes. GEO WIMMER, 312 Iowa Street, San Francisco. Telephone Mint 1382.

—EASTERN PRICES BEATEN.—

SAN FRANCISCO Pioneer Screen Works,

JOHN W. QUICK, Prop.

Improved Facilities! Finest Work! Lowest Prices!

Perforated Sheet Metals, Steel, Russia Iron, American Planish, Zinc, Copper and Brass Screens for All Uses.

MINING SCREENS A SPECIALTY.

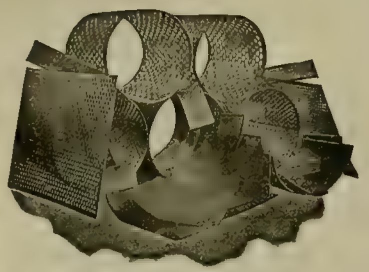
221 and 223 First Street, San Francisco, Cal.

For Best Satisfaction and Lowest Prices

—IN—

PERFORATED METALS

—AND—



MINING SCREENS

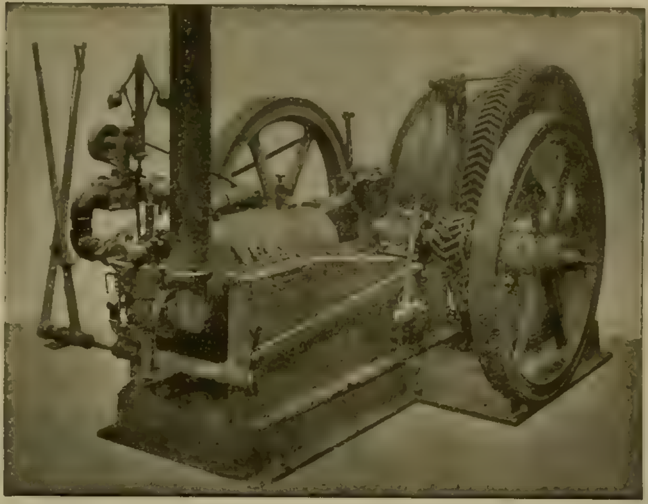
PLACE YOUR ORDERS WITH

Fraser & Chalmers,

CHICAGO, ILL., U. S. A.

SEND FOR SAMPLES, MENTIONING THIS PAPER.

HERCULES HOISTS Are Sold the World Over.



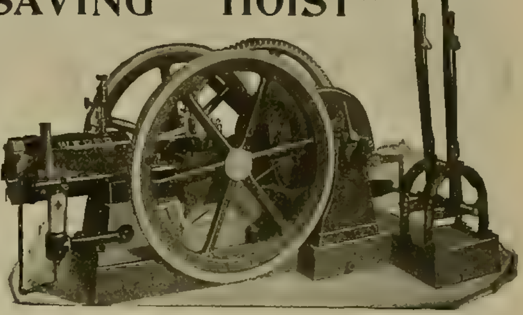
Hercules Gasoline Hoist--Speed 385 Ft.; Load 2500 Lbs.

HERCULES GAS ENGINE WORKS,............141-143 FIRST STREET, SAN FRANCISCO, CAL.

A MONEY-SAVING "HOIST"

is the Weber Gasoline or Oil Hoist. Made right from right materials, in sizes from 6 to 150 H. P., with Single or Double Drum, for Gasoline, Gas or Distillate. Especially useful in mining, quarry, or ship use—good anywhere. State size wanted and for what purpose.

WEBER GAS & GASOLINE ENGINE CO.,
430 S. W. Boulevard,
Kansas City, Mo.
See our PUMPING PLANTS.



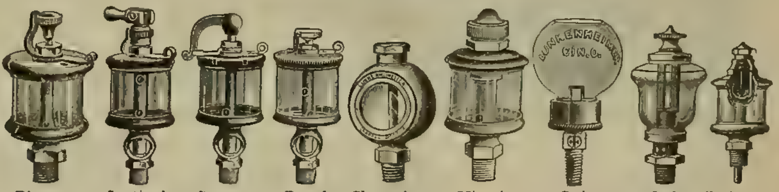
"Lunkenheimer" On any Brass or Iron Steam Specialty is an absolute guarantee that the quality is unequaled and the material and workmanship the best. If you want goods that satisfy the most exacting, specify "LUNKENHEIMER" make.

...The Lunkenheimer Company...

WRITE FOR CATALOGUE. BRANCHES: NEW YORK. LONDON. GENERAL OFFICES AND FACTORIES. *Cincinnati, U. S. A.*

BRANCHES: NEW YORK, 26 Cortlandt St.; PHILADELPHIA, Bourse Bldg.; LONDON, S. E., 35 Gt. Dover St.; MEXICO CITY, Puente de San Francisco No. 6.

DO YOU USE OIL?



Pioneer. Sentinel. Crown. Royal. Champion. Miami. Cody Shaft. Cody Engine. Rod Cup.

You cannot make a mistake in specifying "The Lunkenheimer." Endorsed by millions of satisfied users. In stock by dealers in Mining Machinery and Supplies everywhere.

Trommel Screens
THE ROBERT AITCHISON PERFORATED METAL CO.
303 TO 305 DEARBORN ST. CHICAGO, ILL.

THE WM. HAMILTON MANUFACTURING CO.,
LIMITED,

MINING MACHINERY,

PETERBOROUGH, ONTARIO,

CANADA.

California Vigorit Powder Co.

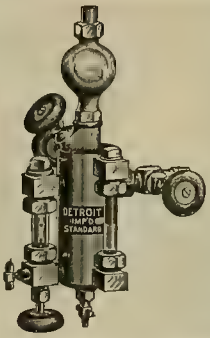
—Manufacturers of—

Dynamite High Explosives and "Vigorit Low" Blasting Powder.

OFFICE: 208 CALIFORNIA STREET, SAN FRANCISCO, CAL.
WORKS: POINT ISABEL, CONTRA COSTA CO., CAL.

Dewey, Strong & Co., Patent Agents,

330 Market Street, San Francisco, Cal.



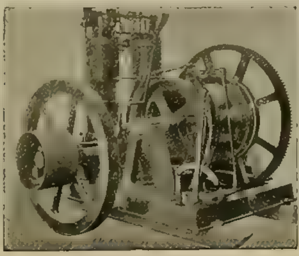
❧ ❧ ❧ ❧ ALL ABOUT ❧ ❧ ❧ ❧

Sight Feed Lubricators.

Our new catalogue for 1900 is ready for distribution. It explains in detail the principles governing the operation of **Sight Feed Lubricators**, using sectional view to show the internal construction, and containing cuts of the different styles in parts before being assembled into the complete lubricators, thus enabling every one to understand their construction and operation thoroughly.

In addition it shows our full line of **Glass Oilers, Oil Pumps, Oiling Devices, Multiple Oilers, Valves, Etc.** It will be sent to any address on application.

DETROIT LUBRICATOR CO., DETROIT, MICH.



Mining Hoist.

THE GOLDEN GATE GAS ENGINE
Will raise more ore than any other **AT LESS COST.**

MANY IN USE, Giving Satisfaction.

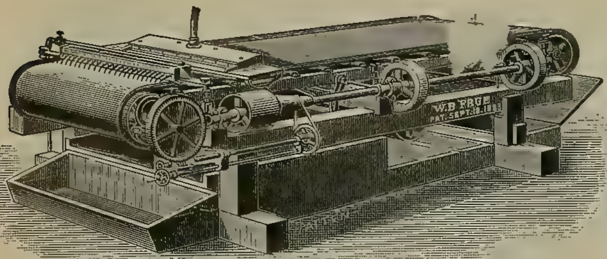
Built for any Capacity and for any Purpose.
Pumping Water, Propelling Boats, Hoisting Ore, Machine Shop Power, Etc.

Send for Particulars and Catalogue.

ADAM SCHILLING & SONS,
213 & 215 Main St., San Francisco, Cal.

FOUR and SIX-FOOT FRUE VANNERS

With Brownell "Patent Lip" Flange Belts.



STANDARD MACHINE OF THE WORLD.

When a Concentrator like the Frue Vanner has been on the market nearly two decades, and the sales have constantly increased, it is safe to say it is the "Standard Machine of the World." More Frue Vanners have been sold during the last twelve months than for the same period at any time during the history of the machine. Practical mining men in all parts of the world where mining is carried on will testify as to its merits. It is the "standard" which all competitors are trying to imitate.

The results obtained by this machine are the "acme" of concentration, and several cheap and untried machines that have lately come on the market compare by it. The manufacturers will tell you that they are "just as good, and cheaper," etc. The facts are that no other concentrator made has an equal capacity, or will yield as clean a concentrate with as small loss in the tailings as the Frue Vanner. The amount saved from the lower first cost of an inferior machine counts little in the year's results, when compared with the increased output from a Frue. This machine not only gives better results at both ends of the belt (i. e., clean product and poor tailings), but is operated at less expense and requires less attention than any other machine on the market. At the Alaska-Treadwell mine, where they have ordered over 350 Frue Vanners, one man attends 48 machines for 12-hour shift.

FOR DESCRIPTIVE PAMPHLETS, ADDRESS

J. S. BROWNELL, Western Agent FRUE VANNING MACHINE CO.,
132 MARKET STREET, (Successor to Adams & Carter.) SAN FRANCISCO, CAL.

GEO. E. DOW PUMPING ENGINE CO.

(Successors to DOW STEAM PUMP WORKS.)

108-120 BEALE ST., - - SAN FRANCISCO, CAL.

MANUFACTURERS OF

DOW PUMPS

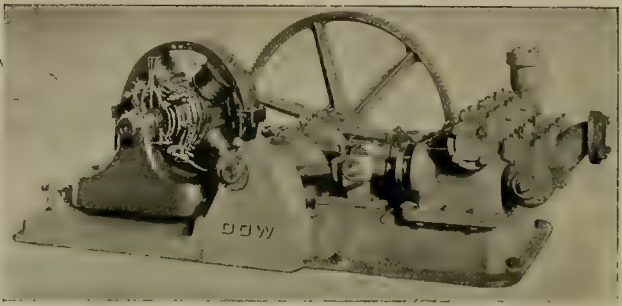
FOR MINING PURPOSES,

Operated by STEAM, AIR, ELECTRIC or WATER POWER.

VERTICAL SINKING PUMPS, BUCKET OR DOUBLE PLUNGER PATTERN.

DEEP MINE STATION PUMPS.

PUMPING MACHINERY FOR EVERY POSSIBLE DUTY.



HOR. TRIPLEX MINE STATION PUMP WITH ELECTRIC MOTOR.

THE HALLIDIE ROPEWAY

For Transporting Ore, Fuel, Earth, Sugar Cane, etc., by Wire Ropes.

SIMPLE, ECONOMICAL, PRACTICAL, DURABLE.

LOADS MECHANICALLY. DUMPS AUTOMATICALLY.

WIRE TRAMWAYS (Single and Double Rope Systems),

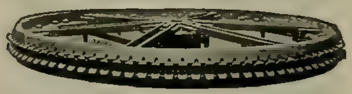
Cableways, Transmission by Wire Ropes,
Incline Planes, Cable Grips,
Logging by Cables, Automatic Loaders,

PLOWING, SCRAPING AND TRANSPORTING by Wire Ropes,

DESIGNED, SUPPLIED AND ERECTED. Estimates Furnished.

Improved GRIP PULLEY.

Patents Nos. 483,442; 610,353.



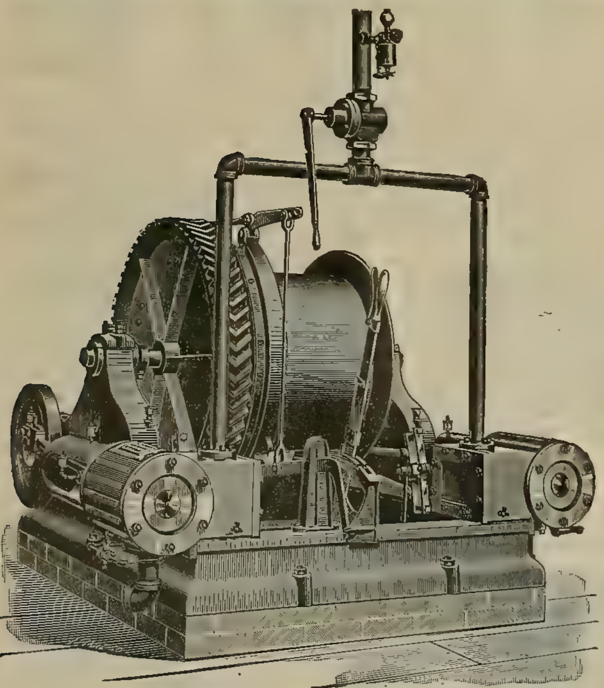
EFFECTIVE, SIMPLE, AUTOMATIC.

Saves Wear on Wire Rope and Cable.

Send for Illustrated Pamphlet.

Correspondence Solicited.

CALIFORNIA WIRE WORKS, - 9 Fremont St., San Francisco, Cal.



FIXED DRUM ENGINE.

PARKE & LACY CO.,

21 and 23 FREMONT STREET, SAN FRANCISCO, CAL.

Hoisting and Pumping Machinery

...FOR...

MINE PROSPECTING AND DEVELOPMENT.

SOLE AGENT FOR THE

Ingersoll-Sergeant Rock Drills and Air Compressors.

LICENSEE FOR THE MANUFACTURE AND SALE OF THE

Ropp Straight Line Furnace for Roasting, Chlorinating and Desulphurizing Ores.

Huntington Centrifugal Roller Quartz Mill,

Simmons Ball-Bearing Hydraulic Giants, Paul Ball Mill.

WE CARRY IN STOCK

Horizontal, Vertical and Portable Engines and Boilers,
Rock Breakers, Cornish Rolls, Pulverizers, Concentrators, Ore Feeders,
Hoisting Engines, Horse Power Hoisting Whims, Water Wheels, Steam Pumps, Ore Cars, Wire Rope, Ore Buckets, Water Buckets, Skips,
Blowers and Exhaust Fans, Shafting and Pulleys, Belting, Oils and Mine Supplies.

SOLE AGENT FOR

Manganese Steel Shoes and Dies. Bullock Diamond Drills.

KNOWLES PUMPS AND PULSOMETER PUMPS.

Estimates Furnished for Complete Plants for Hoisting Works, Smelters, Concentrating and Stamp Mills.

MINE BELL SIGNALS. Adopted, Used and in Force in Accordance with Law.

We print in legal size, 12x36 inches, the Mine Bell Signals and Rules provided for in the Voorhies Act passed by the California Legislature. The law is entitled "An Act to Establish a Uniform System of Bell Signals to Be Used in All Mines Operated in the State of California, for the Protection of Miners." We furnish these Signals and Rules, printed on cloth so as to withstand dampness. 50 Cents a Copy.

MINING AND SCIENTIFIC PRESS, 330 Market St., San Francisco, Cal.

CALIFORNIA
STATE
LIBRARY

This Paper not
to be taken from
the Library.****

MINING
AND
SCIENTIFIC PRESS.
AND PACIFIC ELECTRICAL REVIEW.

No. 2089.—VOLUME LXXXI. Number 5.
SAN FRANCISCO, SATURDAY, AUGUST 4, 1900.
THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

For Eastern Readers.

With the exception of the Comstock shares there is little public buying or selling of mining stock in California. Ordinarily, men work the mines instead of the street. Inquiries received from Eastern investors indicate that considerable quiet traffic is going on in mining stock in sundry localities east of the Missouri river. So much has been said herein on this subject that nothing can be added that would be new, but there is a point raised in a recent inquiry that deserves notice. The question asked is as to the relative value of investment in mining stock as compared with stock in a manufacturing or similar industrial enterprise.

Cleaning Up in Mill, Empire Mine, Grass Valley, Nevada County, Cal.—(See page 120.)

Ordinarily, the difference is in the fact that, as the term is generally used, mining stock does not "earn" money as stock investment in other industrial enterprises. A mining investment differs from any other in having its profits derived from what is really its capital—the ore in the mine. Dividend-paying shares in a railroad, a factory, a bank, a mercantile concern or any other similar form of corporate business draw their profits from the proceeds or result of the operations of the business, and, without reference to the capital itself, which is assumed to remain intact, and, with due allowance for contingencies and deterioration, can so continue on indefinitely. In a mine every dollar of profit represents so much taken from the mine itself, which practically represents the capital of the concern. The earning power of an industrial enterprise may be perpetual. When the mine gives out, its capital is exhausted; and as it is only from this source that dividends can be paid, they cease with the working out of the mine.

"Ore Train," Empire Mine, Grass Valley, Nevada County, Cal.—(See page 120.)

There are many mines that may be considered as good permanent dividend-paying investments as can be found, and furnishing far better and higher dividends on the amount invested than could be secured by the placing of a similar sum in any other way; but the stock in those mines is not ordinarily for sale, and, when a block is sold, there is considerable publicity over it.

Little attention is to be paid to prospectuses in daily papers, or to specious statements of what is "going" to be done. There is generally likelihood of making a good mine by honest and intelligent development of a good prospect, and some of the best dividend-paying mines in the country have been developed by the co-operative purchase of mining stock. Under certain circumstances nothing is a better or surer investment; but the Eastern investor or inquirer, for whose benefit this is written, should distinguish between business investment and heedless speculation.

MINING AND SCIENTIFIC PRESS.
ESTABLISHED 1860.
Published Every Saturday at 330 Market St., San Francisco, Cal.
ANNUAL SUBSCRIPTION:
United States, Mexico and Canada........$3 00
All Other Countries in the Postal Union........4 00
Entered at the S. F. Postoffice as second-class mail matter.
J. F. HALLORAN........Publisher.
Special Representatives:
EASTERN.
E. H. HAVEN........150 Nassau St., New York City.
MIDDLE WEST.
CHAS. D. SPALDING........153 La Salle St., Chicago, Ill.
INTER-MOUNTAIN.
W. A. SCOTT........43 Jacobson Building, Denver, Colo.
SOUTHERN CALIFORNIA.
W. D. CURTIS........223 W. Second St., Los Angeles, Cal.

San Francisco, August 4, 1900.

TABLE OF CONTENTS.

ILLUSTRATIONS.—Cleaning Up in Mill, Empire Mine, Grass Valley, Nevada Co., Cal.; "Ore Train," Empire Mine, Grass Valley, Nevada Co., Cal., 117. About to Blast—Splitting the Fuse, Empire Mine, Grass Valley, Nevada Co., Cal., 120. Griffin Three Roller Ore Mill, 121. Latest Mining and Metallurgical Patents, 122. Vibratory Screen and Separator; Inclined Vibratory Screen; Moran Flexible Joint, 123. Post and Cap to Support Roof Only; Post and Cap to Support Both Roof and Side, 124. Poling with Oak Laths; Construction of Chutes with Waste Rock; Jasper R. Rand, 125. Brown's Electro-Geodetic Mineral Finder, 130.
EDITORIAL.—For Eastern Readers, 117. Oil Fuel for Locomotives; More About Mining Experts; Holding a Mining Claim; Increased Gold Production, 118.
MINING SUMMARY.—126-127-128-129.
LATEST MARKET REPORTS.—131.
MISCELLANEOUS.—Concentrates, 119. The Empire Mines, Past and Present; Copper Alloy for Amalgamating Surface, 120. Silver Smelting in Mexico; The Griffin Mill, 121. Latest Mining and Metallurgical Patents, 122. Some Mines of China; Vibratory Screens; The Moran Flexible Joint, 123. Precipitation in Cyaniding; The Gardner Process; Relative Heat Efficiency; "Whin" and "Quartzite;" Deep Mining at the Utica Mine Angels, Cal., 124. Jasper R. Rand; Commissioner Hermann's Decision; The Cost of Testing a Mine; California Debris Commission Report, 125. Personal; Commercial Paragraphs; List of U. S. Patents for Pacific Coast Inventors; Notices of Recent Patents; Recently Declared Mining Dividends, 129-130. An Electrical Geodetic Apparatus, 130.

Oil Fuel for Locomotives.

Petroleum possesses superior advantages for locomotive fuel compared with coal on the Pacific coast. For some time the engines on the Southern California R. R. have used oil fuel, and now the C. P. Ry. engines between San Francisco and Ogden, Utah, are to be fitted for oil burning. Locality and cost of the two fuels determine economic value. Some of the railroads east of the Missouri river get bituminous coal for $1 per ton. The S. P. Co. pays about $5 per ton and the S. C. R. R. has paid $8. Some extensive railway experiments indicate that one pound of oil used as fuel is equivalent to two pounds of coal; and that with oil costing 3½ cents per gallon, it was equal in cost to coal at $4 per ton. According to such test, oil at that price is the cheaper fuel where coal costs more than $4 per ton and the dearer where it costs less. On some roads a fuel is used consisting of oil gas tar, coal gas tar, creosote oils and petroleum residues, the engines being fitted to burn either the above mixture or coal as desired. For such oil use each injector has two steam supplies—one to an internal annular jet, which injects the oil fuel in the form of finely atomized spray through the nozzle, and at the same time exhausts air through a central tube, either from the main automatic vacuum brake pipe or through a series of air heating tubes placed round the interior of the smoke-box. The second steam supply is delivered to a ring-blower arranged at the front of each injector, from which it escapes in small jets, inducing in regular quantity additional atmospheric air to insure perfect combustion, and at the same time atomizing the stream of liquid fuel issuing from the nozzle. These jets also distribute the gases over all parts of the firebox, and so equalize the flame, without the aid of firebrick erections, in former systems, that were preventive of alternate use of a coal fire. Taking a month's average run of 3000 miles, the fuel consumption of an engine so fitted was 11.5 pounds liquid fuel and 11.8 pounds coal per mile; with coal used exclusively, 35.4 pounds per mile.

The Santa Fe Co. is now arranging to use liquid fuel on its locomotives between San Francisco and the Arizona line.

Several California manufacturing establishments are also fitting their stationary engines for oil fuel. Coal has been costing San Francisco steam users about $6 per ton, and it is figured that with oil delivered at $1.43 per barrel considerable saving will be effected.

More About Mining Experts.

Some remarks in last week's issue on mining experts and expert evidence appear to deserve elaboration. What was said last week is so. The suggestion that the court have an expert of its own is considered in line with present requirements.

The custom or practice of admitting expert testimony is not so ancient as to be endowed with the traditionary homage accorded to precedent, and even if it were, we, here, in the west half of America, who believe that the law was made for man and not man for the law, could abolish or change the present system to the more equitable one of having the court and not the lawyers or litigants furnish expert testimony.

Everywhere are being tried cases between mining companies, sometimes involving millions, before courts where may be called in two, ofttimes antagonistic, sets of expert statements by mining engineers and experts and some who can lay no just claim to either title. Some of these experts seem to go on the stand feeling that they have been retained by their employers and that, like other men, their first duty is to earn their fee and give value received for the retainer. That frame of mind, however satisfactory to the employer, is not ordinarily conducive to a fair or impartial statement of the entire truth, no matter if, as last week suggested, the expert does not desire to confuse nor confound the facts and wants to state the truth as it appears to him.

On the part of the lawyers their efforts seem, sometimes, to be to try to prove that the expert retained by their side knows all about it, and the expert retained by the other side knows nothing concerning the matter, each side expecting to grill the other in cross-examination, and if they can confuse or mislead the judge or the jury so much the better—or the worse. Where the expert does not want to state the truth or is incapacitated by reason of nature, education or knowledge of doing so, it makes it worse still, as in that celebrated mining case told of in Denver where the expert had prepared a map of the underground workings of the property in dispute, and, having submitted it to the attorneys on the side for which he was employed, was told by them that its use would tend to destroy their case, and gave it as their opinion that his own map would help to establish the theories and claims of the other side. "That can easily be fixed," was his alleged answer, and fixed it was, as the story goes. He sat up all night, made a new map locating the vein and its direction differently from what it really was, and next day when he went into court swore to its correctness. This is unaccompanied by affidavit and probably is an exaggeration.

Such stories may be circulated against any class, no matter how honored or honorable; but anyone who has had anything to do with mine litigation can tell how near true it may be in some cases coming under his personal observation or experience. Indeed, it is the case that some mining engineers decline to appear as experts, not desiring to have their motives impugned or their honesty decried. The expert is not to blame; he goes on the stand and frequently is not given a free head, but has to answer nothing but cleverly concocted questions, and, as in all such cases, the environment goes largely toward determining what is and what is not admitted as testimony. It is not the expert but the system which is at fault.

The object of all courts and legal procedure is to obtain justice, and justice demands that the whole truth be honestly brought out. It is in order that where mining litigation comes before the court, that it be the province and the duty of the judge to determine upon evidence and inquiry whether a mining expert offering to testify is so fitted, and, if he be, that he be not considered or selected as the witness of the one party or the other, but go as an arbitrator or commissioner; a technical adviser of the court itself; a guide for the court and the jury in forming correct judgment in the case. What he might be called would be a secondary matter; if desired he could continue to be designated a witness, but the suggestion that that class of information be selected by the court itself will probably meet the approval of many mining experts everywhere who have felt at times that they were placed in a false position and who, while as men of honor desired to place the real facts of the case before the judge or the jury, found themselves stultified or restricted by the surrounding circumstances. For compensation for his services the mining expert could be paid by the court out of the public treasury or have his fee charged to the expense of the trial, as part of the costs of the case, to be met by both parties as common expense. This may seem radical suggestion, but it is our belief that what is here proposed is what will ultimately come to pass, to the advancement of justice, decrease in costs of mining litigation, at least equal recompense to mining experts as under the present system of fees, and increased satisfaction to any mine owners or workers who find themselves required to resort to litigation.

Holding a Mining Claim.

The locator of a mining claim who fails to do the required annual assessment, but who resumes work upon the claim before any other party has made a location on the same claim, has been given by the courts a quasi title in cases where another party had located upon the claim subsequent to the resumption of work by the original locator. The most recent decision on that question that we call to mind was by Judge Hallett of Colorado. He decided a case involving that principle in favor of the original locator. He held that the second locator acquired no rights by filing on the claim after the first claimant had recommenced work; that any rights a "jumper" might have would begin only with the first stroke of his pick, and could not be based upon any alleged neglect or lapse of the previous locator, provided that such previous locator had resumed work before the jumper had made his location. Judge Hallett's decision has not been reversed by any higher court. His decision in effect is that the annual assessment work required by law is not for the purpose of keeping alive the title to the claim, but to prevent such title from collapse; that it made no difference whether the annual work in question was done or not, so long as the first locator had asserted his rights in the following year before any attempt had been made to relocate the claim. That is, if a man did not do the required amount of work up to a certain time his claim lapsed; but if, however, he began work on the claim during the following year, before another locator had intervened, he re-established his rights, his location then being practically an original location, and no other locator could claim title by relating back any lapse of which the first locator had not taken advantage in time. The action of the original locator in such cases is risky and he is liable to have trouble. If he fail to perform the necessary assessment work his claim is jumpable under the law, and it were better to take no such chances as those taken in the case in question. The matter is here referred to in answer to sundry inquiries on the subject.

Increased Gold Production.

An official report from the Bureau of Statistics, Washington, D. C., shows that the increase in gold production in this country and elsewhere during the past few years makes the total gold product of the half century now ending $6,665,631,000. This is more than twice as much as during the entire 350 years preceding the half century now closing. The gold production of the world from 1492 to 1850 amounted to $3,129,720,000, that of the period 1851–1899 was $6,665,631,000.

The following table, compiled from the estimates of Adolph Soetbeer and the Director of the U. S. Mint, shows the gold production of the world by half century periods from the year 1500 down to the present time:

Period.	Amount produced.
1501–1550	$225,580,000
1551–1600	245,580,000
1601–1650	281,840,000
1651–1700	324,440,000
1701–1750	587,580,000
1751–1800	677,240,000
1801–1850	787,460,000
1851–1899	6,665,631,000

The additions to the world's supply of gold during the past four years have been as follows:

Date.	Gold production in United States.	Total gold production in the world.
1896	$53,088,000	$202,251,000
1897	57,363,000	238,812,000
1898	64,463,000	287,428,000
1899	72,500,000	315,000,000
Total	$247,414,000	$1,043,491,000

Concentrates.

UNTIL a U. S. patent is obtained the owner of a mining claim is never certain of his title.

THE largest stamp mill in Canada is probably the one at the Ymir mine, Nelson district, B. C., eighty stamps now crushing $10 ore.

A DELINQUENT co-owner of a mining claim has 180 days from the beginning of the publication of notice of delinquency in which to pay up.

IT is not unusual to work a continuous telegraphic circuit of 6000 miles for hours at a time by the Associated Press in sending daily press report.

SILVER, in the form of coin, is at a premium at Cape Nome, Alaska, by reason of its scarcity, a $20 gold piece being exchangeable for only $18 in silver.

THE California Debris Commission since its organization has received 481 applications for mining permits, of which 371 have been granted: of these 145 have been revoked.

MINING beach sands has had many columns of description herein. An illustrated article in the issue of May 15, 1897, is among such valuable information furnished in former years.

AN aperture 12 inches by 12¾ inches wide, through a 1½-inch plank, with a head 6 inches above the top of the opening, will discharge 200 miner's inches per minute, or about 300 cubic feet.

TALC is composed of 63.5% silica, 31.7% magnesia, 4.8% water. It is a greasy mineral with a pearly luster, color white to apple green. An inferior quality of coarser structure is called soapstone.

THE Congress mine, Arizona, was originally worked for the copper. Depth made a gold mine of it. The Congress is now working on the 2700-foot level and the ore taken from the bottom of the incline shaft is reported rich as ever.

SO FAR as known, the biggest mine blast in California was fired in 1878, in the Dardanelles mine, Placer county, moving 500,000 cubic yards gravel; nineteen tons Judson powder were used—equivalent to about 75,000 pounds black powder.

WHEN petroleum is talked of, a "barrel" is understood to mean 42 gallons. A wine barrel contains 31½ gallons and is the standard used when capacity of cisterns or tanks is given in barrels. Petroleum will weigh 6½ pounds per gallon.

SOUTH DAKOTA law requires that every corporation doing business in that State must make an annual public statement of its affairs through an advertisement in some newspaper published in that State; but no attention is paid to such singular statute.

THE Wetherill magnetic separator is considered a valuable appliance. It is in successful operation in the works of the New Jersey Zinc Co. at Franklin, N. J., and is being given experimental operation at Denver, Colo., in the separation of black sand.

IN law a "known" mine is deemed synonymous with an operated mine. The existence of a mine is not "known" until ore has been extracted or shown to exist in sufficient quantity and value to warrant extraction within the boundaries of the claim located.

IN March, 1881, the California Legislature passed a bill providing for a State hospital and asylum for miners, and the Governor signed it. The intent was to establish a hospital for disabled miners; but no subsequent Legislature has made any appropriation therefor.

RESULTS alone determine the value of a mine. A property producing $500,000 per year and paying $50,000 annual dividends, with an annual investment of $25,000 in machinery, is not as valuable as one producing $250,000 per year, with annual dividends aggregating $75,000.

GAS ENGINE efficiency might be theoretically increased by complicating the construction of the machine, but the increased friction therein involved would probably in practice tend to lower the efficiency. The aim of gas engine builders is to average all efficiencies and to build as simply as possible without sacrificing essential features.

IN COLORADO, so far as known, the Merryweather mine, on Irwin's peak, Clear Creek Co., at an altitude of 14,405 feet, is the highest in the State. The Sierra Blanca mine, near Garland, is 14,400 feet above the sea. The May Lundy mine, Mono Co., at an elevation of 11,108 feet, is probably the highest mine now being worked in California.

BEFORE putting in an electric lighting plant, a town should first find from other towns' experience how the municipal ownership idea worked. Usually it works unfavorably. It is not a question of honesty, but inability. No town can ordinarily install and continuously run an electric lighting plant as cheaply as under competent private ownership.

ZINC is now low in price and but little Colorado zinc ore is being shipped abroad. Ores under 45% zinc have little or no commercial value, and do not pay to ship foreign. While there have been some shipments made to foreign smelters, the returns are not reported satisfactory, and the quantity shipped has been largely overstated. The foreign smelters are no better equipped for treating zincy ores than are the United States smelters, but their coal, labor and supplies cost only about one-half what they cost in the United States; hence they are able to apply treatment which would be out of the question in this country. Freight rates have been obtained as low as $9 from Leadville to Swansea and Antwerp; consequently, the Colorado market is open to them with little freight discrimination.

THE miners of any locality in California have a right to organize a mining district and adopt rules and regulations not in conflict with the State or federal law. They have the right to create the office of mining recorder for such district and file location notices in his office. The policy of such action is not under discussion, but the right to so legally act exists.

A DOUBLE BELT having an arc of contact of 180° will give an effective pull of thirty-five pounds per inch width for an oak-tanned fulled belt and thirty pounds for other leather belts and six to seven ply rubber belts; or 950 feet per minute of 1-inch wide oak-tanned and fulled belt will transmit 1 H. P. and 1100 feet per minute of other leather belting and six to seven ply rubber.

AN air-tight suction pipe for a pump can be produced from ordinary iron pipe with screwed joints. Use graphite on the threads, screw them together tightly, cover the joints with a mixture of melted tallow and resin, of such proportion that it will not be brittle when it cools. It should be put on very hot. When ready for use plug the end of the pipe, apply a water pressure of 100 pounds, if possible maintaining it for two hours, and look for leaks.

CARBONATE OF LIME will not dissolve in water that has no carbonic acid in it, but will precipitate. If the feed water be highly heated in a heater and purifier (by exhaust steam, for instance), the carbonic acid can be removed and any carbonate of lime in the water will be deposited in the purifier, instead of in the boiler, thus avoiding incrustation of the latter. Sulphate of lime, however, can not be got rid of in this way, as it will not precipitate below 300° F.

ONE BARREL unslaked lime weighing 220 pounds will make 2½ barrels stiff lime paste, equal to 0.3 cubic yard. One barrel of lime paste and three barrels of sand will make three barrels of mortar, equal to 0.4 cubic yard. One barrel of unslaked lime will make 6.75 barrels mortar one part lime, three parts sand. Cement weighs 400 pounds gross per barrel, 375 pounds net. One cubic foot dry cement shaken down weighs 100 pounds and makes 0.63 cubic foot stiff paste, when mixed with 25% to 30% water.

THERE are three theories as to the origin of petroleum—that it is of animal, vegetable and mineral origin, the adherents of each theory adducing what they consider proofs. Opponents of the animal origin theory have claimed that, if so, nitrogen compounds would be found therein; and now that asphalt from near the Red Sea has yielded 2% nitrogen, advocates of the animal origin theory feel more positive than ever. Meanwhile those who may uphold the combined vegetable and mineral origin of the oil may be considered nearest the truth.

THE height of a reservoir bank above the highest water level is usually 4 feet for low and 6 feet for high reservoirs. When the depth of water at the side of the embankment does not exceed 30 feet the top of the bank may generally be 4 feet above the top water level. With a depth of from 30 to 50 feet the height should be 5 feet; and when the depth is 60 feet or over the height should be 6 feet. Trautwine suggests that the top width be 2 feet plus twice the square root of the height in feet. The inner slope should be 2½ base to 1 height, and the outer slope 1½ base to 1 height.

CONCERNING the "power" of a steam boiler, the word in that connection is not correctly applied, but is used because of a custom. The rating of a steam boiler is expressed in terms of its ability to evaporate a certain quantity of water into dry steam in a given time. Simply to say that a boiler has 10 sq. ft. of heating surface to a horse power, tells nothing and means nothing as to its evaporative effect. A single engine, having a single cylinder, should produce a "horse power" upon 30 lbs. of water evaporated into steam of 70 lbs. gauge pressure; a compound engine, having two cylinders and working at from 6 to 10 expansions, will produce a horse power for an expenditure of 20 lbs. of water; and a triple-cylinder engine, working at 16 to 30 expansions, should give one horse power for every 15 lbs. of water evaporated into steam per hour, in all of the above citations. The "power" of a boiler begins and ends with its ability to evaporate certain quantities of water in a given time.

OF the substances familiar to everybody, some occur, under ordinary conditions, in the three states of gas, liquid and solid. Water, for example, under the usual pressure of the atmosphere, passes into steam at 100° C., or 212° F., and freezes at 0° C., or 32° F. If the pressure is increased, the boiling point rises, and if the pressure is lowered the boiling point falls accordingly. The pressure and the temperature must both be taken into account. If the temperature is kept high, as in a steam boiler, a greater pressure must be exerted to maintain the water in a liquid state, and if the ordinary temperature were, on the average, 400° C. higher than it is, water would be known to us only as a gas. That is, steam at a temperature above 358° C., or about 759° F., cannot be changed to liquid by any pressure, however great. A similar state of affairs exists for every substance. That is, there is for every substance some point of temperature above which it cannot become liquid, and this point is called the critical temperature. Any gas will be easy or difficult to liquefy, according as its critical temperature is high or low. Oxygen, whose critical temperature is 118° below zero, resisted all efforts at liquefaction for many years; nitrogen, with a critical temperature of —146° C., was still more refractory, and hydrogen, whose critical temperature has not been exactly determined, had to be cooled to about 235°, or more, below the zero of the Centigrade scale before it yielded.

THE theoretical velocity with which water flows under a given head is 8.03 times the square root of the head. To find the pressure in pounds per square inch of a column of water, multiply the height of the column in feet by .434, approximately; consider that every foot elevation is equal to ½ pound pressure per square inch; this allows for ordinary friction. To find diameter of pump cylinder to move a given quantity of water per minute (100 feet of piston being the standard of speed), divide number of gallons by 4; square root of quotient will be diameter (in inches) of the pump cylinder. To find quantity of water elevated in one minute, running at 100 feet of piston speed per minute, square diameter of the water cylinder in inches and multiply by 4. To find the theoretical horse power necessary to elevate water to a given height, multiply total weight of the water in pounds by the height in feet; divide the product by 33,000; (an allowance of 25% should be added for water friction, and a further allowance of 25% for loss in steam cylinder.)

THE rate of combustion in a furnace is computed by the pounds of fuel consumed per square foot of grate per hour. In general practice the rate for a natural draught is: for anthracite coal, from 7 to 16 pounds; for bituminous, from 10 to 25 pounds; and with artificial or forced draught, as by a blower, exhaust blast or steam jet, the rate may be increased from 30 to 120 pounds. The dimensions or size of coal must be reduced and the depth of the fire increased directly, as the intensity of the draught is increased. Temperature of gases at base of chimney or pipe should be 600°, and fractional resistance of the surface of chimney is as the square of velocity of current of gases. Ordinarily from 20% to 30% of total heat of combustion is expended in the production of the chimney draught in a marine boiler, to which is to be added the losses by incomplete combustion of the gaseous portion of the fuel and the dilution of the gases by an excess of air, making a total of fully 60%. Temperature of a furnace is assumed to range from 1500° to 2000°, and volume of air required for combustion of one pound of bituminous coal, together with products of combustion, is 154.81 cubic feet, which, when exposed to above temperature, makes the volume of heated air at bridge wall from 600 to 750 cubic feet for each pound of coal consumed upon grate. One square foot of grate will consume on an average twelve pounds of coal per hour. In calculating horse power of steam boilers allow for: tubular boilers, 15 square feet of heating surface equivalent to 1 H. P.; flue boilers, 12 square feet; cylinder boilers, 10 square feet. Consumption of fuel averages 7½ pounds, or 15 pounds dry pine wood for every cubic foot of water evaporated. The Centennial standard is thirty pounds of water evaporated per hour from 100° F. at seventy pounds pressure.

CHLORIDE OF GOLD is readily decomposed by heat, the decomposition beginning at 180° when the monochloride is formed, and being completed with the formation of gold and chlorine at 220° to 230°. Whether dry or in aqueous solution, the trichloride is also decomposed by light, gold being deposited in scales in the latter case. Weak voltaic currents precipitate metallic gold from the solution of trichloride upon the negative pole. The solution of trichloride of gold is also decomposed by many reducing agents, such as organic substances, metals and protosalts; heating the solution in every case hastens the decomposition. Organic matter is sometimes present in considerable quantities in metalliferous veins, sometimes as graphite and anthracite. It also occurs in the coloring matter of fluorspar and smoky quartz. The reduction of organic matter is assisted by the action of light. Alkalies also quicken the action of organic matter. Alkaline carbonates act on hot solutions, half the gold being precipitated as hydrate, while the other half remains in solution in the form of a double chloride of gold and the alkali. Sulphur, selenium, phosphorus and arsenic all precipitate gold on boiling the solution of the trichloride. Many metals reduce chloride of gold, the action being, of course, more rapid in the case of the most highly electro-positive metals, such as zinc and iron. Lead sometimes gives fine dendritic plates of gold. Sulphuretted hydrogen precipitates sulphide of gold from both neutral and acid solutions, while phosphoretted, arseniuretted and antimoniuretted hydrogen all precipitate metallic gold. The lower oxides of nitrogen, nitrous acid, and many other "ous" acids and oxides effect the same decomposition. It is difficult, or, rather, impossible, to say what agents have in any particular instance been the cause of precipitation. In the case, however, of metals and of organic matter some indications occasionally still exist. Peat, for instance, has been found intermingled with small masses of nuggetlike pieces of gold, and in a Dakota mine filaments of gold crystallized on mine timber soaked in acid waters have been discovered. On a larger scale the Transvaal offers illustrations in the form of auriferous veins, the bituminous portions of which are unusually rich in gold. Of metals as the possible cause of auriferous precipitation, iron and copper pyrites, stibnite, galena, etc., when found associated with gold, may be enumerated.

The Empire Mines, Past and Present.

NUMBER I.

Written for the MINING AND SCIENTIFIC PRESS by GEORGE W. STARR, Resident Manager.

Nestled in the foothills of the Sierra Nevada mountains, at an elevation of 2400 feet, the oldest and best known mining town in the United States—Grass Valley—flourishes with the vigor of pioneer days, tempered by a growth of fifty years. Grass Valley, now a prosperous city of neat homes, gardens, orchards and vineyards, is surrounded by beautiful drives and walks, shaded by magnificent native pines, oaks, maples and spruces, while the alder, dogwood, shrubbery and vines along the banks of its many brooks help to complete nature's dower to the place where gold in the quartz was first discovered in California.

About to Blast: Spitting the Fuse, Empire Mine, Grass Valley, Nevada County, Cal.

In the autumn of 1849 placers were discovered, followed by the discovery of quartz in June, 1850, which created no excitement until a man named McKnight, who had come from Newtown, camped on the summit of Gold hill, overlooking Boston ravine (now a portion of Grass Valley), and there discovered the Gold Hill ledge (October, 1850), the quartz of which, at its outcrop, was literally filled with gold, demonstrating clearly the source of the rich placers.

This discovery set the camp into the wildest excitement and was immediately followed by the discovery of quartz ledges on Massachusetts hill, Ophir hill and Rich hill (October, 1850). Other discoveries followed in rapid succession and many people rushed to Grass Valley to "peg out" a quartz mining claim, which was originally 30x40 feet.

What is supposed to be the first quartz mill was built by two Germans in November, 1850. The stamps were tree trunks shod with pieces of iron. This was followed by the Gold Hill mill in 1851. These mills nearly proved failures and in 1853 quartz mining had fallen to a low ebb, rising with the rapid evolution of the stamp mill to a flourishing state in 1857.

In 1867 Grass Valley had thirty stamp mills, 284 stamps and 1600 men working. Among the well-known mines then working were the following: Allison Ranch, Pennsylvania, Norambagua, Gold Hill, Peabody; Eureka–Idaho (now Maryland mine); Lone Jack, Omaha, Homeward Bound (now Omaha Consolidated; North Star, New York Hill, Rocky Bar, Massachusetts Hill (now owned by North Star Mines Co.); Ophir Hill, Rush & Laton, Keefe & Judd, Rich Hill, Magenta, Osborne Hill, Empire, Donahue (now owned by the Empire mines).

From 1867 the mines were supposed to be "petering out" and in 1879 Grass Valley was known as a worked out, dying camp, with but three mines in active operation, the Idaho, New York Hill and Empire, the first in "bonanza" and the other two in "borasco." In May, 1880, the New York Hill (now being reopened by the North Star Mines Co.) closed down, leaving the fate of the camp with the then great Idaho and the struggling old Empire. To the Empire mine Grass Valley owes a debt of lasting gratitude, for in the history of that mine, more than to all other circumstances combined, is due Grass Valley's growth from a temporary mining camp to an attractive city of permanent homes.

In the history of gold mining in California the Empire stands pre-eminent, not alone for its wealth, but for what the mine, above all others, has given in the way of example and earnest, well-applied endeavor. It is the pioneer in deep mining, and the first to regard Grass Valley mining a legitimate business, controlled by the same laws and conditions as should govern a well-managed manufacturing establishment.

The writer, when consulting engineer for Barnato Bros., South Africa, had to refuse many applications for positions. One, more persistent than usual, received a refusal of his application, as follows: "No, of course, I can not get a position. But I will get one yet, for I am going to America, to sleep one night in Grass Valley, that I may be a practical mining engineer." The remark is brought to mind because of the many formerly connected with the Empire mine whose names are household words in the mining world—George D. Roberts, J. W. Gashwiler, William Cliff, Thomas Mein, David Watt, David McKay, John Hays Hammond, Richard Angove, H. A. Tilghman, Cospee Thurston, V. M. Clement and James D. Hague.

What now constitutes the Empire mines is a consolidation into one ownership and management of what was formerly hundreds of claims. The nucleus of this amalgamation was the original Empire mine on Ophir hill, discovered in October, 1850, by George D. Roberts, and sold with adjoining claims in 1851 to Woodbury, Park and others, who owned a quartz mill in Boston ravine known as the Empire mill. In the spring of 1854 the Empire Mining Co. was incorporated, additional territory was purchased and operations commenced on a systematic basis. In 1865–66 new works were erected at an outlay of nearly $200,000, including a 30-stamp mill, then one of the finest in the State. The principal owner and manager at this time was Captain S. W. Lee, who clung to many of his marine ideas. The interior of the new mill was ceiled and painted and the superstructure so designed that it was always known as "the steamboat mill." In September, 1870, this mill was destroyed by fire and replaced by a 20-stamp mill. Mining operations continued until November, 1878, when, all pay ore in sight being extracted, pumping was suspended and the main incline, which had reached a depth of about 1200 feet on the dip of the ledge, was allowed to fill with water. Work was then commenced on a new shaft sunk on a parallel vein, known as Rich Hill ledge, which had been worked through the Ophir shaft. The product in free gold from May, 1854, to this period (no record being obtainable prior to 1854) is as follows:

BULLION PRODUCED FROM EMPIRE MINE, GRASS VALLEY, CAL., FROM MAY 1, 1854, TO OCTOBER, 1878—DERIVED FROM THE BOOKS OF THE COMPANY.

(Six-Stamp Mill, Crushing Ten Tons Daily.)

May 1, 1854, to December 31, 1854	$ 152,887 91
January 1, 1855, to December 31, 1855	192,231 67
January 1, 1856, to October 31, 1856	73,931 38
April 1, 1857, to December 31, 1857	72,654 74
January 1, 1858, to December 31, 1858	112,408 30
January 1, 1859, to December 31, 1859	121,443 44
January 1, 1860, to December 31, 1860	102,759 18
January 1, 1861, to December 31, 1861	72,413 04
January 1, 1862, to December 31, 1862	96,130 31
January 1, 1863, to December 31, 1863	59,374 43
	$1,056,234 40

Estimating the full running time of the mill as equal to an average of 300 days in each year, there are 2810 days, at ten tons daily, or 28,100 tons of quartz, giving as the approximate value of the ore crushed per ton $37.55, exclusive of sulphurets.

April, 1865, to December, 1865	$ 71,780 70
January, 1866, to July, 1866	71,111 31
August, 1866, new mill commenced, 30 stamps	25,367 08
September, 1866	18,727 13
October, 1866	13,814 45
November, 1866	22,025 65
December, 1866, repairing mill and moving hoisting works	4,327 33
January, 1867, to June, 1867 (mill partially idle)	58,927 80
	$ 286,081 45

Oct., 1867, to Oct., 1868	254,000 00
Oct., 1868, to Oct., 1869	178,000 00
Oct., 1869, to Oct., 1870 (mill partially idle)	123,000 00
Oct., 1870, to Oct., 1871 (30-stamp mill destroyed by fire, replaced with 20-stamp mill)	64,000 00
Oct., 1871, to Oct., 1872	110,000 00
Oct., 1872, to Oct., 1873	168,000 00
1874	119,000 00
1875	201,000 00
1876	120,000 00
1877	171,000 00
1878	117,000 00
	$1,625,000 00
	$1,056,234 40
	286,081 45
	1,625,000 00
Total to Oct., 1878	$2,967,315 85

The above statement includes free gold only.

(TO BE CONTINUED.)

Copper Alloy for Amalgamating Surface.

NUMBER II.—CONCLUDED.

It is Dr. Rose's opinion that the discoloration on the alloy plates is prevented by the weak electric current mentioned above. Aaron testifies that the same effect can be had when the usual copper plates are in use by placing them in contact with iron or some other metal which is positive to copper. The strips of iron bolted to the top and sides of the plate are said to be sufficient for the purpose, the copper being in that case unaffected by the acidity of the water, which causes oxidation and dissolution of the iron only.

Mr. Furman goes on to say that any one who visits the stamp mills of Gilpin and Clear Creek counties in Colorado, or other localities where sulphide ores are treated by stamp milling and plate amalgamation, will notice the tendency of the plates to become discolored. He says that his experience with the suggested alloy plate was more satisfactory than with the ordinary ones, and that this led him to experiment with plates consisting of aluminum-copper alloy. "I made three copper-aluminum alloys containing respectively 5%, 10% and 15% of aluminum, which were rolled into plates, amalgamated and subjected to various tests.

"I found that these plates, when immersed in the tailings and water from the creek, suffered practically no discoloration. I tried them also with water and freshly broken pyrites; with water and pyrites which had long been subjected to atmospheric influences, and with water containing small amounts of free acids and free alkalies. In every case they showed practically no discoloration. The plates were examined with a magnifying glass, to see if the gold was readily caught by the amalgamated surface. The results were so satisfactory that I inquired of leading manufacturers of rolled copper whether they could make me a few plates of a copper alloy containing 10% of aluminum. They replied that there was no market for such material, and that they could not undertake its manufacture."

Silver Smelting in Mexico

NUMBER II.

The sample mill is not in operation during the night nor on Sunday, except on the company's private business when it is pressing. The force of the sample mill, which sometimes reaches the number of 200 men and boys, handles 800 tons of ore a day, equivalent to forty cars.

Smelters always buy ores f. o. b. the railway station nearest to the mine and embody the freight in the treatment charge. The reason for this is that the smelter will get reduced rates from the railways according to their volume of business, while a miner or ore broker will not. In illustration of the terms on which ores are purchased at Smelter No. 3, I will here append an open-rate schedule furnished in 1898 to ore sellers shipping from a station on the line of the Mexican International Railway in the State of Durango:

Pay for all the silver contained $36.50 a kilo.

Pay for all the gold contained if not less than 3.43 grams per 1000 kilos. (or one-tenth ounce per 2000-pound ton) 62½ cents U. S. currency per gram.

Pay for 90% of the lead, not under 5%, 5½ centavos per kilo.

Add for excess of iron or manganese over silica 15 centavos per unit.

Deduct 20 centavos for each unit of silica in excess of iron contents.

Deduct 30 centavos for each per cent of sulphur over 3, the maximum charge being $4.50 per metric ton of ore.

Deduct 55 centavos a unit for zinc, if over 8%.

Deduct 55 centavos for each per cent of arsenic, antimony or baryta over 3%, all three added together.

FREIGHT AND TREATMENT CHARGES.

$20 per ton for ores containing 5% of lead.
18 " " " from 5% to 10% of lead.
14 " " " " 10% to 15% "
12 " " " " 15% to 20% "
10 " " " " 20% to 25% "
7 " " " " 25% to 30% "
4½ " " " " 30% to 35% "
2½ " " " " 35% to 40% "
½ " " " " 40% to 45% "

A premium will be accorded of:

$1.50 per ton for ores containing from 45% to 50% of lead.
3.50 " " " " 50% to 55% "
5.50 " " " " 55% to 60% "

Stamp tax has to be paid by the vendor of the ore.

The federal tax of 3% on the gold and silver value in the ore, as well as the mint tax of 2% on the gold, are paid by the ore purchasers.

It is hardly necessary to add that large producers of ore will get much more favorable rates, especially if they enter into long-time contracts.

ROASTING DEPARTMENT.—Ores containing more than 8% of sulphur should be subjected to calcination before smelting, to avoid an excessive production of matte and dragging too much silver into the by-products. Yet it is good policy not to roast ores very high in silver, but to throw them on a bed with only a small amount of sulphur in it, whereby the sulphur contents of the bed are not materially raised. Such a bed must be composed, however, of ores with a loamy gangue, like the ferruginous lead ores from the vicinity of Monterey; ores which would allow the silver ore to sift through the interstices, like quartzose ore, for instance, would not do. Furthermore, there are sulphide ores with coatings of horn silver, like "La Paz," from Matehuala, which should not be roasted, lest chloride of silver be volatilized. The largest portion of the roasting ore handled is concentrates from Pachuca, and tierras (fines) from Angangueo, which have to be crushed to pass through a No. 12 mesh screen. For various reasons, the owners of the smelter do not feel inclined to encumber themselves much with roasting ores. The principal material to be roasted remains, therefore, the matte falling at the blast furnaces. The first matte runs about 23% in sulphur; the concentrated matte less, say, 16% or 18%. There are six long-hearth roasting furnaces (calciners, hand roasters) without fuse box, which receive their charges from above through a hopper in the arch at the flue end and are discharged from opposite sides through two square holes in the floor near the fire bridge end. The roasted ore is raked through these holes into wheelbarrows placed under them.

A long-hearth furnace holds six charges of 4000 pounds of matte, or 3500 pounds of Pachuca concentrates. The reason why there is such a difference made in the weight of these materials is of a two-fold nature. In the first place, the concentrates, being lighter than the matte, reach almost to the crown of the arch when spread out in the furnace, and, secondly, the sulphur contents of the former are higher than those of the latter. The material in the furnace is rabbled every twenty minutes, and a charge is drawn every four hours. No attempt at agglomeration or sintering is made, the material being unsuitable for that operation, and the men not skillful enough to keep their floor clean, if it were done. After a charge has been drawn, the discharge holes are covered with iron plates, and the next charges are moved forward with paddles, when an empty space will be formed at the flue end on which a new charge is dumped from above. The charges are weighed up in trucks at the bins, and raised up on an electric lift to a trestle which runs across the furnaces at the flue end and branches off to the feed floor of a battery of gas producers. In the original roaster building there are five calciners. Each set of furnaces has a separate flue and chimney of ample section and a height of 75 feet. Originally wood was used for heating the furnaces. It is a splendid material for attaining a good roast, on account of its yielding a long flame. But the constant danger of the wood piles being set on fire by sparks from passing locomotives led to the discontinuance of its use. Different coals and different grates were tried without satisfactory results. Three gas producers were erected with the object of disposing of vast accumulations of coke waste, each 7 feet diameter by 16 feet high; cost, $2460 U. S. currency, f. o. b. factory. They are connected with the calciners through branches from an underground main flue, which is curbed with firebrick. The ash pits are laid in cement and are kept filled with water. The steam blast is furnished through a small pipe connected with the main steam pipe in the blast furnace building. The steam is wet, but this is no detriment.

These six furnaces roast seventy-two tons of matte or sixty-three tons of ore in twenty-four hours, hence cost of roasting will be:

	Matte.	Ore.
Labor	$1 07	$1 22
Fuel	1 06	1 21
Totals	$2 13	$2 43

To this must be added the cost of power for electric elevators, electric light, tools, repairs, etc., say, 30 cents. This will bring up the cost to, respectively, $2.43 and $2.73.

After the success of the Taylor producers had been established, three more were put up, making six in all. This number could accommodate twelve calciners, if necessary, yet it would be advisable to have two producers in reserve.

The main flue was entirely rebuilt, enlarged and extended over to the new calciners, at the same time making provision for the probable addition of more calciners.

The roasted material, as drawn from the furnaces, is dumped on a cooling floor paved with hard burned brick and there drenched with water, weighed, sampled and divided into lots, which have to be smelted away as fast as possible, as the cooling floors are limited in size. Roasted matte is used advantageously in replacing part of the iron ore in the blast furnace charge.

The smelting department is separated by a wide passage from the engine and boiler house, and in line with it is the furnace building. In it are ten cupolas, which are distant 25 feet from center to center of each other. This is insufficient for large furnaces, as considerable space between two furnaces is required to stack up the bullion produced during a shift, and sometimes more. The smelting department has undergone many changes and is still in a transition state, as we shall see below. The furnaces are of the side-feed pattern, are operated with a closed breast, and provided with syphon tap, except one which is used for matte smelting. They consist essentially of four parts—the crucible, the water jackets, the shaft and the chimney.

The crucible (hearth, sump, well) is enclosed in a casing formed by eight heavy cast iron plates—the curb plates—standing on a bottom plate of heavy boiler iron, not cast iron, with a rim of angle iron riveted to it, which conforms to the shape of the casing and keeps the plates in position. The casing, and hence the bottom plate, forms an elongated octagon. The curb plates are 3 feet 6 inches high, and consist of the front or dam plate, the back plate, two side plates and four angle plates. They are bolted together through lugs at their sides and are further firmly held together by a set of binders 2½ inches square. In the center of the upper edge of the front plate there is a semicircular cavity in which the slag spout is fitted. In the side plates there is a bowl-shaped projection in which the lead wells are built up. To economize in patterns by making them interchangeable, founders place this projection in the center of the upper edge of the plate. But this is wrong. The lead well should be placed as near the front plate as practicable. I located it at one-third of the distance between front and back plate from the front plate; it should come between two tuyeres. It is also wrong to detach this projection and bolt it on; a great deal of unthought-of trouble will be experienced with such an arrangement.

The crucible is built of firebrick laid in fireclay mortar, and has tapering sides, the dam and long sides having a steep taper, while the back wall slopes gently towards the front, and is even made thicker than the other walls to avoid the necessity of locking up too much bullion. The depth of the crucible may not be over 27 or 30 inches. Contrary to ancient practice, no steep (brasque) is used in shaping the crucible.

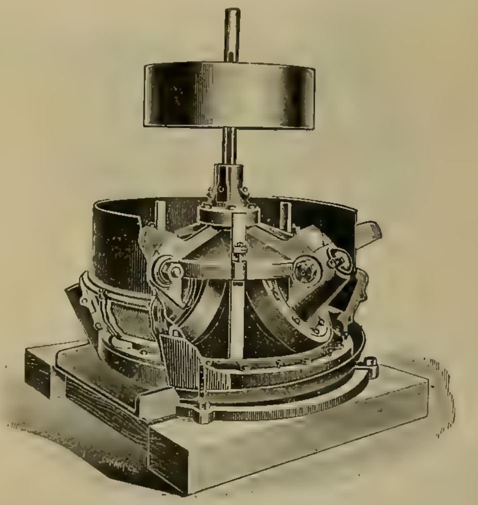
The syphon tap is a channel 6 inches square in section leading from the bottom of the crucible upward to the lead well; it does not go up in a straight line. It is wrong to make the section rectangular, with the long sides upright. In this case matte will invariably enter the lead well and clog it. To guard against the bulging out of the plates by the expansion of the brick walls, a space of 3 inches is left between plate and wall, which is tamped out with sand or a mixture of sand and clay.

The water jackets are resting on the topmost course of the crucible walls. They are made of cast iron in symmetric sections, in order to restrict the patterns to the smallest number. The sides consist of six sections each, the front and back of two each. In the side jackets a tuyere opening is cored out, which is 4⅝ inches in diameter on the outside and 3¾ inches on the inside facing the fire. The center of the tuyere opening is 11 inches above the bottom of the water jackets in the case of the large-sized furnaces, and 13 inches in the case of the smaller-sized ones. The water space of the jackets is 6 inches and the thickness of the wall is ⅝-inch.

(TO BE CONTINUED.)

The Griffin Mill.

On this page is illustrated the Griffin three roller ore mill made by the Bradley Pulverizer Co., 92 State street, Boston, Mass. Of this mill the manufacturers say while it "is a modification of the well-known Chilian mill, the rollers run upon a crushing ring or die, which is inclined inwardly at an angle of about 30°, the rollers themselves also being inclined to the central shaft of the mill, thus using the centrifugal force, as well as the weight of the rollers themselves, as a crushing agent.



Griffin Three Roller Ore Mill.

"The mill consists of a heavy and substantial bed, in which is fixed a crushing ring 5 feet in diameter and 6 inches wide, and inclined inwardly at an angle of about 30°. Above the bed or pan is a conically shaped carrier fastened to the main upright driving shaft. To this carrier are fastened the shafts on which the crushing rollers rotate, being secured thereto by rocking heads and trunnions so that the shafts may move in radial lines.

"The rollers are propelled or driven with an orbital motion, around and upon a crushing ring or die, and not only utilize their full weight in crushing the ore upon the die, but also use all the centrifugal force developed.

"The material to be crushed is fed by an automatic feeder into a feed chute, and is delivered in a channel inside of the die. From this point it is carried around and distributed upon the die by vertical and adjustable distributing bars or plows, while the necessary amount of water is being fed into the mill. The action of the rollers upon the pulp throws it against the screens, the portion which is sufficiently fine passing through into a trough outside, from which it is delivered through the discharge spout.

"The material not fine enough, by action of the mill, falls back and across the face of the die, and is thus brought in a satisfactory manner in front of the crushing rollers.

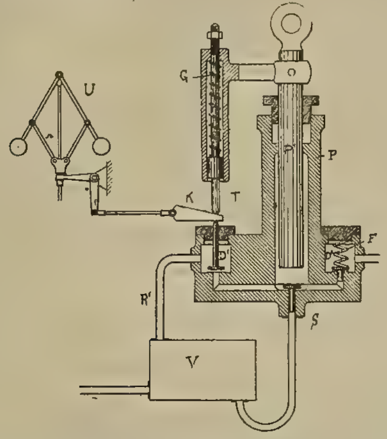
"The fact that the die is inclined inwardly makes it possible to procure a much more even distribution of the material to be crushed than can be done on either a vertical or horizontal die."

Mining and Metallurgical Patents.

Patents Issued July 24, 1900.

Specially Reported for the MINING AND SCIENTIFIC PRESS.

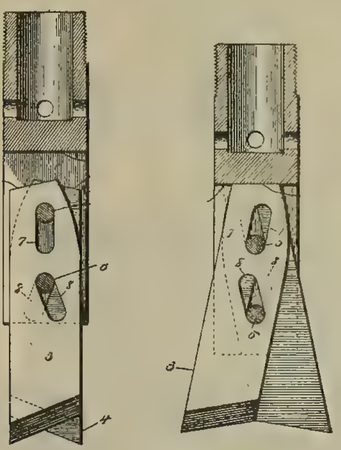
APPARATUS FOR REGULATING FUEL SUPPLY OF INTERNAL COMBUSTION ENGINES.—No. 654,140; R. Diesel, Munich, Germany.



An apparatus for supplying variable quantity of liquid fuel to combustion motor, combination with fuel supply, of pump operated by motor; suction valve connected to pump chamber; ventilating return valve D' located above and connected to top of pump chamber, chamber above valve with ventilating opening at top and return connection R' from beneath top to fuel supply; feed valve D^2, lower face of which, when closed, is at or below top of pump chamber; return valve normally opening at lower pressure than feed valve, and means for closing or throttling feed valve at part of stroke regulated by governor, or by hand.

◆

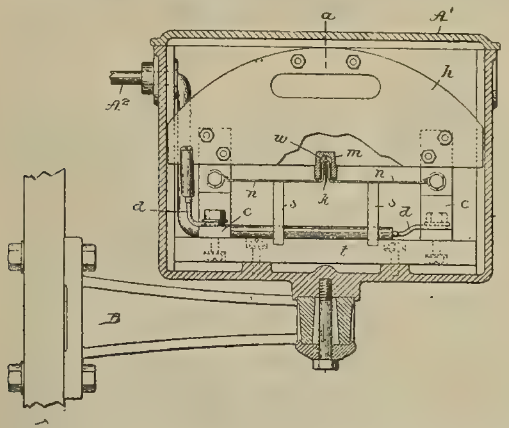
EXPANSION DRILL.—654,164; H. J. Lawrence, Elmore, Minn.



An expansion drill comprising drill stock slotted vertically at its lower end, in combination with overlapping expansible cutters formed with vertical elongated slots and oppositely inclined elongated slots, and having their upper ends oppositely inclined, and securing rivets one of which extends through vertical slots of cutters and the other through oppositely inclined slots thereof.

◆

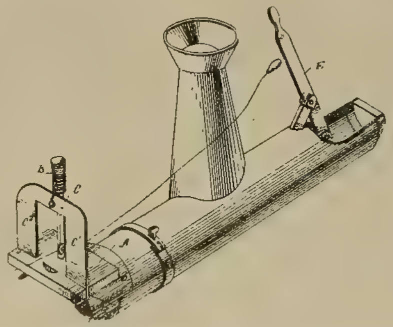
ELECTRICAL SAFETY FUSE.—No. 654,187; A. L. Stevens, New York, N. Y.



Combination with containing vessel, having means for insulated entrance therein of pair of conducting wires, terminal blocks in vessel connecting conducting wires and opposite ends of electrical safety-fuse wire, volume of oil maintained in vessel to submerge terminals and greater portion of fuse wire, fuse block m recessed to form chamber, pair of insulating clamping blocks h h supporting same, and perforated wedge partly filling recess in fuse block, recessed block and wedge operating to maintain section of fuse wire insulated and free from surrounding oil.

◆

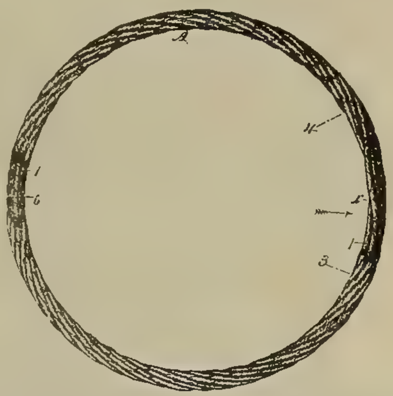
PIPE CUTTING DEVICE.—No. 654,213; J. W. Wilson, Shaner, Okla.



In pipe forming and laying device, combination of baseblock and standard thereon, cutter, spring connecting standard and cutter and normally holding cutter in elevated position, cord secured to cutter adapted to depress same against tension of spring and means for forming pipe.

◆

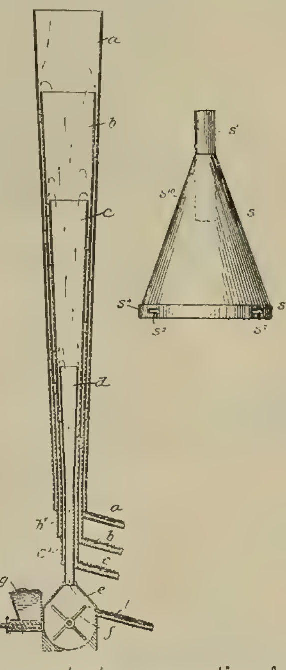
METHOD OF MAKING ENDLESS WIRE ROPES OR CABLES.—No. 654,225; A. D. Carnagy, Trenton, N. J., assignor to the John A. Roebling's Sons Co., same place.



The method of making endless wire rope or cable which consists in making form of article desired, having strands of same size and number as those of the rope or cable to be formed, and substituting for each of the outer form strands in succession, winding of strand from which the wire rope or cable is to be made and finally substituting for the core strand of the form the opposite ends of the strand which has been substituted for the outer form strands.

◆

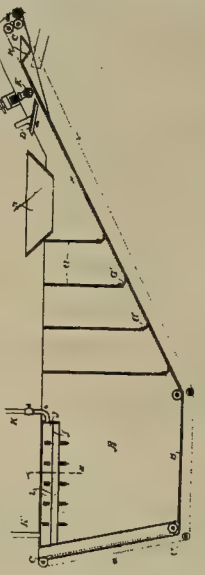
ORE CONCENTRATOR.—No. 654,290; A. H. Stebbins, Little Rock, Ark.



In an ore concentrator, supporting framework, settling chamber, supporting devices connecting framework and settling chamber, latter comprising plurality of similarly shaped separate pipes, and having gradually increasing cross-sectional area from bottom to top, each pipe extending into and part way up its next exterior pipe and below bottom thereof, agitator directly below settling chamber, communicating with central pipe of series, means for feeding ores into agitator, devices for forcing blast of air into and through agitator to lift entire mass of ores directly upward through central pipe into settling chamber.

◆

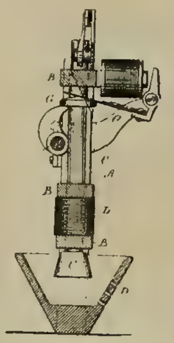
APPARATUS FOR WORKING ORES OF VALUABLE METALS.—No. 654,315; T. E. Leece, Bishop, Cal.



Apparatus for working ores, tank having endless traveling belt and directing rollers by which belt is caused to travel in close proximity with interior ends and bottom and is returned exterior to and beneath bottom of tank, means for supplying material to be operated upon to belt, overflow and separating device consisting of porous or filtered bottomed box with pipes through which vacuum or pressure may be produced within box and transverse supports against which filter or screen surface is supported from opposite sides.

◆

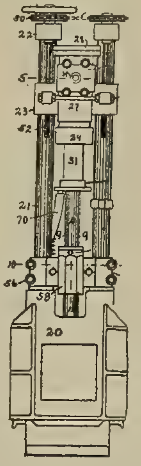
ORE STAMP.—No. 654,420; D. M. and J. E. Smyth, Pasadena, Cal.



Combination with stamp and shaft and cam for raising same, of an electro-magnet, circuit connections and switch actuated immediately before cam separates from stamp, for turning current into electro-magnet and spring intervening between electro-magnet and stamp and acted upon by armature of magnet for applying power of magnet through leverage of spring in accelerating fall of stamp.

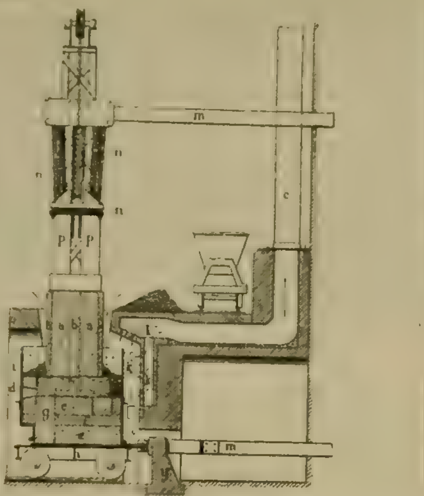
◆

STEAM ENGINE FOR ORE STAMPS.—No. 654,434; J. J. Brewis, Milwaukee, Wis.



Steam stamp, pair of cylindrical standards, bracket mounted on each standard provided with clamping device for securing it at any desired position by frictional contact with cylindrical surface of its standard, screw supported upon and parallel with each standard and engaging screw threads in brackets upon their respective standards, means for causing screws to turn together so as to raise and lower brackets uniformly, and steam cylinder supported by and clamped between brackets.

ELECTRIC FURNACE.—No. 654,463; H. Leleux, Paris, France.



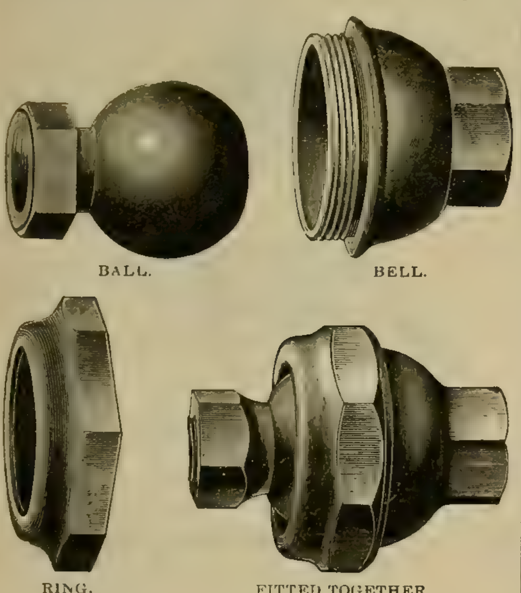
Electric furnace provided with vertically arranged electrode formed by one or more cores of carbon of high conductivity, each core being surrounded by an agglomerated mass of carbon having less high conductivity, each of these cores having its two inner faces provided with electric pad to provide large surface of contact between electrode and plates connected to lead, plates being secured against pad by wedges and keys to obtain permanent tightening whatever may be temperature of electrode.

The Moran Flexible Joint.

The accompanying illustrations show the improved Moran flexible joints—both sectional and fitted together. These consist of but three parts—the ring, ball and bell—requiring no springs or packing, and are not liable to get out of order or leak. They are of all-metal construction, flexible, tight and subject to no expense for repairs. They are used in railroad work, steam and water connections between engine and tender and steam heating connections between coaches, in permanent plants, providing for expansion and contraction in long lines of pipe, particularly in main pipe from boiler to overcome vibration or tremor and for pneumatic hoists and traveling crane connections, where either steam or air are employed. The makers consider them adapted for use in connection with compressors and rock drills, making a flexible and durable line of pipe, which will allow of any desired pressure being carried, thereby increasing the capacity of the drill and adding to its life, because of the method of applying the lubricant, viz., by simply placing a sight feed lubricator on the pipe line near the boiler and feed in when required without any stoppage, securing satisfactory result.

For dredging purposes the liquid joint makes a flexible and metallic connection for suction and discharge pipes on dredgers, through which water, sand, gravel or rock may be conveyed.

They are also used in large power plants, temporary steam lines, pumping service in mines, and are applicable to all classes of machinery requiring a flexible conveyor of gas, steam, air or liquid, and because of their compact construction can be employed on the inside of boilers, pipes, etc.



BALL. BELL.

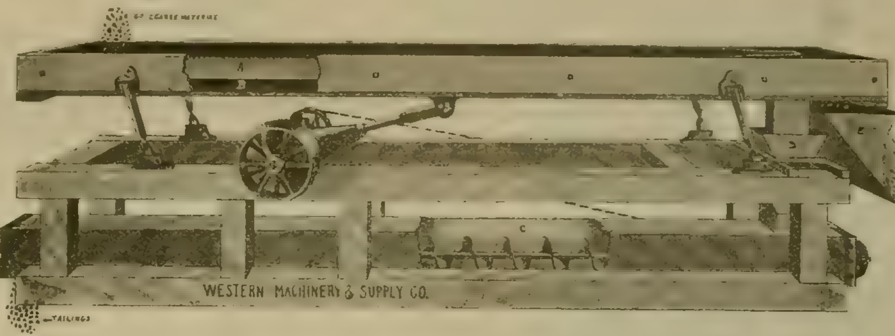
RING. FITTED TOGETHER.

Straight Flexible Joint for Steam, Air and Gas.

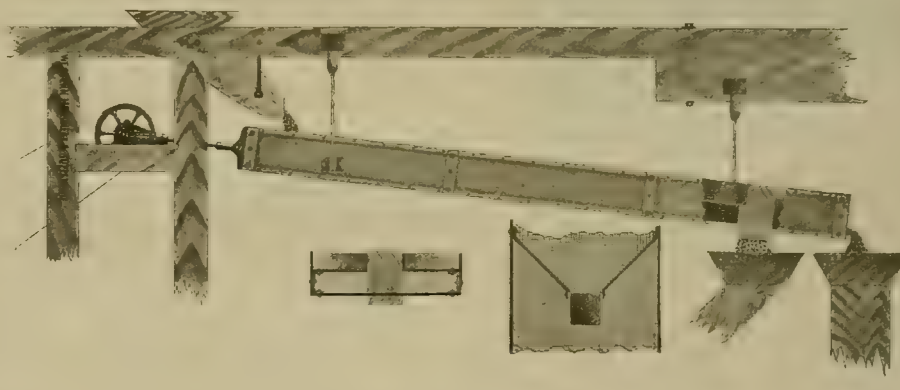
These joints are carried in stock by the Joshua Hendy Machine Works, 38-44 Fremont St., San Francisco, Cal.

Vibratory Screens.

On this page are depicted an inclined vibratory screen built almost entirely of steel. The screen is hung from the structure with a slight incline. The device may be, however, made to screen on a horizontal plane. The material drops into the screen at the head end, and, by reason of the vibratory movement given the screen by a crank running at a certain speed, immediately takes an outward movement towards the end of the screen, the distribution of the material, after separation, being arranged so that the tailings are deposited first through a small chute near the end of the screen. The fines travel onward along the floor of the screen trough and fall over the end, to be used as desired; the screen plates are adjustable.



Vibratory Screen and Separator.



Inclined Vibratory Screen.

The vibratory screen and separator is a combination of a vibratory screen and spiral conveyor, intended for use where the tailings, after they are separated from the fines, are to be returned to the crusher to be reground. The screening trough is supported by bar springs connected with the trough by pivots and at the lower end rigidly fastened to the structure, set at a certain angle; when motion is given to the screen by the crank which is placed under the center, the screen oscillates in such a manner that the material is made to travel onward towards the end. In the illustration A is the screen plate, B the floor which carries the screened material onwards towards the end of the machine. The tailings travel onward over the screen plate and fall through an opening into the chute D, and are then conveyed back towards the receiving end of the screen by the spiral conveyor C. The application of a belt to the driving pulley will operate the screen and spiral conveyor at the same time. This is accomplished by means of a sprocket on the opposite end of the crank shaft, and to which is attached a link-belt chain which, by another sprocket and bevel gears, drives the spiral conveyor. The screen may be made without the return conveyor, may be run independent of any line shaft and by means of an electric motor. Both appliances are made and furnished by the Western Machinery & Supply Co., 159-161 La Salle St., Chicago, Ill.

Some Mines of China.

A. Mathez, who went to China some months ago, has returned, and the Denver Republican states that the party he was with did not have time to go over the entire field, the Boxer insurrection compelling them to suspend operations very soon after arriving on the ground, but that he traveled several hundred miles and made a careful examination of the placers of Chai-li'rh and of a lode mine at the same place. He says that the main gulch is rich virgin ground, the Chinese being unable to work it on account of the water. On both sides of this gulch are lateral gulches above high-water level and from which a considerable amount of gold is extracted by the primitive methods of the Chinese. They do not attempt to wash the ground from the surface down, and even if they had giants they could do nothing, as the introduction of water would cause an expense not warranted by the output. The lateral gulches are worked by tunnels, seldom more than 2 feet high, with which the native operators drift on bedrock, small boys being employed in the work, who crawl into the tunnels and bring out the dirt in baskets to be washed in the stream of the main gulch. Instead of working from the bottom of the gulch, the miners commence at the top and work down, carrying the tailings up hill. The ground in these dry gulches averages about 15 cents a yard, and is worked at a profit, with all the dirt handled in this way. The current rate of wages is $3 gold a month, and board, the latter costing about $3 a month, making the total expense about $6 a month for each man. The main gulch is a good proposition for an elevator, as it is comparatively flat with a good supply of water. Mr. Mathez says that while they did not have time to make a thorough examination of the main gulch, it is known to be rich, and with the installation of a modern plant could be made to pay handsomely.

The lode mine examined has been worked successfully for many years, but the deepest workings are not more than 150 feet from the surface. One vein examined has a body of ore 18 inches wide, carrying three and one-half ounces of gold and 20% of copper. The ore is hauled by wagon or pack mules to Tien Tsin, a distance of 150 miles, at an expense of about $10 a ton. The ore is generally carried as ballast to Swansea at a very low rate, and after all expenses of mining, transportation and treatment nets about $100 a ton. The methods of the Chinese in lode mining are similar to those of some Mexicans, with the difference that instead of using a notched stick the Chinese use rough ladders, or make steps in the solid wall, carrying heavy loads of ore on their backs.

The country is entirely destitute of timber and though the mine was stoped out to the surface the crevice was left without any support whatever. They use a table that in some respects slightly resembles those in use in this country for concentration, which is worked by hand, an attendant keeping the pulp stirred up with a rake; even with this crude appliance they manage to save 80% of the value contained in the ore. Mr. Mathez says that after many years' experience in the mines of the United States, he has never seen a district where a mine could be put on a paying basis at so short a distance below the surface.

No examination of the coal and timber land was made, but Mr. Mathez went into one coal mine that is being extensively worked on a seam of 18 inches of coal, in three different veins of about 6 inches wide. The coal is reached by an incline with steps in the solid rock going to a depth of 80 feet vertically. The vein is then followed on its incline and the workings are now about 120 feet below the surface. When asked why a shaft was not sunk to the coal body, the operator replied that the cost of hoisting would be more than the coal is worth. Still, operations on this mine are conducted at a good profit. Everything in the way of mining is carried on in the crudest way. No machinery is used except the table, and the miners confine their work to the ore alone, taking as little dead rock as possible. In many places boys are employed to take out ore from veins not more than 12 inches wide.

Precipitation in Cyaniding.

To THE EDITOR :—Under "Concentrates," in the issue of June 23, 1900, appeared the following :

> The temperature of the cyanide solution has an appreciable effect on precipitation ; many cyanidists say that at a temperature of 90° F. there are better results than when it is lower.

I know there is excellent authority for this statement, but my own experience does not confirm it. Generally speaking, chemical action is more rapid in warm than in cold solutions ; but, if so with cyanide solutions, the difference is so slight that I have never been able to detect it. I have secured as good results at 33° F. as at 120 F°. With other conditions right, perfect work can be done with solutions almost freezing cold.

In the same issue is the following :

> It is the opinion of some cyanide experts that, so far as the chemical part of the process regarding the solution of gold by cyanide is concerned, there is not much room for further advance, and that whatever improvement is made will be largely of a mechanical nature. It is, however, generally conceded that in the matter of precipitation of gold from the cyanide solution there is yet much to learn.

While that paragraph might have had the weight of many authorities back of it a few years ago, the opposite of the statement is certainly nearer the truth now.

At the Schmidt & Johns mill, at Silver Star, Mont., tailings were treated from half a dozen yards in one season and royalty was paid to four different owners. Some of the tailings treated very nicely. Other piles required the utmost care and skill, and even then it was not possible to make as good an extraction as one would wish. Not only was a perfect check kept on the heads and tails of each vat, but record of the tonnage of each solution was kept, with its assay value. At the end of the season the superintendent, P. C. Waite, tabulated his records, and it was found that every dollar entering the zinc boxes had been accounted for. This is not an exceptional record. Others are making it every day in Montana. It is made by C. L. Dahler, at the Iron Rod mill, with zinc shavings on solutions from refractory, slimy tailings. The files of the MINING AND SCIENTIFIC PRESS are in evidence that it is made at the plant of the Montana Mining Co., Ltd., at Marysville. (See article by C. W. Merrill, "Notes on the Alleged Shortage in Cyanide Bullion," MINING AND SCIENTIFIC PRESS, July 8, 1899.) When a man's assays show that he should have over a third of a million dollars in his clean-ups for the season, and he has every dollar of it, surely it can not be said that he has "yet much to learn" in the way of recovering the gold from his solutions.

But how is it in other parts of the world? A letter from Alfred James of London to the writer, under date of April 24, 1900, bears directly on this point, and I make the following extended extract from it. He says :

"I have read with much interest your contribution on 'Successful Precipitation From Solutions Weak in Cyanide' to the MINING AND SCIENTIFIC PRESS of March 24th, and note you state, in a kind reference to my work, that where I would use '1 cubic foot of zinc shavings to one ton of solution passing through the extractor each twenty-four hours, less than half this amount has been in use with us in Montana the past summer.' It is just possible that in the papers I have written I did not make myself sufficiently clear when I stated that 1 cubic foot of zinc shavings to each ton of solution will treat perhaps the most refractory solutions met with in practice. We have been treating solutions containing practically no free cyanide at all—including those derived from the filter bottoms in the sluicing out of the tailings—with a practically perfect extraction, the effluent amounting to less than one grain of gold per ton, using less than half a cubic foot of zinc per ton of solution treated daily. Our boxes in normal work all over the world are designed on the basis that three boxes, each of which has six 1000 cubic inch capacity compartments filled with zinc, or 11 cubic feet of zinc in all, will treat daily forty tons of ordinary solution ; and this ratio practically applies to the whole of the Indian plants, some of which are of quite large capacity, to those in Eastern Asia, and to a large number of those in South Africa, in New Zealand, in Australia and elsewhere.

"In writing the paper to which you refer, I had particularly in view solutions resulting from the continuous treatment of weathered slimes and tailings, and thus containing a large quantity of soluble salts—at times even yielding a faintly acid test. It was asserted that such solutions could not be treated effectually with zinc in any quantity, and the particular object of the paper was to point to the mines of Johannesburg, where this solution occurred, that with two boxes in series they could treat even this solution effectively.

"As a matter of fact, the electrical precipitation process has now been displaced at the majority of the mines by zinc precipitation, with the addition of lead salt. I anticipate, however, that before long they will discover—provided they do not start the boxes with fresh zinc—that the lead salt, too, is entirely unnecessary. They have for some time past been treating slimes solutions in the Lydenburg district without the addition of any such salt."

I would say the trouble is to get enough gold into solution ; there is no trouble getting it out. Surely, there are few cyaniders but would like to make a little better extraction than they are able to. I would say there is "much room for further advance regarding the solution of gold by cyanide," and that it is reasonable to suppose that such advance will be made. I believe there can not be much improvement in the way of the mechanical part of the process. Nevertheless, there are difficulties preventing the cyaniding of certain ores and causing unaccountable losses with some material which in time, with study and work, may be overcome. There is room for improvement along this line ; but I can not see where there is possible room for improvement in precipitations when to-day everything is recovered from solutions, clean or foul, and whether containing free cyanide or otherwise. What more can one ask?

Helena, Mont., July 23. MATT W. ALDERSON.

The Gardner Process.

To THE EDITOR:—The American Copper Mining & Extraction Co. of Denver, Colo., owns the patent of the Gardner process of copper extraction, which has been tested and considerably discussed of late. An experimental plant to exemplify this method of extraction has been established here by P. M. McCaffrey. On July 23, 1900, a special test was made of 148 pounds of partially oxidized copper ore from New Mexico. After being pulverized to about 20 mesh the ore was thrown into a small vat and about thirty gallons of water turned in from an adjacent tank. Then twenty pounds of sulphuric acid and three ounces of common salt were added. After agitating the solution a few minutes a half pint of nitric acid was added, and a few minutes later about a half ounce of permanganate of potash ; and during the agitation, which was kept up for about half an hour, a considerable quantity of hot water was gradually introduced. The action of the salt changes part of the sulphuric acid to hydrochloric acid and that of the permanganate produces nascent chlorine and doubtless aids as an oxidizing element. The combination of hydrochloric and nitric acids forms aqua regia, a solvent for copper. The resultant solution was then drawn off into the precipitating tank, containing a perforated, revolving copper cylinder, the latter containing about fifteen pounds of scrap iron. The cylinder was revolved in the solution for twenty minutes, during which time the sulphuric acid, which has a greater affinity for iron than for copper, liberates the copper and takes up the iron, the copper precipitates settling to the bottom of the vat. After the liquid is drawn off the precipitate is scraped into a drying pan, dried and smelted in a small furnace and the metallic copper poured off. It is claimed the liquid, after precipitation, is returned to the solution tank, to which 15% of the original amount of chemicals is added, and that a second treatment results in extracting what may have failed to dissolve in the first treatment. The patentees and promoters of this method claim for it an adaptability to the treatment of low-grade oxidized copper ores, and that it might serve as a preparatory process to cyanide work where the existence of copper in gold ore proves a hindrance to cyanidation. W. A. SCOTT.

Denver, Colo., July 24.

Relative Heat Efficiency.

To THE EDITOR:—In the statement in the issue of July 14th that a ton of coal (2000 pounds) has 28,000,000 units of heat while a barrel of petroleum has 3,500,000, or one-eighth as many, I think no allowance was made for loss in ash and waste gases in burning coal, but allowance was made for waste in burning the oil.

My records show that a general average efficiency of coal burned direct in forges is 10% secured of the theoretical value and in burning oil about 75%, so that such a comparative statement might read like this:

A ton of coal (2000 pounds) has, theoretically, 28,000,000 heat units, 10% of which are available on work in forge fires, or 2,800,000 heat units. A barrel of 42 gallons, or 275 pounds, petroleum has a theoretical heating value of 5,775,000 units, 75% of which are available on work in forge fires, or 4,331,250 units. A barrel of petroleum is equal to a little over one and one-half tons coal. W. J. BROWN.

Philadelphia, Pa., July 19.

"Whin" and "Quartzite."

To THE EDITOR:—"Concentrates" recently defined "whin" as a local name for quartzite, while R. B. Symington of San Francisco claims the name for igneous dyke rocks. Both appear to be right, as the term is differently used by different people, and the Standard Dictionary states that "whin" or "whinstone" is a local British word, applied to "any hard, dark-colored rock," as "basalt, chert or quartzose sandstone." W. J. S.

Marysvale, Montana, July 23.

Deep Mining at the Utica Mine, Angels, Cal.

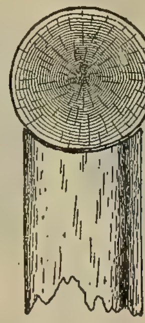
In the issue of Oct. 7, 1899, appeared an illustrated article, with the above caption, read by J. H. Collier, Jr., of Berkeley, Cal., at the Sept., 1899, meeting of the American Institute of Mining Engineers in San Francisco, Cal.

In discussion thereof, F. H. Probert, Neudorf, Anhalt, Germany, in a communication to the secretary, says: I have read with much pleasure Mr. Collier's valuable paper. But the system of timbering which he describes as used in the levels, stopes, etc., though it must be admitted to be very strong and safe, seems to me somewhat extravagant. The amount of timber required every month for such a system must be enormous, and only where suitable material could be cheaply obtained would such a plan be economically practicable.

The first point which strikes me is the unusually great diameter of the timber employed.

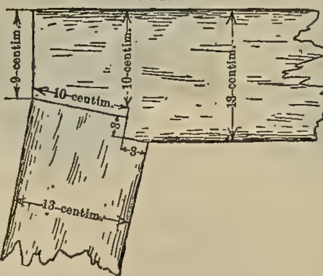
In the mines of Pfaffenberg and Meiseberg, which are under my supervision, the country rock consists of argillaceous slates, traversed by innumerable small fissures or joints, dipping at all angles and striking to all points of the compass. Undoubtedly this network has been caused by the upheaval of granite masses in the vicinity. Each fissure is accompanied by a more or less well-defined gouge or fluccan, caused by the rubbing together of the slates at or after the original disturbance. In such a mine the timbering must be of the very best quality and design; but we are compelled to exercise economy in this respect. It is often necessary to timber a level, both at the top and on both sides, for from 150 to 200 meters. Thurstock timbering, supplemented by poling, is our general method. The posts are either round or rectangular, and seldom more than 20 to 25 centimeters in diameter. The foot of each post is set firmly into the floor of the level, or, when no sound footing is obtainable, sills are used. The caps are also either round or square, and of about the same diameter. When the roof alone needs support, we simply cut a shallow curved notch in the top of the post to take the shape of the cap (see Fig. 1); but when both the roof and sides of the level are insecure, we cut the timber as shown in Fig. 2. This part of the work is all done underground. The posts and caps, having been sawn on the surface into the previously measured lengths, are then sent to the working place, and the timbermen, kept exclusively for this work, cut the notches and fit them together. Such men are paid at the rate of 2.50 marks (about 62 cents) per shift of ten hours, or, whenever practicable, by contract, according to work done.

FIG. 1.



Post and Cap to Support Roof Only.

FIG. 2.

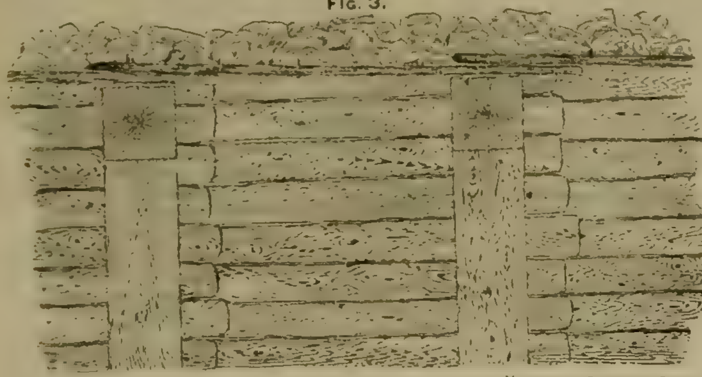


MINING AND SCIENTIFIC PRESS.

Post and Cap to Support Both Roof and Side.

In very loose ground, poling is resorted to. Here again I am compelled to think that the poles used at the Utica mine are unnecessarily bulky. Our poles rarely exceed 2 meters in length and from 15 to 18 centimeters in diameter. They are made of pine, which is found to be very good for the purpose. When we encounter running ground, posts and caps are set up about 1 meter apart, and the whole ground is made secure in the manner described by Mr. Collier, the only difference being that we use oak laths instead of poles. These laths are from 10 to 15 centimeters wide, 4 to 5 thick and 80 to 120 long. One end is sharpened to allow it to be more easily driven into its place by blows from a hammer. The man who superintends the hydraulic pumps makes such laths in his spare time at so much a hundred. This system of timbering is shown in Fig. 3.

FIG. 3.



MINING AND SCIENTIFIC PRESS

Poling with Oak Laths.

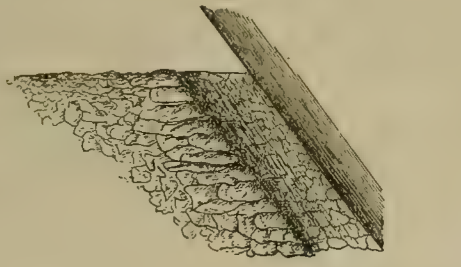
It is calculated that each running meter costs 15.70 marks (about $3.90), as follows:

	Marks.
Timber, 13 centimeters wide, 16 broad and 5 meters long, cut into lengths of 2.2 and 1 meter	4.00
Wages for cutting this from the rough by hand saws	.70
Poles (75 pieces required for every meter of level)	4.00
Wages for cutting these poles	2.00
Wages of two timbermen	5.00
Total	15.70

For the permanent timbering of levels, oak is used wherever possible. It lasts from ten to fifteen years, whereas pine lasts only four or five years, so that, in the long run, oak is more economical. It is found, however, that where there is much water, pine is better. For the temporary timbering of stopes, pine is almost always used.

In the stopes, I am of the opinion that much more could be done with the "deads" than is set forth in Mr. Collier's paper. If I understand his account, it implies that a great quantity of such material is obtainable from the driving of levels and the development of the ore bodies. Here in the lower Harz mountains we make use of these "deads" in many ways. Instead of using timber to make ore chutes and manways, we employ two men to select the largest and best pieces of waste rock and to build with these to the required height, as the stope is raised, the necessary chutes. (See Fig. 4.) These men are paid 1.30 marks (about 33 cents) per square meter of walling. The chutes require practically no repairs, and are absolutely solid if properly built. No cement of any sort is used.

FIG. 4.



MINING AND SCIENTIFIC PRESS

Construction of Chutes with Waste Rock.

Again, the miners themselves have to sort all the rock and put the ore into the chutes. The "deads" are stacked up in the form of a wall to support any loose ground, the fine stuff being used to make a good floor for the stope. Should a mass of rock become loose, it is immediately secured by the miners with a post and cap, until it can be supported by "deads," when the post is withdrawn, so that practically no timber is lost. As the stopes are worked out, the space below is filled with "deads." We find this much cheaper than putting in square sets and then filling in with "deads."

* * *

COMMISSIONER HERMANN of the General Land Office has decided to continue for a reasonable time the suspension of about fifty whole townships in Los Angeles, San Francisco and Visalia land districts in California from disposition under the agricultural laws on representations that they contain valuable oil deposits. A thorough inquiry into the true character of the lands is now in progress. Petitions and sworn protests have been filed with the General Land Office setting out that vast areas of non-agricultural lands in California have every indication of containing valuable deposits of oil. The land office last February ordered the suspension of these townships in view of the controversy over their value as oil lands. The action is in line with a recent decision of Judge Ross of the United States Circuit Court for the Southern District of California affirming the right of forest lieu selection scripholders to file on land not legally known to be mineral, regardless of placer mining locations. This was a test case, one of the many similar cases pending where forest lieu selection was made on land alleged to be oil land and therefore reserved for disposal under the mining laws exclusively.

Qualitative Tests for Boracic Acid.

TO THE EDITOR: It seems not to have occurred to the authorities on this subject to test the effects of the distilled alcoholic vapors on tumeric paper. We find by repeated experiment that if applied in the following manner the presence of boracic acid in a mineral borate is rendered more certain and delicate, especially when in traces only.

Boil vigorously in a test tube—about 2.5 centimeters diameter and 20 centimeters long—a few cubic centimeters of wood alcohol (common alcohol will do also), to which a decigram (.10 gram) more or less, of the mineral pulverized, and about one-half cubic centimeter of muriatic acid have been added. While boiling hold the moistened end of a strip of tumeric paper in the vapors near the mouth of the test tube. Much boracic acid will begin to color the tip of the paper red very quickly, and a little only after boiling down awhile. Muriatic acid, in the absence of borates, finally produces a dirty grayish brown color. Now, if the paper is dipped and agitated in a little water to which a few drops of ammonia have been added, the paper, where effected by the vapors, will turn purple to deep blue, according to the amount of boracic acid present. The contrast with the red color produced by ammonia on the unaffected parts is very marked. WADE & WADE.

Los Angeles, Cal., July 28.

The Cost of Testing a Mine.

Several inquiries have been received from eastern persons regarding the probable cost of the examination of mining properties, and leading brokers report that they are constantly in receipt of letters, asking for information on this matter. In many of these cases the writers exhibit a remarkable ignorance of what is required of a mining engineer in the examination of a mine. One broker was asked to employ a competent man at an expense of not to exceed $50 to examine a placer mine in the western part of Routt county containing nearly 2000 acres. As traveling expenses would amount to more than twice that sum, no one has yet been found willing to go, and in an examination of a placer property recently concluded, an expert was on the ground nearly six weeks in arriving at an approximate conclusion regarding the value of a tract of 2500 acres.

The expense of examining a mine or prospect varies greatly, important factors being the character of the property, the character and extent of the ore body, the amount of development, the distance to be traveled, the modes of conveyance and the eminence of the engineer; for prospects with trifling development the charges of engineers are comparatively light, but for mines which have large bodies of ore exposed an examination frequently runs up into thousands of dollars, as besides the fee of the engineer, numerous assays must be made, assistants are required to aid the engineer, and frequently many tons of ore must be run through a testing plant to determine the best methods of treatment. Less than two years ago the examination of a large mine in this State involved the making of 1100 assays at a cost of more than $1500, and the treatment of 500 tons of ore. In addition to these expenses must be taken into account traveling expenses, hotel bills and incidentals, such as the purchase of necessary tools, the employment of extra labor, etc.

Average engineers expect to receive as fees not less than $25 a day and expenses. This is not extravagant, as few even at that figure make more than an ordinary professional income during the year, while many are fortunate if they net the average wage of a bookkeeper. Engineers of established reputation make much higher charges. There are several engineers in this State who will not look at a mine for less than $1000, and many instances can be cited in which the engineer's fee, exclusive of expenses, was as high as $3000. This class of expert engineer, as a rule, declines to examine anything but developed mines, or make general reports covering large areas of mineral territory, which include geological and topographical features, water supply, engineering possibilities and matters of that kind, which require exceptional skill and experience. On the other hand, there are in this city not fewer than 100 good engineers who will make examinations of small mines and prospects for $100 to $500 and expenses, dependent upon the distance from Denver and other factors mentioned. Large mining syndicates usually employ their engineers by the year and pay large salaries. Several Denver men receive $10,000 a year with the privilege of making outside examinations, and one Colorado man in the employ of a London syndicate receives an annual income of about $50,000 as consulting engineer for several companies. To make the trip to Routt county, mentioned above, would require $1000 for a competent engineer, $200 for traveling expenses, $125 for hotel bills, and the wages of two men at $2.50 to $3 a day for six weeks. The engineer could probably be secured for $25 a day, and by increasing the force of laborers so as to cover the ground more rapidly, the total expense would be materially reduced, but in that case it might be necessary to employ an assistant to the engineer to enable him to keep his record of extraction up to the work of the men digging the pits.—Denver, Colo., Republican.

Jasper R. Rand.

J. R. Rand died at Montclair, N. J., July 18th. He was born September 17, 1837, in Westfield, Mass.

His earliest business connection was with his father, who was a manufacturer of whips, when Westfield was the headquarters of that industry. In 1865 his father retired from business, and Mr. Rand and his younger brother, Mr. Addison C. Rand, succeeded him. In 1870 he removed to New York and was for a time associated with another brother, Mr. Albert T. Rand, president of the Laflin & Rand Powder Company. In 1872 Mr. Addison C. Rand began the manufacture of the Rand rock drills and other mining machinery, and the two brothers subsequently organized the Rand Drill Company, with Mr. A. C. Rand as president and Mr. J. R. Rand as treasurer, which arrangement continued until the death of Mr. A. C. Rand in March, which left the chief office vacant, when Mr. J. R. Rand was elected to the position. He leaves a widow, a daughter and a son, the latter now representing the Rand Drill Company in Paris.

California Debris Commission Report.

The annual report of the California Debris Commission has been submitted to General John M. Wilson, chief of engineers, and has been made public by him.

It is shown that the amount of money expended in this work during the past fiscal year was $12,591. The commission has, since it organized, received 474 applications to mine. Three hundred and sixty-seven permits have been granted. Thirty-seven permits have at different times been temporarily suspended, generally on account of neglect to comply with instructions concerning the impounding works or on account of accident to those works. One hundred and forty-five permits have been revoked since the organization of the commission, in most cases because the mines have been worked out or abandoned or changed hands.

The commission has been informed by the proprietors of three mines working under permits that their operations were stopped during the year by injunctions issued by the court of Sutter county. When the first case of this kind occurred the commission requested instructions as to its duty in the premises, and the attorney-general held that as there appeared to be no question raised as to the validity of the permit issued by the commission it was not expedient for the commission or any department of the Government to intervene in the suit. Accordingly the commission has taken no action in these cases.

The report states that the total amount mined under permits during the year is estimated at 1,500,000 cubic yards.

No plans for the improvement of the San Joaquin river have been made by the commission for the reasons that this stream is but slightly affected by mining debris and its improvement is under the charge of the engineer officer in whose district it is located. A former report to Congress by the commission relative to its investigations as to sites for restraining dams or works in the Yuba river is briefly referred to. These proposed plans for the improvement of this stream contemplate the construction of various works. It is estimated that the total cost will be $800,000. There is now available $500,000 for this purpose. The fact that the amount thus available is not equal to the estimated cost of the proposed works has caused some uncertainty as to the possibility of beginning work until further appropriations are made. Full illustrated description of this work was given in the issue of June 23, 1900.

MINING SUMMARY.

ALASKA.

The latest rush is from Juneau and Douglas Island to Glacier Creek district, above Juneau, on a direct line between Sheep creek and Berner's bay.

Gloomy reports come from overdone Cape Nome, where exists sickness and suffering and a prospect of worse.

A stampede is reported from Dawson and Circle City to the Tanana, where 40 cents to the pan is reported.

Letters dated July 22d say that 1000 men had left Nome during the preceding two weeks for the placer district of Kougarok, a tributary of the Kusetreim river, which latter feeds a series of small lakes at the head of Grantley harbor, Port Clarence. All that interior country is a chain of rivers and creeks.

One hundred and fifty miners have been arrested at Topkuk after a clash with the soldiers, who charged the miners with fixed bayonets. The arrested men are under guard by soldiers, who have sent for additional help and a Government vessel. The whole of the Topkuk region is reported in a turmoil. The trouble arose over the tundra claims owned by the Alaska Commercial Co. The miners claimed that they were part of the beach diggings, overpowered the civilian guards and went to work on the disputed ground. The soldiers ordered the men off. They went, but immediately returned. The soldiers were again called out, but the miners refused to go, when they were arrested.

ARIZONA.

COCHISE COUNTY.

The Black Diamond group of claims in the Dragoon mountains is reported sold for $40,000 to C. J. Faulkner, W. Kellog and J. T. Devine of Washington, D. C., N. O. Bagge and J. A. Bain of New York, who have formed the Black Diamond Copper Co. to develop the group. They talk of a branch road to connect the Southern Pacific, 18 miles.

A copper group and extensions in the Dragoons, formerly owned by Bryant & Casey, have been bonded for $100,000 to W. H. McKittrick of California and Ryan Bros. Cattle Co., Arizona.

It is understood that the Commonwealth Co. will have their new mill up at Pearce and 100 stamps pounding by Jan. 1, 1901. The insurance has been adjusted and the debris cleared away.

F. Fenner, Supt. Lowell and Arizona, is putting in new machinery. The shaft will be sunk to a depth of 1000 feet.

GILA COUNTY.

At the Black Warrior mine, near Globe, owned principally by J. A. Fleming, the leasing plant is completed a month and is in operation by the leaching process—the largest leacher in that country.

MARICOPA COUNTY.

The Octopus group of mines near Wickenburg is reported bonded by J. L. Dougherty to A. A. Wadsworth for $100,000.

MOJAVE COUNTY.

The Connor-Minnesota mines are reported sold by J. Barry to the Wallapai M. Co. of Chloride. Included in this sale was a 100-ton concentrator, steam hoist, buildings and equipments. The purchasers are Los Angeles men. The sale was made through E. T. Loy.

At Kingman the deep pay chute on the Midnight is to be worked by leasers till Jan. 1, 1901.

Supt. H. B. Clifford of the Dragoon M. Co. is working fifty men at Johnsonville.

Kingman Miner: Recently a cave in the 110-foot level of the Merrimac mine, at Chloride, exposed a large body of rich ore. At the 250-foot level a bulkhead has been removed and the ore was found to extend to that level. This gives the Merrimac Co. nearly 200 feet of stoping ground.

The Tennessee mine at Chloride is to resume operations on a larger scale. More men will be put on and the ground between the 400 and 500 levels exploited.

PIMA COUNTY.

D. Allen of Washington Camp is reported about to close the sale for his Pool group of mines for $100,000.

The Helvetia copper mine, near Tucson, controlled by Calumet & Hecla people, is reported to be in copper ore, some of it native copper; the deposits average 15%. It is stated that the capacity of the furnace will be increased to 300 tons. A branch from the Southern Pacific is to be built.

YAVAPAI COUNTY.

A. N. Bartholdi has sold his interest in the Bartholdi group for $5000 cash and 4000 shares of stock in the I. F. M. Co. of New York. The group is in the Black Canyon district, 8 miles south of Jerome. They are copper claims. The International Financial Co., incorporated in New York, is the purchaser. A branch of that company will operate under the name of the Verde King Copper Co.

CALIFORNIA.

AMADOR COUNTY.

Supt. Parks of the Kennedy and Eureka Con. mines, near Jackson, says that the exodus of miners from Amador has seriously interfered with development work in the mines of that county, and that the same condition of affairs exists in the mines of Calaveras and Tuolumne counties.

The Record at Sutter Creek reports that at the Fremont Consolidated Supt. Purrington is preparing foundations for new hoist and head gear.

At the Bunker Hill Consolidated Supt. Downs has the shaft unwatered and retimbered to a depth of 540 feet.

Supt. Pritchard is operating the Keystone mine.

Supt. Tregloan of the South Spring Hill expects to start up some stamps on good ore.

From the Lincoln mine forty tons of ore are daily hoisted from the 500-foot level and crushed at the South Spring Hill mill.

At the Wildman-Mahoney mines it is expected that the east or Emerson shaft will be started again, that a connection can be made with the lower levels.

At the Central Eureka mine Supt. Thomas has the new ten stamps operating by electric power furnished by the Standard Electric Co. on high-grade ore.

In the South Eureka a new steam hoist, built by Knight & Co., is now in position.

Supt. Truscott has the Oneida 60-stamp mill nearly finished. It is expected that part of the mill will be ready to start up this month.

In the Kennedy mine the east shaft is down nearly 1400 feet; sinking goes on at the rate of from 80 to 100 feet per month. The 40-stamp mill is crushing the usual amount of ore.

In the Gwin mine Supt. McClure has on the 1600-foot level a vein of 27 feet, averaging $10 per ton.

CALAVERAS COUNTY.

About thirty men are at work on the Melones dam at Horseshoe Bend, on the Stanislaus.

Five miles southeast of Valley Springs is the Slate Creek mine, owned by Colville & Co. There is a small stamp mill running. Along the vein are the Vote, Alex Brown and Eproson, Beckley, Tilford, Dean and other mines.

In the Ford shaft, retimbering from the 100-foot level to the surface is going on, preparatory to letting a contract for sinking 200 feet.

The water supply in the Utica Co.'s system is falling off rapidly. The snow has disappeared from the higher mountains, and little water is finding its way into the reservoirs. A large head is turned into the ditch from the Silver Valley reservoir; but the evaporation is great, and only a small percentage reaches Angels.

Near Angels the Ghost mine is unwatered and the shaft clear to a depth of 1000 feet. Wm. Bravin has charge.

The assessment on the Utica G. M. Co. of $501,625 has been reduced to $434,125. The assessment of the Royal Con. is reduced from $228,860 to $178,860.

EL DORADO COUNTY.

Drew, Cohn and Donnelly have men at work on the river bed mine at Salmon Falls, where that section of the river worked has been dammed.

The Two Channel M. Co. contemplates development work of the Wilton, near Josephine.

The Nugget says work has been suspended temporarily at the Gold Bug mine, near Georgetown.

The Kimble mine, south of Placerville, is employing thirty-one men. About 120 carloads of gravel are put through the mill during the ten hours it runs each day.

In the Mt. Pleasant mine, near Grizzly, the water is now below the 600-foot level. It is expected that the mine will be free of water by Sept. 10, when the new owners, Brown Bros. of Oleta, will begin thorough exploration.

J. H. Bradley, Supt. Omo mine, says the 10-stamp mill started up this week.

W. H. Martin has sold to A. Hayward the Superior mine at Placerville for $15,000.

HUMBOLDT COUNTY.

The Blue Lakes Advocate says: "The Orleans Bar G. M. Co. have commenced mining in earnest."

The Crescent City News says the Orleans Bar G. M. Co. has brought the water onto the bar 12 miles in a 5-foot flume, at a cost of $50,000. The mine is in operation with 800 inches of water and can be run all summer.

INYO COUNTY.

The Ballarat G. M. Co. has incorporated in Salt Lake City, Utah, $500,000 capital stock; C. M. Freed president, C. W. Freed vice-president, L. D. Freed treasurer, G. H. Lowenstein secretary. Work on the property will soon begin. It was sold for $50,000 to the company by P. J. Ginser, the locator. A mill run gave $280 from ten tons. The company projects building a 20-stamp mill.

F. Mathews reports that to avoid delay 250 pounds of powder was taken by his party into camp, but the entire lot exploded, leaving them without any combustibles to work with.

Inyo Independent: Last week Cooper's little 4-stamp mill in Pleasant canyon, near Ballarat, yielded a cleanup of 3¾ pounds gold bullion from the owner's mine. The fineness of the bar is remarkable, being worth $18.50 per ounce, but the shipment before assayed at the rate of $19 per ounce.

KERN COUNTY.

Near Bakersfield the San Joaquin Company has ordered a steel storage tank, 97 feet in diameter, 30 feet deep, to hold 37,000 barrels.

LOS ANGELES COUNTY.

The Temescal ranch of 14,000 acres, situated partly in Ventura and partly in Los Angeles counties, has been bought by Los Angeles oil men for $400,000, and drilling for oil will be begun as soon as possible. The land adjoins the holdings of the Modello Oil Co., controlled by the Crockers.

MARIPOSA COUNTY.

L. E. Aubury of Los Angeles is operating the Roma and Sierra Rica mines on Bear Creek.

MONO COUNTY.

A. J. McCone has a contract for construction of a stamp mill at Lundy.

NEVADA COUNTY.

In the Erie mine, Eureka district, forty men are now employed by Supt. Turner at Graniteville. The new 20-stamp mill is approaching completion under the direction of G. A. Nihell.

PLACER COUNTY.

The Prairie Flower quartz mine at Canada Hill has a 5-stamp mill running steadily. Twenty men are employed.

A plan for the reorganization of the Pioneer G. M. Co. has been agreed upon by the directors—the same as that upon which the stockholders voted at Helena, Mont., May 31st, except that it provides that 20 cents instead of 25 cents be paid by present stockholders for having the stock of the present company exchanged into the stock of the new and that 30 cents more may be called later.

Colfax Sentinel: W. Muir, Turkey Hill mine, Michigan Bluff, has thirty men at work in the old Weske channel, and men are developing the Sacramento mine at Forest Hill.

PLUMAS COUNTY.

Near Johnsville the Jamison M. Co. is employing fifty men in the mill and mine. About the same number are employed at the Four Hills mine, 6 miles from Johnsville. The 10-stamp mill on this property is running steadily. The owners propose to erect a larger mill.

F. F. Vanzini, at the Eureka mine, has fifteen men at work extracting and milling ore.

At La Porte, Manager Holgate of the Dutch mine has taken charge. The Thistle Shaft Co. is boring on the property.

J. Rosenthal has bought copper mining properties on the North Fork of Feather river, near Meadow View, from McMillan & Boyden.

SANTA BARBARA COUNTY.

The Fithian ranch, Carpenteria, 3000 acres, has been leased for oil by the Northern Con. Co., who have erected a 75-foot derrick. The hole will be started with 11-inch casing and will be sunk 2000 feet.

The Santa Barbara Herald asks that this shall be believed: "The people of the Oxnard Oil Co. at Summerland had an oil well completed for the pump last December. Up to a month ago it pumped well. At that time it was sand pumped, but when there was an attempt made to pump again it was found that the well had commenced to flow, and that the production by the natural method was greater than by the pump. The oil does not run out of the casing in a steady stream, but comes in jerks, just like the flows of a pumped well. The tide of the oil ebbs and flows with the same rhythm as the tides of the pumped wells near by."

SHASTA COUNTY.

In the Bully Hill the ore body has been found in the lower tunnel, in 1100 feet, 50 feet less than was expected.

Austin H. Brown, Supt. at Bully Hill, expects part of the new machinery by Sept. 1. The copper smelter will have a capacity of 2000 tons per day.

SIERRA COUNTY.

Work has begun on a ditch from the Middle Fork of the North Yuba to Downieville for supplying mining companies.

SISKIYOU COUNTY.

The Black Bluffs mine, Fool's Paradise mining district, 10 miles north of Yreka, has been sold to Baker & Jewett, owners of the Cherry Hill mine.

Grant, Taggart & Dennison, at Salmon Summit, have twelve men at work on the Yellow Cat. The ledge ranges from 1 to 4 feet in width and assays $30. They are getting in machinery.

The dredger in Yreka creek at Hawkinsville is lifting gravel from bedrock, 30 feet below the surface. Large boulders are broken with giant powder.

The Searchlight says the DeLamar smelter, at Bully Hill, will be completed Jan. 1, 1901.

STANISLAUS COUNTY.

Near Grayson, E. P. Newhall is developing a quicksilver property; on the Summit quicksilver mine, on Red mountain, Adobe valley, he has a double track tunnel in 600 feet. He is said to be backed by Alvinza Hayward. It is believed that big mines will eventually be developed.

TRINITY COUNTY.

Mineral Wealth considers the Chloride-Bailey mine of Dedrick, on Canyon creek, 14 miles above Junction City, the most promising quartz mine of the county. The group comprises twenty-six claims, besides 160 acres of placer ground on Snowslide gulch, which will constitute the future millsite of the mine. The principal work has been done on the Chloride proper; sinking goes on from the 660-foot point, to be continued for 1000 feet with drifts every 100 feet. Three eight-hour shifts are worked.

The Wallace & Mahoney placer mine has operated nine seasons under the present ownership, a half acre being worked away per year. It yields upwards of $20,000 per acre, but is an expensive mine to work on account of the big boulders encountered. The powder bill the past season was $2000.

On the East Fork of the North Fork of the Trinity at the Lone Jack, owned by Day Bros. & Balch, a $10,000 tunnel is being driven through hard rock; it has half its length, 300 feet, still to run.

The Yellowstone is being developed by its owner—R. A. Skinner. The last big run turned out $7700 from 700 tons. Some low-grade rock—$3 to $5—is still in the stopes.

TUOLUMNE COUNTY.

J. J. Lawrence is the new Supt. of the Crystalline mine, near Jamestown. He has men grading for the new double-compartment vertical shaft.

Magnet: Acting under instructions received from London, Supt. Gerrans discharged the men employed at the Tarantula mine and closed down operations.

The shaft at the Bown mine is down 650 feet.

The machinery is being taken out of the Lady Washington mine, Carters.

At the Pompey mine, 4 miles west of Rawhide, the shaft is down 160 feet.

Near Jacksonville the 10-stamp Mammoth mill is running twenty-five tons from the Republican mine daily.

Work is to be resumed upon the Willette mine.

The machinery is set up in the new mill at the Clio mine. The hoist is completed. E. Fitzgerald has been appointed foreman.

Peterson, Conlin & Pownall have finished a survey for a 900-foot tunnel into Bald mountain, west of the Hilton & McPherson mine, to tap the Over property.

The Sonora Independent says the Bonita mine, north of the Providence, owned by Chas. Fair, will start operations.

COLORADO.

CLEAR CREEK COUNTY.

Near Idaho Springs the Kokomo mine on Seaton mountain has 3 feet of ore that runs $150 per ton. Forty men are employed; the mine ships a car of 25 tons a day to the mill at Dumont.

CUSTER COUNTY.

(Special Correspondence).—The Hermet Lake Copper M. Co. have recently equipped their property with machinery for mining and milling. It is situated

The following table gives the gold, silver, lead and copper production of Colorado during 1899, as compiled by Harry A. Lee, commissioner of mines for Colorado:

County.	Gold value.	Silver (coinage value).	Lead value.	Copper value.	Total value.
Arapahoe..	$ 268 71	$ 1 19	....	....	$ 269 90
Archuleta...	103 35	25 62	....	....	128 97
Boulder ..	547,858 35	45,501 84	$ 1,253 52	$ 13,879 50	608,493 21
Chaffee	216,662 94	87,784 58	53,330 41	122,695 21	480,473 14
Clear Creek.	546,824 85	895,427 82	322,566 82	51,591 31	1,816,410 80
Conejos ...	6,263 01	13,695 65	....	....	19,958 66
Costilla .	806 13	75 07	....	....	881 20
Custer	1,054 17	3,577 18	37,409 16	162 54	42,203 05
Delta	206 70	5 96	....	....	212 66
Dolores	66,846 78	153,151 59	91,466 57	7,838 03	319,202 97
Douglas ..	82 68	14 30	....	....	96 98
Eagle.......	46,094 10	26,449 35	53,100 47	1,034 76	126,678 68
Huerfano	124 02	2 98	....	....	127 00
Fremont..	9,404 85	2,367 70	511 50	1,179 52	13,463 57
Gilpin ...	1,996,060 56	202,960 46	58,660 35	182,689 84	2,440,371 21
Grand......	124 02	7 75	....	....	131 77
Garfield .. .	723 45	10 13	....	....	733 58
Gunnison	70,112 64	79,231 27	62,550 32	8,133 35	220,027 58
Hinsdale. ..	38,342 85	92,886 41	472,584 18	8,747 94	612,561 38
Jefferson. ..	1,364 22	209 13	34 42	44 73	1,652 50
Lake.......	2,196,497 55	4,307,704 30	2,172,362 78	1,137,576 94	9,814,141 57
La Plata	25,672 14	1,883 92	141 97	37 16	27,735 19
Larimer. ..	2,067 00	80 43	....	435 67	2,583 10
Las Animas.	206 70	1 79	....	....	208 49
Mineral	91,671 45	2,262,192 42	253,769 14	3,561 27	2,611,194 28
Montrose..	723 45	27,477 70	....	13,208 56	41,409 71
Mesa	124 02	2,454 70	....	818 87	3,397 59
Montezuma.	15,419 82	135 25	....	....	15,555 07
Ouray......	1,694,940 00	1,397,862 39	337,770 45	53,741 67	3,484,314 51
Park.......	153,040 68	42,979 22	124,175 95	1,391 72	221,587 57
Pitkin......	52,233 00	2,477,778 23	1,137,989 59	3,407 71	3,671,388 62
Rio Grande.	19,202 43	1,619 38	73 08	59 17	20,954 06
Routt......	11,554 53	757 26	152 20	....	12,463 99
Saguache...	3,885 96	8,523 51	19,716 95	6,219 68	38,346 10
San Juan...	996,273 33	710,108 40	715,721 96	210,908 10	2,633,011 79
San Miguel.	1,376,704 68	719,961 74	175,174 07	28,218 09	2,300,058 58
Summit....	260,566 02	157,810 74	180,249 67	11,540 01	610,166 44
Teller......	16,058,564 34	49,033 74	....	48 43	16,107,646 51
Totals....	$26,508,675 57	$13,771,731 10	$6,170,765 53	$1,869,169 78	$48,320,341 98

about 11 miles from Silver Cliff, in the Sangre de Christo range. The water supply is from Hermet lake, and is conveyed to the mine and mill through an 11-inch pipe line, 2700 feet iong. The mine is opened through a tunnel 350 feet long, which cuts the vein at right angles. The ore is transported from mine to mill over a gravity tramcar line. The mill has a capacity of sixty tons per day, having twenty stamps, a 10x22-inch Blake crusher, four Frue and four American concentrators, all of which are operated by a 24-inch Hug wheel, under 400 feet pressure. The ore is a native copper, contained in red trap rock. This property is owned by Boston people and is under the management of W. J. and W. S. Elmendorf. The equipment was supplied by the Hendrie & Bolthoff Mfg. & Supply Co., and was set up and buildings erected under the direction of W. C. Stanley of Denver.

Silver Cliff, July 27.

DOLORES COUNTY.

At Rico the old milling plant will be fitted up with machinery for the treatment of zinc ores.

Later advices say that the New Jersey Zinc Co., working the Atlantic Cable group, has abandoned the property, believing the ore is not rich enough to warrant a mill. Manager Dwyer has gone to Leadville. The owners of the property claim that the zinc ore from the Cable property has been found better than was expected.

EAGLE COUNTY.

The town of Gilman, of 600 inhabitants, and the center of the mining industry of the county, was destroyed by fire on the 1st inst.

FREMONT COUNTY.

W. B. Milliken, manager Union Construction Works, Florence, says the new plant will start up about Sept. 1 with a capacity of 250 tons per day.

The Florence M. & R. Co., a new corporation, with a lease on the Cripple Creek Beam M. Co.'s plant at Florence, is making extensive improvements on the property. It is being changed from an amalgamation and concentration plant into a concentration and cyanide mill. This mill was built several years ago, but was not successfully managed, and $50,000 worth of machinery has been standing idle for some time.

GILPIN COUNTY.

(Special Correspondence).—An electric locomotive will soon be in use transporting ore from the lower levels of the Cook mine, through the Bobtail and Bates Hill tunnels, to the Boston & Denver mill at Blackhawk.

The Jennie Blanche, at the mouth of Four-mile canyon, will be developed by a company of lessees of Denver.

The National mine, on Quartz hill, near Central City, is now under bond and lease to H. P. Lowe of Denver. The National shaft, 400 feet deep, is half full of water. It will be unwatered and sunk to 600 feet depth.

Jenkins, Lightborn & Co. are operating the Peterson 15-stamp mill in Lump gulch and the Daisy mill at Perigo. Both run on the ores from the Gold Dirt mine.

Central City, July 29.

The Gilpin G. B. P. & M. Co. has organized, capital stock $100,000, at Central City, to placer North Clear creek.

The Gilpin & Boston G. M. Co. sent eight tons of tailings, the product of eight cords of ore, to the Gilpin mill at Black Hawk, which sold for $28 per ton. The ore cleaned up three ounces gold per cord on plates.

GRAND COUNTY.

(Special Correspondence).—The Copper Chief has been purchased by E. J. Hagerman of Colorado Springs and F. Whipp of Cripple Creek, who have a force of ten men at work developing the property. A shipment of fifty tons of ore was made which ran as high as 40% copper. Other shipments are to be made soon.

Sulphur Springs, July 27.

LAKE COUNTY.

At Leadville men are buying lots in the city limits to locate mining work.

The Penrose shaft of the Home M. Co. will be sunk a farther distance of 80 feet.

The Carbonate Chronicle says several hundred tons of manganese daily are moving from Leadville to the Illinois Steel Works.

The Leadville News-Reporter says that development work on the Big Six mine has produced ore carrying high in gold, rich in lead and iron and running 1000 ounces in silver.

SAN JUAN COUNTY.

The change from rolls to stamps in the Sunnyside mill in Eureka gulch has been completed. The mill is operated by water power and with the old mill, a short distance above, 125 tons of rock are treated daily. The pulp passes from the stamps to Bartlett tables, the fines being subsequently treated on Wilfleys and then on canvas, and the extraction is so satisfactory that Judge Terry is now making arrangements for an addition of twenty stamps, which will give the united plants a daily capacity of 200 tons.

SAN MIGUEL COUNTY.

(Special Correspondence).—The San Bernardo has been leased to H. M. Hogg of Telluride, who proposes to so develop it as to be able soon to resume shipments. This property has a good record as a producer and has been noted for its high grade ore.

The Bessie, Gold King, Alta and Four Metals, located in Turkey Creek and Gold King basins, are all active and together employ about 200 men.

The Wild Flower, in Swamp canyon, is to be vigorously worked. A 2-foot ledge of ore has developed, carrying good values in silver and gold.

The Bullion mill, under lease to J. Real, started three weeks ago, after having been improved some. It is run as a custom mill and is said to be well patronized.

Telluride, July 29.

The Butterfly group, Ophir district, is reported being operated, the ore bodies improving in size and value. A recent clean-up, after a nine days' run, netted $1451, and $430 concentrates.

The Tom Boy mill is reported turning out $50,000 in gold per month; 200 tons are crushed daily, the values are saved on the copper plates, scraped off and smelted into gold bricks for shipment. The hoist capacity from 400 to 500 tons daily from a depth of 500 feet is in operation, and the three-compartment shaft being sunk from the mill tunnel level is going down now about 300 feet from that level. The company is also developing the Argentine and Red Cloud group of claims on a vein running parallel to the Tom Boy.

By Nov. 1 it is thought that the Pennsylvania tunnel will have cut the Smuggler-Union lead 700 feet below the present lowest workings of the Smuggler-Union mines. The distance from the mouth of the Pennsylvania tunnel to the intersection of the Smuggler vein is about 3500 feet. A new tramway will be built from the mouth of the Pennsylvania tunnel to the Smuggler-Union mills and shipping station at Pandora, about three-quarters of a mile.

TELLER COUNTY.

(Special Correspondence).—A reorganization of the Anaconda M. Co. was effected on July 25th, at a meeting of stockholders in Denver, at which 306 stockholders were either present in person or represented by proxy, representing 756,563 of the 1,000,000 shares. The company is organized under a new charter, with a stock issue of 2,000,000 shares of the par value of $1 each, the new corporate name being the Anaconda Con. M. Co., which takes over the property and assets of the old company, paying the indebtedness of the latter, amounting to $125,000. The stockholders of the old company are paid for their stock, share for share, in stock of the new concern. A. J. Zang was made president; J. T. Milliken, vice-president; F. J. Campbell, secretary and general manager; A. E. Carlton, treasurer; all of whom are directors, with the addition of D. Rubidge, W. B. Milliken and F. S. Sigel. After paying the indebtedness, there remains in the treasury 500,000 shares of stock, worth over $200,000. Manager Campbell is and has been for the past two years manager of the Vindicator mine in this district.

Cripple Creek, July 27.

(Special Correspondence).—The inauguration of proceedings on the part of the general Government to set aside a patent issued to the Independence Town & M. Co. for mineral grounds at Independence, Cripple Creek district, previously mentioned in these columns, was the outgrowth of charges of fraud preferred by the Wilson Creek Co. in its contest for the grounds in question. In the absence of any reports of progress by the Government in prosecuting the case for cancellation of patent, there are extant what appears to be authentic announcement of a consolidation of the Independence and Wilson Creek companies, who have fought each other so bitterly for seven years; or that the Wilson Creek management has purchased the control of the Independence. Just what will be done as to the charges of fraud, on which the Attorney General of the United States bases the suit for cancellation of patent, has not been explained. The property is among the most valuable in the district, and it is not to be questioned that it will soon be operated by somebody.

Victor, July 28.

(Special Correspondence).—W. A. Baldwin, trustee, has purchased the New Zealand lodes, with a portion of the Favorite, Mollie Maguire, Zenobia and Hidden Treasure, all contiguous, located on the summit of Bull hill, the price named being $255,000. The sale was made by F. M. Woods of the Woods Investment Co., acting for the Magnolia and New Zealand G. M. companies. It is surmised that Mr. Baldwin was acting for W. S. Stratton, who owns an extensive area of ground in that locality. The effect of the sale is to dispose of litigation involving some of the groups.

The Zoe G. M. Co. has been organized, to further develop and operate the property on a three-acre tract on the Ariqua townsite, which is said to have produced $100,000 within the past year. M. Kinney of Colorado Springs is at the head of the company. A new plant of machinery is being put in.

Willard, Miller & Co., who have a lease on the Abe Lincoln, on Raven hill, have opened a 2½-foot ledge of ore at 220 feet depth, which assays as high as $40 per ton. Hoisting machinery is being put in and further work will be pushed.

Victor, July 28.

The company organized by W. S. Stratton to operate his various Cripple Creek properties, acquired by him during the past nine months, is styled the Cripple Creek Mining & Development Co., capital $10,000,000, incorporated under the laws of Wyoming, W. S. Stratton, W. A. Ramsay, W. A. Baldwin, J. H. Emerson and D. H. Rice directors for the first year. The purpose of the company is to mine and operate in the Cripple Creek district.

Supt. Camp of the Elkton Con. Co. is putting in new engine, boiler, compressor, a hoist, steel gallows-frame, large engine house, pump, etc. The engine will be 20x48, with 12-foot double reels, carrying 2000 feet of cable. The gallows-frame will be the second one in the district built of steel, the Hull City people having the other, and will be 55 feet high to the sheave. The pump has a capacity of 1000 gallons a minute; a straight lift of 800 feet is being installed. The output is about 1000 tons a month.

F. M. Woods, acting for the New Zealand G. M. Co. and the Magnolia G. M. Co., has sold to W. A. Baldwin, trustee for W. S. Stratton, the O. K. and New Zealand lodes and portions of the Favorite, Mollie Maguire, Zenobia and Hidden Treasure claims for $225,000.

The Buckhorn G. M. Co. has sold the Whip-poor-will claim of 2½ acres to E. S. Johnson for $15,000. A bond and lease had been given by former officers of the company for $20,000. It had nearly two years to run. The company thought it better to take the $15,000 cash offer than to wait.

It is locally said that a compromise has been effected between the Wilson Creek Co. and the Independence T. & M. Co.

Stratton's Independence is now reported to have disclosed the existence of flat veins between the third and fourth levels, running across the vertical veins; from 3 to 4 feet of the matter is being shipped. It is said to run five ounces gold per ton. For the week ending July 19th there were shipped from the mine 210 tons of ore, gross value $85,625.

The Anaconda G. M. Co. will reorganize with a capital stock of 2,000,000 shares, the new company to take over the property and all the holdings of the old company, the stockholders of the old receive share of the new for share of the old, the debt of $125,000 to be paid by those interested in the reorganization. The plan for the development of the property has not as yet been fully decided upon. It is the intention to sink a 600-foot shaft and lease all the ground to a depth of 200 feet.

The Independence T. & M. Co. and the Wilson Creek Con. M. & M. Co. have consolidated, and the suit which has been authorized by the Secretary of the Interior to annul the patent issued to the Independence Co. will be called off. The Wilson Creek Co. was the complainant.

IDAHO.

BOISE COUNTY.

The Middleman mine at Pearl, owned by Dorman, Tipton and associates, is reported sold to a New York company, represented by W. L. Gross. The condition of the sale is for one-half of the mine. The development under the bond calls for the sinking of the present shaft 200 feet deeper and cross-cutting and drifting upon the ledge 100 feet. As soon as the hoist is in place the new operators will prepare for extraction and shipping of ore.

From the Checkmate mine ore is being shipped.

BLAINE COUNTY.

W. F. Olsen of the Ætna M. Co. at Salt Lake City, Utah, regarding the property at Hailey, Idaho, tells the Tribune that the new tunnel driven on the strike of the vein shows good ore.

Near Hailey there is an effort to reopen some of the old silver-lead mines, such as the Minnie Moore.

In the Hailey gold belt the ore is a copper sulphide. The deepest workings are at the Tiptop and the Crœsus, about 400 feet. The former proposes to sink the shaft to a depth of 1000 feet. The Tiptop has a 20-stamp mill, the Crœsus a 10-stamp mill.

Scranton, Pa., men have bonded the Maryland Con. and will have men at work excavating for a 10-stamp mill.

CANYON COUNTY.

C. S. Crossman has his gold-saving machine at Bridge island, 2 miles west of Parma. He has eight men at work, running two shifts at a cost of $1.50 per hour, handling 1500 cubic feet every twenty-four hours. He uses the gravity system and says he saves 80% of the values before the gold gets to the burlaps. He has a liquid preparation that he has patented, through which the remaining 20%, together with the black sand, passes over a burlap table 60 inches wide, with about 2 inches of water, to another table 1200 inches in width. All the black sand and the small particles of gold that are coated with silica are treated to a mercury bath which is kept constantly in motion until it will amalgamate.

IDAHO COUNTY.

Grangeville states that the Buffalo Hump syndicate has expended $500,000 in the purchase and development of its holdings. It has 120 men at work on the wagon road from Badger to the Hump and the road is ready for the hauling of machinery. At Callendar, where the syndicate is operating, a 40-stamp mill is to crush the ore of the Big Buffalo lead. The mill is being so constructed that sixty additional stamps can be easily added. It is proposed to have a 100-stamp mill in operation next winter. On the Big Buffalo there are thirty-five men at work and three eight-hour shifts running. The three-compartment shaft is 125 feet deep. The new hoisting plant on the Big Buffalo will be of 40 H. P. and of sufficient capacity to sink the main compartment shaft 500 feet.

NEZ PERCE COUNTY.

Lewiston reports that A. Arnold, owner of the Fleetwood mine, has in his incline shaft a ledge from 8 to 20 inches showing $25 free milling gold ore.

SHOSHONE COUNTY.

The Morning M. Co. at Mullan, and the Empire State-Idaho M. & D. Co. at Wardner, are each running a 2-mile tunnel. The Bunker Hill & Sullivan Co. is also boring a 2-mile tunnel, now nearing completion. East of the Bunker Hill in the Alhambra a tunnel 1700 feet long is being run.

The Chester M. Co., Ltd., has incorporated at Wallace; Wardner is the principal place of business; capital stock, $25,000.

MONTANA.

CHOTEAU COUNTY.

The Mission Peak M. Co., which operates in the Little Rockies, has a bond on the Gold Bug and Gold Boy group of free milling gold mines, and will put in a stamp mill and work the tailings by the cyanide process, using steam power for the machinery. They have lignite coal within 6 miles of their millsite. They plan to dam Rock creek canyon at a convenient point above the town of Landusky. The mines are developed by about 1400 feet of shaft and tunnel.

DEER LODGE COUNTY.

F. C. Wood of the Garnet M. Co., of Pony, will install a gasoline hoist to sink the shaft to a depth of 500 feet. E. L. Ballou will have charge of the mill.

FLATHEAD COUNTY.

W. J. Beager, manager American Kootenai M. Co., on the West Fisher, will build a tram 2500 feet long, the ore to be delivered from the mine to the mill by eight buckets. The company has twenty-six men at work.

H. T. Vaughn tells the Libby News that he has a ditch ¾ mile long from Libby creek to this gravel bar, which is about 100 feet deep, and will operate it.

GRANITE COUNTY.

The Shamrock mine at Garnet, owned by McDermott & Lannon, has been leased and bonded for $60,000 by W. H. Godfrey of Butte. Mr. Godfrey has made a cash payment of $5000 and took the property over Aug. 1.

JEFFERSON COUNTY.

The Elkhorn Queen is shipping forty tons per day to the East Helena smelter.

B. Leyson, Supt. Mayflower mine, near Whitehall, says that the Mayflower now lacks 20 feet of being 1000 feet in depth, or about 75 feet below the bed of the Jefferson river.

LEWIS AND CLARKE COUNTY.

On the 1st inst. the Montana M. Co., limited, closed down the Drumlummon mine at Marysville. The 110 stamps of the company's mills have been hung up and there is no ore in the bins. Fifty men will be employed for some time prospecting the mine, and if they uncover new ore bodies operations will be again resumed. There is every indication that the shut-down will be a long one. The Drumlummon was a famous gold mine in Montana. It was located in 1879 by T. Cruse of Helena, now a millionaire, but then so poor he could not get credit for a sack of flour. He sold his mine to English men for $1,000,000. The mine has since earned many millions for its owners. It once employed 700 men.

In the Rimini district machinery is in place on the Mettie to sink 200 feet.

Shipments of tailings from the Golden Gate mine at Rimini to the Peck concentrator have been suspended.

In the Piegan at Marysville ore which assays $350 per ton in gold is reported.

MADISON COUNTY.

The annual income returns of the leading Montana copper companies are given as follows: Parrot, 14.29%; Boston & Montana, 13.20%; Anaconda, 9.30%, and Amalgamated, 9.09%.

MEAGHER COUNTY.

Reynolds & McDowell have bought the Copperopolis group of mining claims, 16 miles from White Sulphur Springs, for $50,000 cash. The group comprises the Northern Pacific, St. John's and Darling Fraction claims. The ore is copper glance.

There are seventy-five men working; the number is to be increased.

MISSOULA COUNTY.

At the Carlan placers, east of Missoula, near Carlan station, on the N. P. road, examination shows sufficient gold in the gravel to pay. Proposed machinery will comprise a pump to lift the water from the Missoula river, flumes and giants. The ground is sand and small gravel, few boulders of any size being found. It can be worked for 10 cents a yard. Pay dirt will average 15 cents a yard.

SILVER BOW COUNTY.

The following statements are for the year ending June 1, 1900:

Anaconda Co.—Mines operated: Anaconda, Mountain Con., Green Mountain, Bell and sampling works.

Tons of ore extracted	1,421,500
Gross value, per ton	$13 18
Cost of extraction, per ton	4 38
Total cost of extraction	6,228,655 25
Cost of transportation (27 miles), per ton	21
Total cost of transportation	300,031 58
Cost of reduction, per ton	3 77
Total cost of reduction	5,354,145 79
Paid for labor	5,878,851 47
Paid for machinery and supplies	5,703,949 57
Freight	300,031 58
Marketing products	1,481,780 73
Net proceeds	5,365,518 15

Recapitulation:

Gross proceeds	18,730,131 50
Cost of mining	6,228,655 25
Freight on ore	300,031 58
Cost of reduction	5,354,145 79
Selling and marketing	1,481,780 73
Net proceeds	5,365,518 15

Butte & Boston Co.

	Blue Jay.	Other mines.
Tons of ore extracted	31,104	122,372
Gross yield, per ton	$14 61	$14 61
Cost of extraction, per ton	4 86	6 19
Total cost of extraction	151,244 70	750,567 31
Cost of transportation, per ton.	22	22½
Total cost of transportation.	6,959 94	27,382 82
Cost of reduction, per ton	3 59	3 59
Total cost of reduction	111,659 77	439,331 98
Paid for labor	134,715 83	630,968 08
Machinery and supplies	127,030 48	567,089 37
Selling and marketing products	35,949 43	41,437 90
Net proceeds	150,481 84	420,831 46

Total for all mines:

Paid for reduction, per ton	$3 59
Total for reduction	550,991 75
Paid for necessary labor	765,683 91
Paid for machinery and supplies	694,119 85
Selling and marketing products	177,387 33
Net proceeds	571,313 30
Total cost of production, per ton	5 93
Total cost of production	908,812 01
Transportation, per ton	22¼
Total for transportation	34,342 76
Net proceeds of Blue Jay	150,481 84
Net proceeds of other mines	420,831 46

Colusa-Parrot Co.—Mines: Burt, Woolman, Home, Original, Stewart, Dives, Colusa and Parrot.

Tons of ore extracted	2,068
Gross yield, per ton	$8 93
Cost per ton for extracting	3 76
Total cost of extracting	778,800 00
Transportation per ton (2 miles)	30½
Total for transportation	63,112 00
Cost of reduction, per ton	3 29
Total cost of reduction	681,445 00
Paid for labor	481,234 00
Supplies	297,566 00
Net proceeds	325,044 00

The Alice G. & S. M. Co.'s principal mine is the Alice, in Walkerville, formerly a producer of silver. The report for the fiscal year ending June 1st, 1900, shows that during the year the company mined and milled 6945 tons of ore, which yielded 132,134 ounces of silver, valued at $75,316.38, the product having been sold at an average of 57 cents an ounce. The same ore yielded $8114.63 in gold. The company also sold 5228 tons of ore for $107,541.32, making the total receipts $190,972.33. The company states that the operating expenses and the total cost of producing the 12,173 tons of ore was $206,544.66, making a loss in operation of $15,572.33.

The report of Receiver Harris of his operations of the Snohomish and Tramway mines shows that during June there was mined a total of 2195 tons of ore from the Snohomish and 105 from the Tramway. The total cash in bank July 16 was $106,077.75. In his report Mr. Harris says: "During the month covered by this report no mining operations have been carried on in the Tramway mine by the receiver. A portion of said mining claim is under lease to the Messrs. Bortoglio & Co. and they produced for the month 105 tons of ore at a profit to the receiver of $398.56. During the first four days of the month the Snohomish produced 320 tons of ore, of which Mr. Heinze received and hoisted 160 tons, the share of the receiver being $711.01. During the remainder of the month the ore production from said Snohomish mine was 2034 tons, for which the receiver received $9028.98."

The Inter-Mountain, Butte, says the experimental plant erected by Mr. Peck of the Peck concentrating process has been shut down, the men discharged and with no date fixed for the resumption of work. The plant is similar to that which was attempted at Park City, Utah, and which continues idle.

NEVADA.

CHURCHILL COUNTY.

All of the material for the smelting plant at Cottonwood has been delivered.

ELKO COUNTY.

The announcement that the mill on the Young America at Tuscarora has been closed down is looked upon in Salt Lake City as being amusing. A shareholder there tells the Tribune that he had never had anything to convince him that the plant had ever started up, notwithstanding the fact that the machinery for it was contracted for more than a year ago.

LANDER COUNTY.

A road has been opened to the antimony mines 7 miles south of Austin, and the extraction of ore has begun.

LINCOLN COUNTY.

At Searchlight at the Quartette Co. mines, the McReady group are making necessary connections, putting in the 250-foot level; the gasoline engine is working well. At the Dunn's group the steam hoist is in place.

LYON COUNTY.

Test runs of the cyanide process on the ore tailings from the Hulley-Logan mine at Como make it probable that the bullion value of the ore can nearly all be recovered through cyaniding.

STOREY COUNTY.

The electric power line is about completed to its terminus on the Comstock lode. It extends from the generator to the sub-station at the C. & C. mine.

Work has been started on the 425 level of the Savage.

J. R. Ryan telegraphs from Virginia City, under date of the 2nd: "At 6:30 this morning the water was 184 feet 5 inches below the 1950-foot level station. No. 1 elevator has been running continuously."

WHITE PINE COUNTY.

D. W. Smith, of Elmira, N. Y., has bought the Chainman group at Ely for $100,000.

The Glasgow & Western Co. has advanced the wages of the miners working in the Star shaft; work is being pushed.

NEW MEXICO.

GRANT COUNTY.

The Pinos Altos G. M. Co. is taking out ore from the Gillett shaft and handling the product in the concentrating mill. The average force in the mine and mill is 125 men. The mill is handling 100 tons of ore daily.

LINCOLN COUNTY.

About 100 miners are employed at White Oaks. The Homestake at White Oaks has 200 tons of ore on the dump.

The Old Abe has a 20-stamp mill. A cyanide plant is also at the mine. Every level of the mine, which is 1200 feet deep, is dry.

SIERRA COUNTY.

The Grandview M. Co. of St. Louis, Mo., has its headquarters at Kingston, D. Bowman agent. The company has the Grandview group of mines, Carpenter district, in the Black range, 8 miles from Kingston, and has bought the water rights and site for milling purposes of the Mimbres Hot Springs. The mines and the mill will be connected by tramway.

TAOS COUNTY.

The Rio Hondo Copper Co., purchaser of the Fraser property, is working three shifts and building more houses.

OREGON.

BAKER COUNTY.

The Sumpter smelter is in readiness for operation. Manager Laughlin says all that is now needed to make it a success is a supply of ore sufficient to keep it going.

JACKSON COUNTY.

The Swayne M. Co. will resume operations at its mines at Applegate. W. D. O'Brien will be in charge.

JOSEPHINE COUNTY.

A San Francisco company has 300 acres of land 3 miles from Gold Hill and will test the efficiency of their dry-washing process. The John L. Ferris Co. has 600 acres of land for dredging purposes in the vicinity and will place dredgers in ponds dug therefor.

The dredger at Waldo has been shut down.

Ganguish & O'Neil are erecting a 5-stamp quartz mill on their property at the mouth of Palmer creek.

The Gold Standard mine on Jackson creek is shipping concentrates to the Selby smelter.

LANE COUNTY.

The Black Butte quicksilver mines, 18 miles south of Cottage Grove, are operating; W. B. Dennis has charge, working fifty men; the reduction works are running.

SOUTH DAKOTA.

LAWRENCE COUNTY.

At Lead the Homestake M. Co. will soon have two more stamp mills in operation, which will give the total number of stamps dropping 950—the largest number of any gold mining property in the United States. The company is also building a 1000-ton cyanide plant and putting in a water ditch 14 miles long.

There are six cyanide mills now building in the vicinity of Deadwood.

UTAH.

JUAB COUNTY.

On the 1st inst. the whole of the Tintic mining district was shaken by earthquakes. The shaft of the Mammoth mine was twisted so it was impossible to get the cage below the 1600-foot level.

The Utah mine, Fish Springs, Deep Creek country, last week sent to Salt Lake a carload of ore which was settled for on a basis of $120 per ton net. The controls on which the ores were marketed showed 182 ounces silver and 50% lead per ton from the workings off the 500-foot level.

SALT LAKE COUNTY.

J. R. Tucker, Supt. American S. & R. Co.'s plants at Murray and Sandy, tells Tribune that the plants are now running at maximum capacity, with about 20,000 tons of ore going monthly through the furnaces, and that he has all the talent necessary with which to discharge the work.

The Last Chance M. Co. properties at Bingham are sold to L. H. Hogle of Chicago, for $75,000, by C. J. Hodge, of Houghton, Mich. The purchasers made a cash payment of $25,000. The Tribune hears that systematic work will commence at once and that the mill will be started up under experienced management.

SUMMIT COUNTY.

At Park City J. B. Weimer of Salt Lake is reported to have control of the tunnel projected by J. McGregor to be driven into the main ore-bearing zone from an opening in Nigger hollow.

Connection has been made on the 1400-foot level with the main ore bodies of the Daly-West at Park City.

TOOELE COUNTY.

It is expected that the consolidated Mercur and Golden Gate mines at Mercur will yield 1000 tons daily of $8 ore, to be treated at a cost of $4 per ton.

WASHINGTON.

FERRY COUNTY.

On Gold Hill, northeast of Republic, the Gold Ledge Con. M. & M. Co. has the claims of the Gold Ledge M. Co., the Gold Ledge Extension Co., and the Badger. H. L. Lilienthal is president and general manager.

It is expected in Republic that the Republic Reduction Co.'s plant will be in operation by Sept. 1.

FOREIGN.

BRITISH COLUMBIA.

Near Ymir the Kenneth M. & D. Co. is to construct a bromo-cyanide plant to treat the ores of the Tamarack mine. The development work on the mine recommenced last week.

At Kaslo C. Caldwell has bought the Pontiac and Tecumseh claims on Woodbury creek, Kootenay lake, for the Canadian Pacific M. Co., developing claims at the mouth of Woodbury creek. It is about to put in a $10,000 compressor and hoist.

Near Grand Forks two shifts are pushing development work on the Golden Eagle, Brown's camp, north fork of Kettle river, in charge of Supt. J. H. Fox.

The B. C. mine, Summit camp, will ship to the Grand Forks smelter, avoiding the long haul to Trail.

The Old Ironsides and Knob Hill mines at Phœnix have shipped seventy carloads of ore to the Grand Forks smelter.

S. H. C. Miner says that another furnace will be added to the Grand Forks smelter, increasing the capacity to 1000 tons daily. He expects to see $5 ore treated at a profit.

S. F. Parrish, manager B. C. mine, Summit camp, denies the report that the property had been sold to a syndicate of C. P. R. officials.

J. Trainer, Supt. Strawberry property, north fork of Kettle river, reports that the crosscut on the 100-foot level is 5 feet in ore. An upraise will be made from the lower level to connect with No. 2 shaft.

E. N. Fell, manager Athabasca, Nelson district, is arranging for a cyanide plant.

A cleanup of a small section of gravel at the Ward-Horsefly mine, Cariboo, realized gold values of $3000; this was preliminary to larger washes later in the season.

In Boundary Creek district, of which Greenwood is the business center, the Spokane Spokesman-Review summarizes the approximate number of men employed in connection with mining as follows:

Camp.	No. men.
Deadwood	120
Deadwood erecting smelter	50
Greenwood	200
Summit	20
Wellington	45
Central	45
Other camps	60
Total	540

The men employed as enumerated in the foregoing table are engaged wholly in the work of development.

Estimates of the capital invested in the mines of the camps so surrounding Greenwood is as follows:

Camps.	
Skylark and Providence	$ 195,000
Greenwood and Wellington	1,400,000
Central	520,000
Smith's	75,000
Deadwood	575,000
Copper and Kimberly	40,000
Long Lake	305,000
Summit	525,000
Greenwood and Grand Forks smelters	405,000
Total	$4,040,000

In nearly all cases with any depth the ore shows a general sameness of appearance—i. e., chalcopyrite, with hematite and some iron pyrites mixed with calcitic and some quartz in a greenish, eruptive rock, showing considerable alteration and sometimes having a schistose structure. In some cases the ore bodies along their trend are capped with magnetic iron oxide, through which is disseminated in varying quantities (though, as a rule, small percentages) copper pyrites. The ore bodies appear to occur in contact with lime and diorite, which have a general northerly and southerly trend and an easterly dip. Some of the ores are self-fluxing and all are adapted for smelting. The number of feet of development work done on the leading properties is as follows:

	Sinking and raising.	Drifting and crosscutting.	Total feet.
Old Ironsides	820	2,242	2,802
Knob Hill	528	2,581	3,089
Victoria	...	2,460	2,460
Grey Eagle	...	330	330
Brooklyn	340	1,710	2,050
Stemwinder	325	165	490
Idaho	50	...	50
Rawhide	...	400	400
Snowshoe	380	1,100	1,480
Gold Drop	395	1,510	1,905
War Eagle	242	190	432
Totals	2,880	12,868	15,548

With the exception of the Idaho and the Rawhide, all the above-named Greenwood camp properties are worked by power plants.

The Old Ironsides No. 2 shaft, now down 400 feet, is the deepest shaft in the district.

J. P. Graves, general manager Grand Forks smelter, has quoted rates to nearly every mining company in the Boundary. He has authority for the statement that he has offered to treat the ores from certain mines at a figure ranging between $3.50 and $4.50. This includes freight and treatment.

CANADA MINES.

The Ontario Government assay office at Belleville, Ont., writes: "An inquiry has been received for properties containing iron pyrites or mundic located near railway shipping facilities, from the Mines Contract & Investigating Co., Toronto. Pyrites are used for the manufacture of sulphurous dioxide gas, used extensively in bleaching wood pulp and paper, also for manufacture of sulphuric acid. In this connection it is worthy of note that several attempts have been made to ship iron pyrites from deposits in eastern Ontario, but the excessive freight rates consumed all profits. The Laurentian Pulp Co. of Three Rivers, Quebec, making wood pulp and paper by the sulphite process, advises the erection of small roasting furnaces at the mines, and the shipping of the condensed and liquefied sulphurous acid gas in cast iron cylinders."

LOWER CALIFORNIA.

I. I. Irwin, of San Diego, Cal., is now the sole owner of the properties of both the Republica and Fortuna M. Cos. in Lower California. The mines are located in two different districts in that portion of the peninsula, 50 miles back of Ensenada.

MEXICO.

(Special Correspondence).—There are in the dumps of the Mina Grande, Tajitos and Quezadena mines, in the mining district of Tatepuzco, Ahuacatlan, Tepic, more than 4000 cargas of 138 kilos each, of ore averaging from 4 to 5 ozs. per carga (30 ozs. silver per ton). The ore is a concentrating ore, and a 3-stamp mill with a crusher and a concentrator can easily operate during seven months of the year with water power and five months with a steam 10 H. P.

There is an old hacienda de beneficio (amalgamation process) which can be repaired with $1000, Mexican. Reduction of the ores may be calculated in 200 cargas of 138 kilos each.

The mines of Acuitapilco, called El Mozquite, Trinidad, Catarina, Buenavista and Todos Santos, were worked with success by the old Spaniards and later by miners from Guadalajara. One of those mines, the Valenciana, is being developed by an American company. A 3-stamp mill, a crusher and a concentrator will be soon in place. Fifty men are employed at Acuitapilco. The high-grade ore is being sent to the reduction works of Lonergan & Stanhope, and the low-grade ore is being reduced by old patio process with success, as good returns in gold and silver are being received by the company. J. S. Ickis is manager. Ten tons daily is the present extraction; the formation of the district is quartzite and porphyry.

The owners have lately acquired rights on two waterfalls which operate the six old tahonas used in the reduction of the ores. The Valenciana Co. will soon erect a reduction plant.

The San Bartolo mines are southeast of the city of Tepic, 15 miles distant and 60 kilometers from the San Blas seaport on the Pacific coast. The average of the ore is 30 ozs. silver to the ton of 2000 lbs. and 1 oz. gold.

On the south of San Bartolo are the mines of Guadalupe and San Juan; the former has a streak averaging 300 ozs. silver per ton and 3 ozs. gold. The San Juan has ore of low grade gold and silver. The present owners have ten men at work.

The Pacific States Mining & Investment Co. of San Francisco, Cal., will soon organize a new company to develop Tepic ground.

Tepic, July 20.

The Olympia M. Co., capital $200,000, intends to work mining properties in the Moctezuma district of Sonora, 3½ miles from that owned and operated by Phelps, Dodge & Co., adjoining the San Miguelito mines.

THE KLONDIKE.

Dawson reports conglomerate discovered on Indian river. D. McKinnon claims to have discovered a "reef" on McKinnon creek, opposite the mouth of Quartz creek, from 400 to 500 feet wide, and he "thinks the space between two reefs, about 3 miles, is a solid bed of conglomerate, carrying gold." He argues that "the reef is low-grade free milling, and can be handled like that at the Treadwell mine, simply by quarrying out the face of the cliff."

Personal.

E. R. ABADIE revisited Nevada county, Cal., last week.

T. F. VAN WAGENEN is now editor Denver, Colo., Mining Reporter.

J. H. HAMMOND left Silverton, Colo., for London, via New York, last week.

D. MEANY is in charge of the Anderson Lake Co.'s property at McGillvray creek, B. C.

EDWARD BOYCE, at Jerome, Ariz., last week organized a miners' union of 500 members.

F. T. LELAND of the Risdon Iron Works has returned to San Francisco from eastern Oregon.

C. R. WORES has returned to Tucson, Ariz., from Canada, where he had been examining gold properties.

R. S. MOORE of the Risdon Iron Works, San Francisco, has returned from a business visit to Hawaii, U. S. A.

JESSE SCOBEY, mining engineer of Denver, Colo., is temporarily engaged by a mining company in Mexico.

DR. CARL PETERS, the African explorer, has gone from London to the Zambesi river to continue explorations in Eastern Mashonaland, Africa. He takes mining machinery for development of the mineral district discovered by him in 1899.

L. J. BROWNING, Supt. Chile mine, Sand Creek, Madison county, Mont., has returned from Milwaukee, Wis.

S. H. RIBBEL, who has had charge of the Leviathan mill at Mammoth, Mont., has taken charge of the Kennett, Mont., mill.

SAM W. CHEYNEY, manager of the Jamison and Keystone mines, Sierra and Plumas counties, Cal., has returned to San Francisco.

F. JENKINS will resign his mine superintendency at Silver City, Idaho, to devote his attention to developing the Dobson Jim mine near Wallace, Idaho.

E. P. JENNINGS, who had been examining mining properties in Nevada and southern California for Eastern investors, has returned to Salt Lake City, Utah.

W. H. HART, formerly in charge of the John A. Logan mine, is now in charge of the Little Pittsburgh mine of the Latrobe G. M. Co., Straub mountain, Colorado.

AT Los Angeles, Cal., the Southwest Miners' Association has elected Thos. Ewing president, J. I. Crowell and J. R. Clark vice-presidents and G. N. Nolan secretary.

F. JENKINS has resigned his position as manager of the Cumberland mine, Silver City, Idaho. R. H. Britt has been appointed to succeed him. The change took place Aug. 1.

CARL S. FOGH of Leadville, Colo., will assist A. Raht in the superintendency of the construction of the new smelter of the American Smelting & Refining Co. at Salt Lake City, Utah.

ROBERT C. GEMMEL has returned to Salt Lake City, Utah, from Magdalena, Sonora, Mexico, where he went to report on gold properties bonded by V. M. Clement in the interest of a London company.

H. P. LOWE, recently manager Topeka mine, Gilpin county, Colo., has notice from the Paris Exposition that a special medal had been awarded him for a rare specimen of gold-bearing quartz from that property.

WM. E. HOWELL of the Pilgrim mine, American Hill, Sierra county, Cal., has resigned to go to Mexico to assume charge of a concession of land owned by California men. His place will be taken by General Manager F. A. Patterson.

R. E. PALMER, chief mining engineer for the British America Corporation under W. A. Carlyle at Rossland, goes to Spain to take a position under Mr. Carlyle in the Rio Tinto mines, to be the engineer in charge of underground work.

Commercial Paragraphs.

THE Risdon Iron Works of San Francisco has an order from the Golconda mine on Cracker creek, Grant county, Or., for new machinery to sink to a depth of 2000 feet.

THE Anti-Caloric Co., 217-219 Mission street, San Francisco, has been appointed sole agent on the Pacific coast for the Boston Asbestos Paper Co. The Anti-Caloric Co. carries a full line of asbestos goods and steam packings.

C. M. HAMPSON, Denver, Colo., is supplying the Western Realty and Paving Co. with equipment for a conveyor and hoisting engine for handling basalt for paving and riprapping. It will comprise a Dillon double drum hoisting engine, with Hampson's automatic dumping device, a 350-foot span of 1¼ inch carrying cable and ¾-inch hoisting cable, the tower at dumping station being used as engine house, with second floor for engineer's station.

FLINT & LOMAX, Denver, Colo., who sustained serious damage to their shops by fire, have found much new equipment necessary as well as new stock in various departments. Tools and machines for brass work, pattern shop, assembling room and plating department have been largely replaced, including spinning lathe, pattern lathe, band and rib saws, as well as stock of brass and copper sheets. The net result is that their facilities will be better than before the fire. They employ a force of sixty men.

AMONG the bids made to the Board of Trustees of Riverside, Cal., on the proposed new electric lighting plant for that city were the following: The C. C. Moore Co., San Francisco and Los Angeles, $24,908 to $41,960 for complete plant as per specifications furnished. The Machinery & Electrical Co., Los Angeles, complete except the generator for $25,924 and $30,144. The Tracy Engineering Co., San Francisco, seven alternative proposals, prices ranging from $26,440 to $41,696. The Boothe M. & S. Co., Los Angeles, itemized its bid: offered Sioux Corliss engine, three 150 H. P. boilers with smokestacks, two Smith-Vaile feed pumps, one exhaust heater and water purifier, for $25,122; jet condenser for $800, or service condenser for $3500. The Joshua Hendy Machine Works, San Francisco, proposed to put in the plant complete as per the city's plans and specifications for $27,330.73.

JEANESVILLE IRON WORKS CO., Denver branch, received telegraph order from the American Mining Co., Wyo., for two improved No. 9 B Jeanesville sinking pumps and one duplex station pump. The shops have an order from the Anaconda Copper Co., Butte, Mont., for two special duplex pumps. They are also building a high lift compound condensing pumping plant and two improved sinking pumps for a mine in Old Mexico. The Denver branch has had a good demand for this improved No. 9 B sinker, the past two months, and high lift duplex mine pumps.

THE M. C. Bullock Mfg. Co., Chicago, Ill., have just sold a diamond drill to the Government of Chile, another to the Government of Nova Scotia; within thirty days they have sent diamond drills to Japan, Spain, Turkey, Antefogasta and various parts of the United States. They have shipped a compressor and rock drill plant to the Sea of Azof, two mine ventilators to West Virginia, hoisting plants to the Black Hills, Mesabe range and Illinois coal district; a Willans engine to St. Petersburg, another to the Massachusetts State Farm, and are just now erecting an 800 I. H. P. Corliss for the American Cereal Co.

List of U. S. Patents for Pacific Coast Inventors.

REPORTED BY DEWEY, STRONG & CO.,
PIONEER PATENT SOLICITORS
FOR PACIFIC COAST.

FOR THE WEEK ENDING JULY 24, 1900.

654,562.—DOOR STOP—J. R. Bowler, Sr., Santa Ana, Cal.
654,135.—RAISIN CLEANER—C. J. Clarke, Kingsburg, Cal.
654,521.—WAVE MOTOR—E. P. Conture, Gualala, Cal.
654,525.—SEED DRILLS—Dorsey & Mathews, Los Angeles, Cal.
654,526.—LIQUID MIXER—E. T. Downing, Napa, Cal.
654,579.—DOOR BOLT—A. Ericson, S. F.
654,346.—VISON ADJUSTER—F. H. Graham, San Jose, Cal.
654,248.—PAPER CUTTING MACHINE—F. Hager, Portland, Or.
654,250.—FURNACE—A. Heberer, Alameda, Cal.
654,399.—PRUNE GATHERER—O. S. & M. T. Hoover, Mount View, Cal.
654,349.—AX—S. T. Johnston, Trinidad, Cal.
654,315.—WORKING ORES—T. E. Luce, Bishop, Cal.
654,267.—TRAVELING BAG—A. Mieden, Seattle, Wash.
654,320.—ELECTRIC HEATER—R. R. Morison, S. F.
654,486.—LENS POLISHER—O. Pederson, Los Angeles, Cal.
654,487.—SWEEPING MACHINE—O. Pederson, Los Angeles, Cal.
654,323.—PUMP—G. W. Price, S. F.
654,327.—SWITCH—T. S. Savage, Oakland, Cal.
654,283.—PIPE WRENCH—A. J. Sarvin, Springville, Cal.
654,420.—ORE STAMP—D. M. & J. E. Smyth, Pasadena, Cal.
654,333.—DUMP WAGON—P. Vasquez, Halfmoon Bay, Cal.
654,580.—LAMP FILLER—H. H. Venable, Redondo, Cal.
33,011.—DESIGN—W. G. Dodd, S. F.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

ELECTRIC HEATER.—No. 654,320. July 24, 1900. R. R. Morrison, San Francisco, Cal. The object of this invention is to provide a means for annealing gold for dental uses, for heating water, for sterilizing surgical or dental instruments, for heating wax composition of rubber and the like, or other heating instruments for the preparation and convenient application of antiseptic dressings and similar purposes where the heater can be used. It comprises an open central stand or support with a shallow pan within the opening, and ribs by which the pan is suspended out of direct contact with the stand. A second pan fits within the first named one, with means interposed between the two for electrically heating them and means for controlling the electrical current. An annular disk lies upon the bottom of the pan with a flanged opening, which exposes a part of the bottom and forms a restricted operating surface;

means are also provided for controlling the electrical current.

AUTOMATIC SWITCH.—No. 654,327. July 24, 1900. T. S. Savage, Oakland, Cal. The object of this invention is to provide a means by which the motorman or other operator upon a car or like traveling vehicle can determine the direction in which the car should travel upon arriving at a switch where two tracks diverge from each other. At the point where the main and branch line of the track separates is a spring-pressed switch point normally closed to cause the cars to move upon one line of track. A rock shaft and arms carried thereby are provided, one of which connects with the switch point and the other with a pressure plate which projects into the path of the car wheels so as to be depressed by the weight of the passing wheels and throw the switch point away from its contact with the track. A spring acts to return this switch point after the wheels have passed the pressure plate. By means of a foot pedal upon the car, the plates are depressed so as to pass inside the switch point after it has been moved away from its contact and to thus retain it in such position while the car wheels pass upon the other line of track.

WAGON DUMPING GEARS.—No. 654,333. July 24, 1900. P. Vasquez, Half Moon Bay, Cal. The object of this invention is to provide a mechanism for moving the containing box or body of a wagon or similar vehicle in a longitudinal direction and tilting the same to discharge the load carried thereby. It comprises a rock bar or equivalent device carried upon a wagon body, a pinion mounted upon a journal shaft and having teeth engaging the rack and means for rotating the pinion so that by its engagement with the rack it will draw the latter and the wagon body rearwardly upon the bed until it arrives at a point where it will tilt and discharge its load. In conjunction with this are stops which engage with the shaft or roller and form a bearing about which the box tilts, and which prevent its sliding farther to the rear. Rollers are journaled upon the bed to form an anti-frictional support, upon which the box travels easily when it is moved forward or backward.

APPARATUS FOR WORKING ORES OF VALUABLE METALS.—No. 654,315. July 24, 1900. T. E. Leece, Bishop, Cal. This invention relates to an apparatus which is designed for working the ores of valuable metals, and is especially useful for separating slimes from solutions in which they may occur, and also for separating heavier and lighter parts under any condition in which they may be found associated. It consists essentially of a tank having one side at a considerable inclination, and within this tank is an endless traveling belt with directing rollers so that one portion of the belt is caused to travel through the tank in close proximity with the bottom, and the other part is guided back exterior to the tank by similar rollers. The material is delivered into the deeper portion of the tank and the heavier part settles down upon the belt, which continually travels up the incline to a point of discharge exterior to the tank. Transverse partitions having flexible sweeping lower edges in contact with the inclined portion of the belt keep the slimes upon and in close proximity with the belt as they travel upward. A suitable discharge chute receives the material, and the belt is cleaned by water jets and by a revolving brush before returning beneath the tank to again enter it.

The Johnston Pipe Wrench.

WM. B. VOLGER, 88 Chambers St., N. Y.: The large automatic pipe wrench which you sent me January last has been in almost daily use, is as good to-day as when we received it, and is the best tool for the purpose that we have. It is very essential that all the joints made up be absolutely tight, and this wrench has been used in making up over 500 joints, consisting of extra heavy pipe and extra heavy fitting, and not one of these joints has ever leaked.

We attribute this success very largely to the wrench, which grips the pipe in such a way that we have never hesitated in putting the greatest strain upon it, without any fear of crushing the pipe.

I made personally over half of these joints myself with this wrench, and say unhesitatingly that it is the best tool of its kind that I have ever seen.

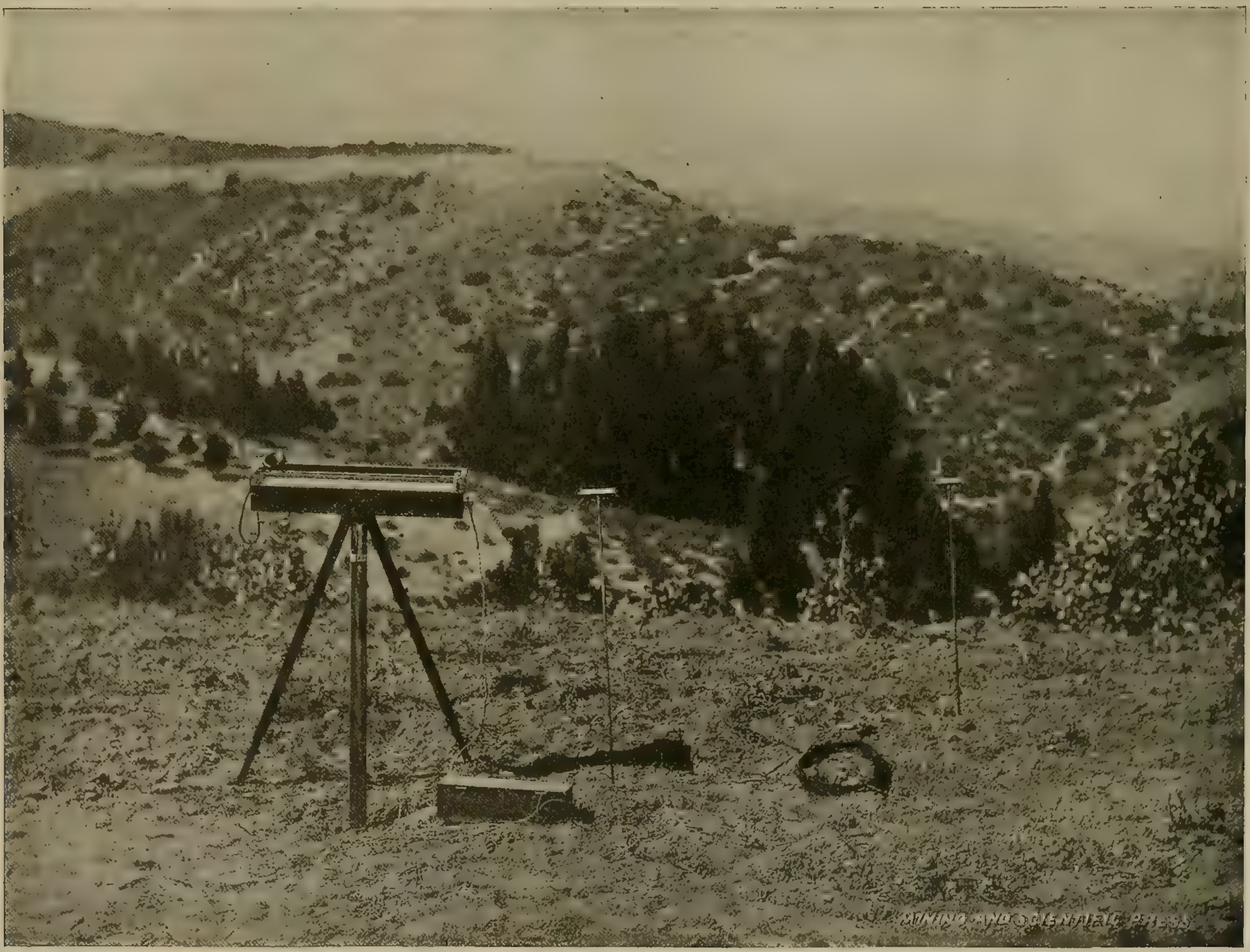
WM. E. WORTH.

Wilmington, N. C., June 24.

This tool is intended for use in different mining sections, giving general satisfaction.

Recently Declared Mining Dividends.

Magnolia Co., Colo., 17 cents a share, $187,000	July 28
Mammoth M. Co., Utah, 5 cents a share, $20,000	Aug. 1
Hecla M. Co., Idaho, 2 cents per share, $20,000	Aug. 1
Buffalo Hump M. Co., Idaho, 10 cents per share	Aug. 1
Bunker Hill & Sullivan M. & C. Co., Idaho, $21,000	Aug. 4
Independence T. & M. Co., Colo., 4 cents per share	Aug. 6
Swansea M. Co., Utah, 5 cents a share, $5000	Aug. 10
Standard Con. M. Co., Cal., 10 cents per share	Aug. 23



Brown's Electro-Geodetic Mineral Finder.

An Electrical Geodetic Apparatus.

Among other new things in the mining and scientific world is what is styled an "electric survey." Men have always claimed ability to tell where mineral is located, by surface indications, and it is not strange that, with the new order of things, the old divining rods and "dousing sticks" should be discarded and electricity brought into the effort to indicate the location and course of mineral veins. F. H. Brown of Los Angeles, Cal., has a patented device that he styles an "electro-geodetic mineral finder." He furnishes the following explanation of its operation:

"The instrument used is a modification of the common form of the Wheatstone bridge, the modifications rendering the instrument capable of overcoming the inaccuracies of measurement heretofore caused by earth currents and abnormal resistances set up by electrolysis when battery currents are sent into the earth from a metallic electrode. In using the machine the custom is to make many measurements of the resistances of the same definite length of earth in a given locality. If there are no ore bodies within one-half of the distance between the electrodes from the surface of the earth, the current will find the path of least resistance in the moist earth nearest below the crust and close its circuit through that path. Under this condition, all the resistances in the locality will approximate the same. In taking these different measurements, however, should we measure the resistance of a certain definite length of earth underneath which lay a body of ore, less than one-half the distance between the electrodes, from the surface, then the current would find the path of least resistance, in passing down vertically to the ore body to a point nearest the positive electrode or rod, would pass laterally through the ore body to a point nearest the other rod or electrode, then vertically upwards to the other electrode.

"The lateral resistance through the ore body would show comparatively no resistance and the reading on the instrument would be only one-half to nine-tenths of the amount indicated on the instrument by the other definite lengths under which there was no ore.

"To tell the depth of the ore body from the surface it is only necessary to vary the length of earth measurements, as for example: If a body of ore was 100 feet beneath the surface, 100-foot measurements over this ore would not indicate its presence, for the reason that the current would have to go down 100 feet to the ore, pass laterally through it and up through another 100 feet of earth resistance, thus passing through two vertical earth resistances of 100 feet each, aggregating 200 feet of earth resistance as against only 100 feet on the surface, in which case the path of least resistance would be near the surface. In order to indicate the presence of this ore body 100 feet beneath the surface it would be only necessary to take surveys of a little over twice the depth, say 220 feet. In this condition the two vertical resistances of the earth, aggregating 200 feet, would be less than the surface resistance of 220 feet, and the current, seeking the path of least resistance, would go down to the ore, pass laterally through it and go vertically up to the other rod; and to locate it, it would be only necessary to take several parallel or radial measurements of the same definite length. A measurement taken over the ore vein or body would be low. The other measurements taken of the same definite length, for comparison, being removed from and not over the ore body, would be higher, and it is only necessary to shorten up the length of earth measured to arrive at a point where the current will leave the ore body and pass through the crust to approximate the depth. The variations of the instrument, being very marked, will show the depth.

"For a further description of this process I refer to patent No. 645,910, March 20, 1900."

The illustration gives an idea of how the apparatus looks in readiness to operate. Its inventor claims that it is "thoroughly scientific," and that he can locate gold and other metals by its use.

Latest Market Reports.

SAN FRANCISCO, Aug. 2, 1900.

SILVER—Per oz., Troy: London, 28d (standard ounce, 925 fine); New York, bar silver, 60⅜c (1000 fine); San Francisco, 60⅜c; Mexican dollars, 48½c.

The rapid increase in gold production in the United States and the large excess of exports over imports have been accompanied by a marked increase in the money in circulation in the United States, which stood on July 1st of each year as follows:

Date.	Gold and gold certificates.	Total money of all kinds in circulation.	Per capita money in circulation.
1896..	$498,449,242	$1,509,725,200	$21.15
1897	556,432,594	1,646,028,246	22 57
1898..	698,780,519	1,843,435,749	24 74
1899	734,716,728	1,932,484,239	25.38
1900..	815,474,460	2,062,425,496	26.50

The coinage at the San Francisco Mint for July amounted to $6,680,827. It was issued in the following denominations: Double eagles, $6,540,000; half-dollars, $130,000; dimes, $10,827.

COPPER.—New York: Lake, 1 to 3 casks, 16.25 cash; carload lots, 16.00; Electrolytic, 1 to 3 casks, 16.50; carload lots, 16.25; Casting, 1 to 3 casks, 16.25; carload lots, 16.00. San Francisco: 17. Mill copper plates, 20c; bars, 22@23c.

LEAD.—New York, $4.00; Salt Lake City, 3.87½; St. Louis, $3.95; San Francisco $5.00, carload lots; 5½c 1000 to 4000 lbs.; pipe 6¾, sheet 7½, bar 6c. London, £17 12s 6d = 3.82½c per ℔.

SPELTER. — New York, $4.25; St. Louis, $4.15; San Francisco, ton lots, 5c; 100-lb lots, 5¾c.

ANTIMONY.—New York, Cookson's, 10¾c; Hallett's, 9¾c; San Francisco, 1000-lb lots, 12c; 300 to 500 lbs., 13@14c; 100-lb lots, 15@18c.

IRON. — Pittsburg, pig, No. 2, foundry, $15.50; gray forge, $15.00; San Francisco, bar, per lb., 2¾c. in small quantities.

STEEL. — Billets, Pittsburg, $19.00; bars, 1.10; San Francisco, bar, 7c to 12c per lb.

Pittsburg reports: The usual slump in the price of iron and steel, which comes along every August, is on, and buyers are waiting for rock bottom to be reached before placing their orders. Dealers say that this has already been touched, and, in fact, one prominent firm has refused several orders at current prices, although this only applies to steel wire.

There is one branch of the trade which is a most uncertain quantity, and that is tool steel. Thirteen of the principal tool steel companies in the country have formed a combination under the title of the Crucible Steel Company of America. As they represent about 95% of the total output, they may conclude to stiffen the price of tool steel, the price of which has only been raised once in fifteen years. But as there is a keen competition between the tool steel of this country and that of foreign manufacture, that fact may act as a brake on any advance.

The Pittsburg Commercial gives the following details of the disagreement existing between the Bessemer Pig Iron Association and the Steel & Wire Co.: "The Steel & Wire Co. some months ago contracted with the Bessemer Association for the delivery of 50,000 tons of Bessemer iron at an average of $25 a ton, deliveries to run until August. Of this tonnage 30,000 tons have been shipped, but 20,000 tons have not been taken from the furnace men, and the Wire Co. has declined to name a place where the iron may be delivered. The furnace owners claim that the action of the Steel & Wire Co. is due to the decline of $7 a ton in Bessemer pig, but that they propose to hold the Steel & Wire Co. to its contract."

The Bessemer Association has about 75,000 tons of pig iron on its books contracted for at from $22.50 to $24 per ton, and in many cases the buyers are trying to get rid of taking the goods. Some of the furnace owners say that the contracts will go into court; others believe that an amicable settlement will be made.

QUICKSILVER. — New York, $51.00; London, £9 10s; San Francisco, local, $50.00 ⅌ flask of 76½ ℔s.; Export, $47.

MAGNESIUM.—New York, $3.00 ⅌ ℔.; San Francisco, $4.00.

ZINC.—San Francisco, 5¾c; slab, 6c; bar, 7¾c.

SOLDER. — Half-and-half, 100-℔. lots, 21¼c; San Francisco, Plumbers', 100-℔. lots, 18¼c.

BABBITT METAL.— San Francisco, No. 1, 10c.

TIN.—New York, pig, $32.50; San Francisco, ton lots, 34c; 1000 ℔s., 34½c; 500 ℔s., 35c; less, 36c; bar tin, ⅌ ℔, 40c.

ASSAY LITHARGE.—San Francisco, 10c ⅌ ℔.

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 30c to 35c.

PLATINUM.— San Francisco, crude, $17 ⅌ oz.; New York, $18.25; manufactured, $19.50@22.00.

BISMUTH.—New York, ⅌ ℔., $1.60 50-℔ lots; San Francisco, $2.50 to $2.75 ℔ lots.

NICKEL.—New York, 50@60c ⅌ ℔.

TUNGSTEN.—New York, ⅌ ℔., 95c; San Francisco, $1.15.

FERRO-TUNGSTEN. — New York, 37%, 35c; San Francisco, 65c (60%).

FERRO-MANGANESE. — Pittsburg, 80%, domestic, $85.

CHEMICALS.—Cyanide of potassium, 98%-99%, jobbing, 32½@34½c ⅌ ℔.; carloads, 31@32c; in 10-℔. tins, 40c; sulphuric acid, 66% B, 2c ⅌ ℔.; soda ash, $1.60 ⅌ 100 ℔s. 58%; hyposulphite of soda, 2¾@3c ⅌ ℔.; blue vitriol, 5½@6c ⅌ ℔.; borax, concentrated, 7@8c ⅌ ℔.; chlorate of potash, 12@13c; roll sulphur, 6c; alum, $1.90@2.00; flour sulphur, French, 2¼@2½c; California refined, 1¾@2c; nitric acid, in carboys, 8c ⅌ ℔.; caustic soda, in drums, 3@4c ⅌ ℔.; Cal. s. soda, bbls., $1.00; sks, 95c ⅌ 100 ℔s.; chloride of lime, spot, $2.35@2.50; nitrate of potash, in kegs, 8c; caustic potash, 10c in 40-℔. tins.

OILS.—Linseed, pure, boiled, bbl., 79c; cs., 84c; raw, bbl., 77c; cs., 82c. Deodorized Stove Gasoline, bulk, 16c; do., cs., 22c; 86° Gasoline, bulk, 21c; do., cs., 27c; 63° Naphtha or Benzine, deodorized, in bulk, per gal., 15½c; do., in cs., 21½c; Lard Oil, Extra Winter Strained, bbl., 60c; cs., 65c; No. 1 bbl., 49½c; cs., 54½c; Neatsfoot Oil, coopers' bbls., 60c; extra bbls., 55c; cs., 60c; No. 1 bbl., 52½c; cs., 57½c.

POWDER.—F. o. b. San Francisco: No. 1. 70% nitro-glycerine, per ℔., in carload lots, 15¼c; less than one ton, 17¼c. No. 1*, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1** 50%, carload lots, 11¾c; less than one ton, 13¾c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9½c; less than one ton, 11½c. No. 2** 30% carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9, in lots not less than 1000.

FUSE.—Triple tape, $3.60 per 1000 feet; double tape, $2.95; single tape, $2.35; Hemp, $2.00; Cement No. 2, $2.95; Cement No. 1, $2.35, in lots of 3000 feet and up.

PHOSPHORUS. — F. o. b. New York or Philadelphia, 45@50c ⅌ ℔.

CANDLES.—Granite 6s, 16 oz., 40s., 11¾c ⅌ set; 14 oz., 40s., 10½c.

COAL. — San Francisco, coast, yard prices: Wellington, $9; Seattle, $7.00; Coos Bay, $5.50; Southfield, $9.00. Cargo lots, Eastern and foreign: Wallsend, $8.00; Brymbo, $7.50; Pennsylvania, hd., $14.00; Scotch, $8; Cumberland, $12; Cannel, $9.50; Welsh Anthracite, $12.00; Rock Springs, $8.50; Colorado Anthracite, $14.50. Coke, $16 per ton in bulk; $18 in sacks.

San Francisco Stock Board Sales.

SAN FRANCISCO, Aug. 2, 1900.

9:30 A. M. SESSION.

300 Alta	.06c	150 Overman	.10c
100 Belcher	.22c	50 Potosi	.15c
200 B. & B	.22c	300 Savage	.13c
25 C. C. & V.	$1 55	100 Sierra Nev.	.26c
100 Crown P't.	.16c	100 Silver Hill.	.64c
400 G. & C	.22c	400	.65c
100 H. & N	.24c	500 Union	.20c
200 Mexican.	.17c	500 Y. Jacket	.30c
700 Ophir	.70c	800	.31c

2:30 P. M. SESSION.

100 Savage	.13c	300 Alpha	.08c
100 Chollar	.15c	200 Belcher	.22c
100	.16c	300	21c
50 Crown P't.	.16c	200 Sierra Nev.	.26c
200 Y Jacket	.33c	500 Overman	.10c
100 C. C. & V.	$1 55	150 Caledonia	.85c
500 Imperial	.02c	800 Challenge	.25c

WANTED.

A Rich Placer proposition, adapted to working by Railroad Steam Shovel, or Dry Land Excavator. Description, with price and terms, to receive attention must be accompanied by reliable reports and references.

Address: EDWARD N. BREITUNG,
MARQUETTE, MICH.

Quicksilver
—FOR SALE BY—
The Eureka Company,
OF SAN FRANCISCO.
ROOM 1, - - 320 SANSOME STREET,
SAN FRANCISCO.

Quicksilver
For Sale in Lots to Suit.
REDINGTON & COMPANY, Wholesale Druggists, 23-25-27 Second Street, San Francisco.

BENJAMIN T. LLOYD,
STOCKS, BONDS AND MINES.
Have immediate customers for well-developed Gold and Copper Properties.
P. O. Box 608, SALT LAKE CITY, UTAH.

SITUATIONS WANTED.

WANTED.—A SITUATION BY A COMPETENT Assayer, Surveyor, Draughtsman and Bookkeeper, with good references. Address L. R., this office.

SITUATION WANTED

by a young man who has just finished a course in assaying and surveying. One with a mining expert preferred. Address W. B M., this office.

Experienced Accountant and Assayer, with knowledge of cyaniding and complete assay outfit, wishes employment with mining company, or would like to hear of favorable field for custom assay office. Highest references. Address L. S. U., this office.

ASSAYER—CHEMIST

desires appointment Four years chief assayer in present situation—one of the largest gold-silver mines. Highest testimonials. Address Assayer, Mining and Scientific Press.

WANTED—SITUATION AS MANAGER OF producing or developing property. Twelve years' experience in gold mining and milling, copper mining and smelting. Address C. H., care of Mining and Scientific Press.

An Experienced, Aggressive Mining Engineer and Metallurgist, technical graduate, eighteen years' practical experience in the United States and Canada as manager and consulting engineer of mines and mills, is open to engagement as manager, superintendent or chemist. Thoroughly understands economic mining and reduction of gold and silver ores. Not afraid of a hard proposition. Can leave present position with month's notice. Correspondence solicited and references exchanged. Address KARL NEITZEL, Camp McKinney, B. C

CYANIDING.

Have had charge of five mills and worked in every part of process from shoveling to laboratory work. Test ores and outline process for treating them. For three years treated SLIMES successfully Wish a position after July 10. Have studied to excel. References as to character and ability.

Address I B., care Mining and Scientific Press.

WANTED.

WANTED.—A CHEMIST AND ASSAYER FULLY conversant with the latest and most economical methods of cyaniding; also an Assistant Assayer and Chemist. State salary expected and forward testimonials. Address "Extraction," care of Mining and Scientific Press.

TO MINING EXPERTS.

WANTED.—A proposition containing magnetic pyrites (Fe_7 S_8 to Fe_{11} to S_{12}).

Address THOS. L. NEAL, Attorney, Lankershim Block, Los Angeles, Cal.

REFRACTORY ORES WANTED.

1000 TONS or more which will assay $75.00 Gold per ton and over, delivered free of charge at San Francisco, Cal. Correspondence solicited.

C. J. TALLON,
308 MARKET STREET, SAN FRANCISCO, CAL.

WE BUY very rich Ores, Dental Scraps, Tellurium Ores, Mill Wastes, Jewelers' Sweeps, Gold Retorts, Old Iron Retorts, Base Amalgam, Quicksilver, Amalgamated Plates, Gold and Silver, Old Slags.

A. M. DONALDSON & CO.,
ASSAYERS AND WASTE PRODUCT SMELTERS,
1661 Larimer St., Denver, Colo.
Write for Donaldson's Assayers' Slag Hammer.

THE ERICSSON SWEDISH TELEPHONES
HAVE BEEN IN USE OVER 20 YEARS.
THEY ALWAYS TALK. GIVE THEM A CHANCE TO TALK TO YOU.
CATALOGUES FREE.
ERICSSON TELEPHONE CO
20 WARREN ST. NEW YORK. N.Y.

FOR SALE.

FOR SALE.—Ten mines, forming a group (gold and silver), with mill site and water power. Acultapilco Mining District. Ore assaying from 30 ozs. to 100 ozs. to the ton; gold, ½ oz. Address to LIC. ELIAS GALINDO, P. O. Box 26. Tepic. Mexico.

FOR SALE — Developed Zinc-Lead-Silver Property. Texas.

Two trunk lines. 700 acres. 8100 feet on vein. Splendid concentrating proposition. 1500 feet development. Mine average: Zinc, 17.66%; lead, 9 57%; silver, 7.35 ozs.; gold, .04 ozs. Price, $30,000. Principals only. H. B. RUNKLE, El Paso, Texas.

FOR SALE.
Hydraulic Pump and Press.
Watson & Stillman Pump and Caking Press. Nearly new.
THE S. H. SUPPLY CO.
WRITE FOR CATALOGUE OF MINING MACHINERY AND SUPPLIES.
22nd and Larimer Sts., DENVER, COLO.

SECOND-HAND MACHINERY For Sale.

Boilers, Engines, Heaters, Pumps, Tanks, Steam Pipe, all sizes, Shafting, Pulleys Boxes, Hangers, Gears, Belting, etc. Iron and Wood Working Machinery, all kinds, all makes. We make a specialty of Saw Mill Supplies. Our prices are low and all goods are guaranteed as represented. Let us know your wants and we will please you.

Harris Machinery Co.,
1042 Washington Ave., S. E., Minneapolis, Minn.

Hydraulic Pipe FOR SALE CHEAP.

1500 feet of 10⅝-inch Casing weighing 27 lbs. to the foot, with Flanges, or Screws and Sockets; in lots to suit. Immediate delivery. Correspondence solicited.

C. J. TALLON,
308 Market Street,........San Francisco, Cal.

ASSAY OFFICE FOR SALE.

An old established and completely equipped Assay Office and Chemical Laboratory, doing a good business in Denver, Colo.; power plant with crushing and grinding apparatus in connection. Good business reasons for selling. Bargain if sold at once. Address Q 641, Mining and Scientific Press.

FOR SALE.
BIG COPPER MINE

In Shasta county. A south extension of Iron mountain. Croppings 700 feet wide; 600 to 800 feet of backs. Four miles from Sacramento river and railroad. Address C. D., this office.

5
Gold Quartz Claims
In Compact Body, Together With
10-STAMP
Quartz Mill and Mill Site
FOR SALE.

Situated on Dog Creek, Shasta Co., California, six miles from Delta Station, on the Shasta Division of the Southern Pacific Railroad, thirty-eight miles from Redding. Mines in good condition for inspection. Will be sold outright, or bonded for a sale after thorough inspection and experting. Property acquired by foreclosure of mortgage. Owner can not handle it.

C. C. BUSH, Trustee,
Address: REDDING, CAL.

FRED C. MILES,
CISCO, PLACER CO., CAL.
COPPER AND GOLD PROSPECTS.
A GOING GOLD PROPERTY.

U S

IT'S A CATALOGUE.

Our little ENGINEER'S RED BOOK is really our catalogue, though it is also one of the best vest pocket reference books for engineers ever published. It answers over 500 engineering problems and incidentally brings out convincing reasons why the

U. S. Automatic Injector

is better than any other.

Most engineers know this about the U. S. Injector, but the Red Book will tell them a good many things they don't know.

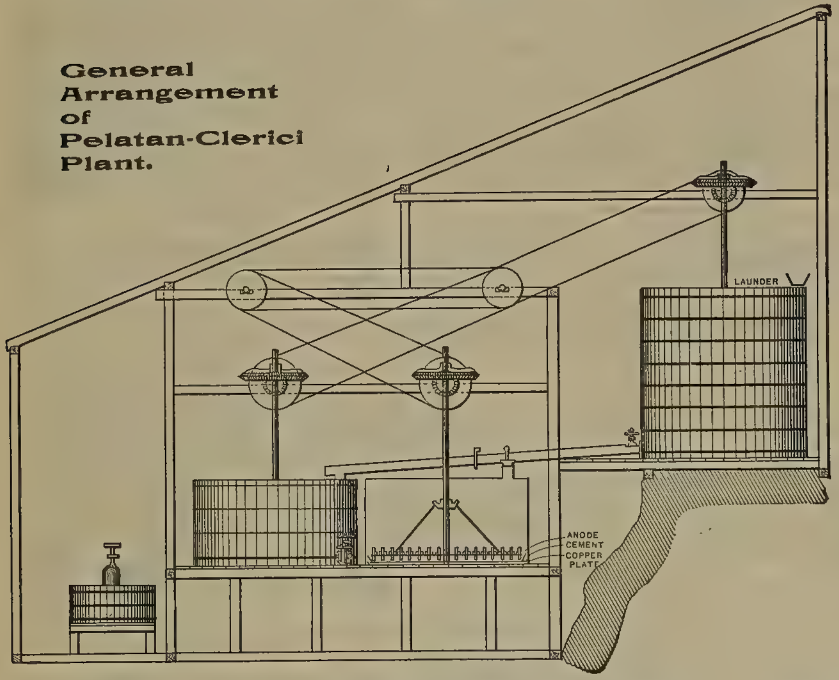
Can we send you one?

AMERICAN INJECTOR CO.,
DETROIT, MICH., U. S. A.

THE CAL. ANTI-CALORIC COMPANY,
Tel. Main 5752. Office, 217-219 Mission St., San Francisco, Cal.
Sole Manufacturers of CAL. ANTI-CALORIC SECTIONAL COVERINGS AND BLOCKS FOR BOILERS. PLASTIC (dry) for Steam Domes, Etc. Sole Agents for the Boston Asbestos Paper Co. Asbestos Goods of All Kinds. Send for Information. Factory, Potrero.

THE "PELATAN=CLERICI" PROCESS

OF TREATING REFRACTORY ORES



General Arrangement of Pelatan-Clerici Plant.

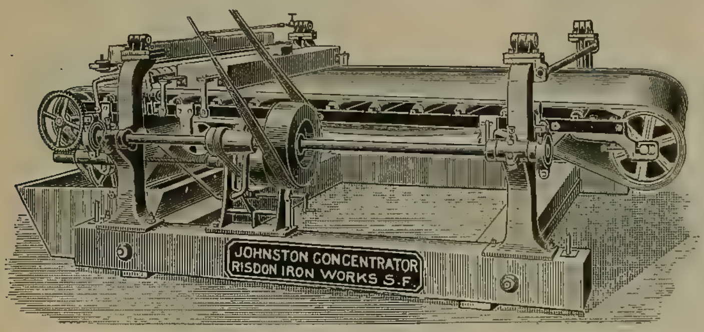
Saves the precious metals by the simplest, most economical and most efficient process known. No roasting or previous treatment, except ordinary crushing. Extraction complete in from 6 to 12 hours. Extracts equally well both fine refractory gold and coarse gold in the form of amalgam. Makes a greater saving of gold than any other process from raw material at less cost. The electric current and dissolving agent promptly dissolve the precious metals, both gold and silver. Samples of ore tested free of charge. Several mills saving over 90 per cent of values by bullion returns. Simplicity. Economy. Efficiency.

FOR PARTICULARS, WRITE TO

THE RISDON IRON WORKS,

SAN FRANCISCO, CAL.
AGENTS.

The JOHNSTON CONCENTRATOR.



DURABILITY, CAPACITY AND SIMPLICITY : : ARE ITS ESSENTIAL POINTS. : :

SAVES MORE VERY FINE SULPHURETS THAN ANY OTHER CONCENTRATOR MADE.

The Johnston Concentrator is slung with arms from above on an angle, giving it the oscillating motion that makes it a perfect machine. This undulating motion immediately settles the sulphurets, retaining all amalgam, leaving sulphurets very clean, one 6-ft. Johnston doing the work of two 4-ft. belt machines.

Send for Catalog No. 14.

Risdon Iron Works,

HOWARD AND BEALE STS., SAN FRANCISCO, CAL., U. S. A.

EXTRA HEAVY DOUBLE DRUM SECOND MOTION HOIST.

DO YOU REQUIRE A

HEAVY DUTY GEARED HOISTING ENGINE?

IF SO, WRITE TO US.

We have a large line of patterns for these plants and will build you one to meet your exact requirements and for ROUND OR FLAT ROPE.

Our stock of Boilers, Pumps, Compressors, Drills and General Mine Supplies is unequaled in the United States.

YOUR CORRESPONDENCE IS SOLICITED.

The Hendrie & Bolthoff M'f'g & Supply Co.

No. 34. DENVER, - - - - - - COLORADO.

ADAMANTINE SHOES AND DIES.

◆◆◆◆◆◆CHROME CAST STEEL.◆◆◆◆◆◆

CANDA Improved Self-Locking CAMS.

TAPPETS, BOSSES, ROLL SHELLS AND CRUSHER PLATES.

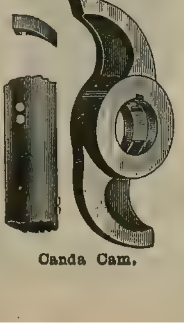
These castings are extensively used in all the mining States and Territories of North and South America. Guaranteed to prove better and cheaper than any others. Orders solicited subject to the above conditions. When ordering, send sketch with exact dimensions. Send for Illustrated Circular.

Manufactured by CHROME STEEL WORKS, Brooklyn, N. Y.

H. D. & H. W. MORRIS,

AGENTS,

Room 194 Crocker Building, San Francisco, Cal.



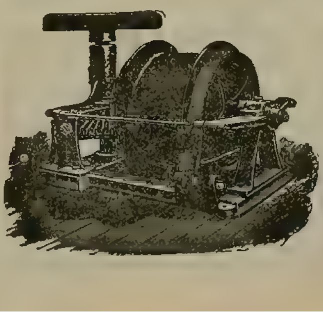
Canda Cam.

JOSHUA HENDY MACHINE WORKS,

No. 42 FREMONT STREET, SAN FRANCISCO, CAL.

—BUILDERS OF—

"Davis" Horse Power Whims. Ore and Rock Cars.



Specialty of
PROSPECTING,
MINING and
MILLING
PLANTS.

ORE and WATER
BUCKETS.

"T" RAIL OF
USUAL WEIGHTS,
EITHER NEW
OR SECOND-HAND,
FOR SALE
CHEAP.

LARGE VARIETY.

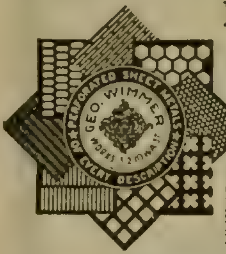
Perforated Metal

THE ROBERT AITCHISON PERFORATED METAL CO
303-305 DEARBORN ST. CHICAGO ILLS.

SUPERIOR WORK.

QUARTZ SCREENS

A specialty. Round, slot or barred slot holes. Genuine Russia Iron, Homogeneous Steel, Cast Steel or American planished Iron, Zinc, Copper or Brass Screens for all purposes. CALIFORNIA PERFORATING SCREEN CO., 145 and 147 Beale St., S. F.



Mining Screens
A SPECIALTY.

Diagonal Slot,
Straight "
Burred "
Round Holes.

In American planished or Russian iron or steel for all purposes. GEO WIMMER, 312 Iowa Street, San Francisco. Telephone Mint 1332.

—EASTERN PRICES BEATEN.—

SAN FRANCISCO
Pioneer Screen Works,
JOHN W. QUICK, Prop.

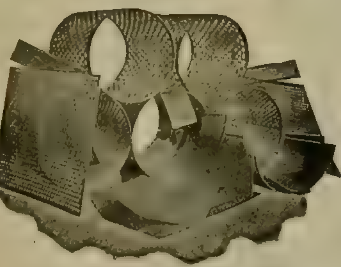
Improved Facilities! Finest Work! Lowest Prices!

Perforated Sheet Metals, Steel, Russia Iron, American Planish, Zinc, Copper and Brass Screens for All Uses.

MINING SCREENS A SPECIALTY.

221 and 223 First Street, San Francisco, Cal.

For Best Satisfaction
and Lowest Prices
—IN—
PERFORATED METALS
—AND—



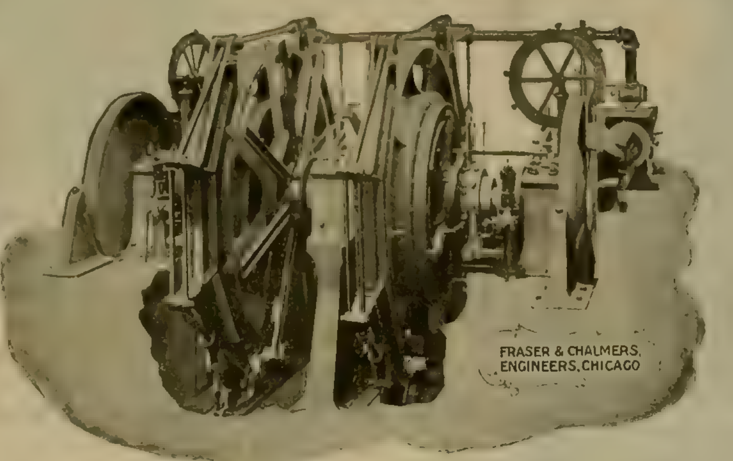
MINING SCREENS

PLACE YOUR ORDERS WITH

Fraser & Chalmers,
CHICAGO, ILL., U. S. A.

SEND FOR SAMPLES, MENTIONING THIS PAPER.

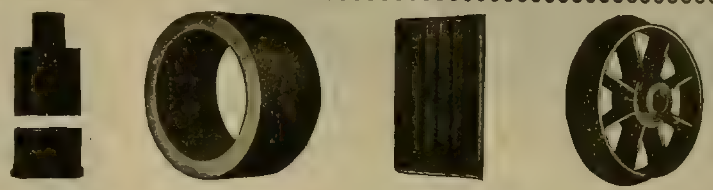
HOISTING ENGINES
IN GREAT VARIETY
ARE DESCRIBED IN
FRASER & CHALMERS
NEW EDITION
CATALOGUE NO. 2.



When you are thinking about putting in a new hoist
Get their catalogue,
Get their quotations,
Give them a fair opportunity to supply you with a fine machine.

Fraser & Chalmers,
Chicago, Ill.

HARD



TOUGH

TAYLOR IRON AND STEEL COMPANY,

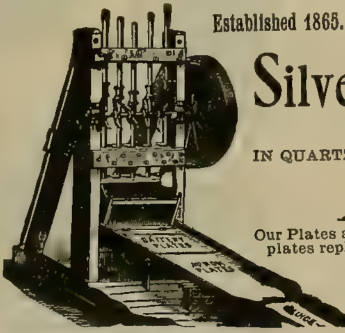
HIGH BRIDGE, NEW JERSEY, U. S. A.

Sole Licensees in America under the HADFIELD System and Patents for MANGANESE STEEL,

Best Metal Known for Roll Shells, Stamp Shoes and Dies, Crusher Plates and Side Liners, Toggles and Toggle Bearings, Gyratory Cones and Concaves, or Liners, Mine Car Wheels, Coal Crushing Rolls, Etc.

PACIFIC COAST PARTIES INTERESTED PLEASE ADDRESS PARKE & LACY CO., SAN FRANCISCO, CAL.

WRITE FOR INFORMATION AND PRICES.



Established 1865. NOTICE TO GOLD MINERS. Incorporated 1890.

Silver-Plated Copper Amalgamated Plates
FOR SAVING GOLD
IN QUARTZ, GRAVEL OR BEACH MINING. MADE OF BEST SOFT LAKE SUPERIOR COPPER.

AT REDUCED PRICES.

Our Plates are guaranteed, and by actual experience are proved, the best in weight of Silver and durability. Old Mining plates replated, bought, or gold separated. THOUSANDS OF ORDERS FILLED.

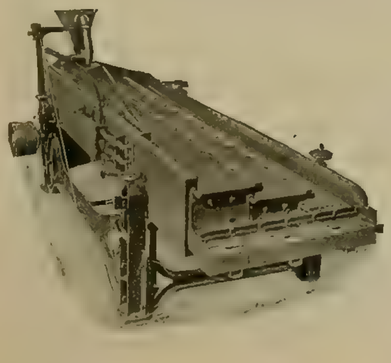
SAN FRANCISCO NOVELTY AND PLATING WORKS,

☞SEND FOR CIRCULARS. Telephone Main 976. 68, 70, 72, 74 and 76 FIRST STREET, COR. MISSION, SAN FRANCISCO, CAL.

FOWLER'S AIR SPACE
and Asbestos Sectional Covering.
As a Non-Conductor, Unequaled.
Special Rates for Steam Boilers and Drums.
G. C. Fowler, 656-58 Howard St., S. F.

DEWEY, STRONG & CO.
SCIENTIFIC PRESS PATENTS PATENT AGENCY
330 MARKET ST. S.F.

THE IMPROVED BARTLETT CONCENTRATING TABLE.

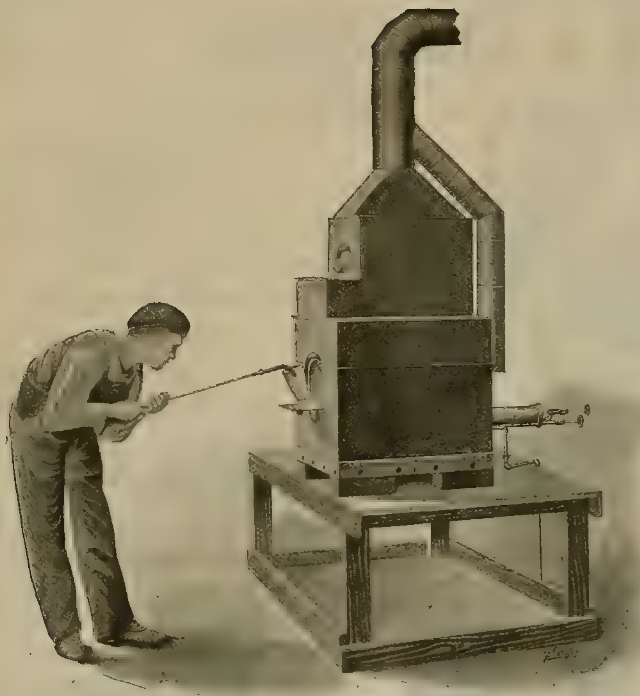


The BARTLETT CONCENTRATING TABLE has been GREATLY IMPROVED recently by the substitution of iron in place of wood wherever possible. It is now built with SOLID IRON TOP, PLANED TO A TRUE SURFACE AND POLISHED; all parts are made by template and EACH PART BEING INTERCHANGEABLE. As now constructed, the table has no special wearing parts and will last for many years. It has a CAPACITY OF FROM FIFTEEN TO FORTY-FIVE TONS IN TWENTY-FOUR HOURS, according to the class of ore worked. It is the only table in the world which will take the place of jigs and do away with all costly and complicated machinery.

It is Especially Designed for Separating Zinc from Lead.

Send for our illustrated catalogue, containing all the latest information on the concentration of ores.

THE COLORADO IRON WORKS CO.,
Established 1860. DENVER, COLO., U. S. A.



NO TROUBLE TO OPERATE--A BOY COULD RUN IT.

TO ASSAYERS:

This is our DOUBLE MUFFLE FURNACE, No. 37. The lower muffle is 10x16x6 inches, and will hold eight 20-gramme crucibles. The upper muffle is 6x12x4 inches.

One Cary burner, size 2 1-4 inches, heats both muffles simultaneously.

Starting with a cold furnace and burner, the first batch of eight crucibles can be poured in less than one hour from time of lighting match, and same cupelled in one hour and a half.

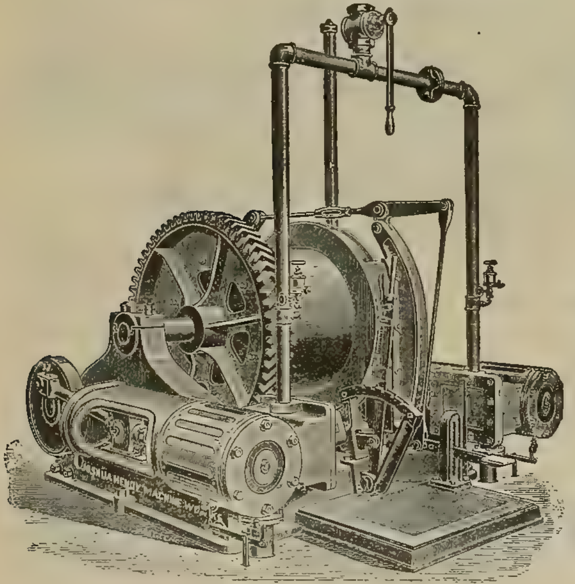
When furnace has become thoroughly heated, melts may be made every twenty minutes and cupellations every twenty-five minutes.

Further particulars on request to

F. W. BRAUN & CO.,
Modern Appliances for Assayers,
LOS ANGELES, CAL.

Joshua Hendy Machine Works,
San Francisco, Cal.

Office and Salesroom....................................38 to 44 Fremont Street.
Works....................................Cors. Bay, Kearny and Francisco Streets.

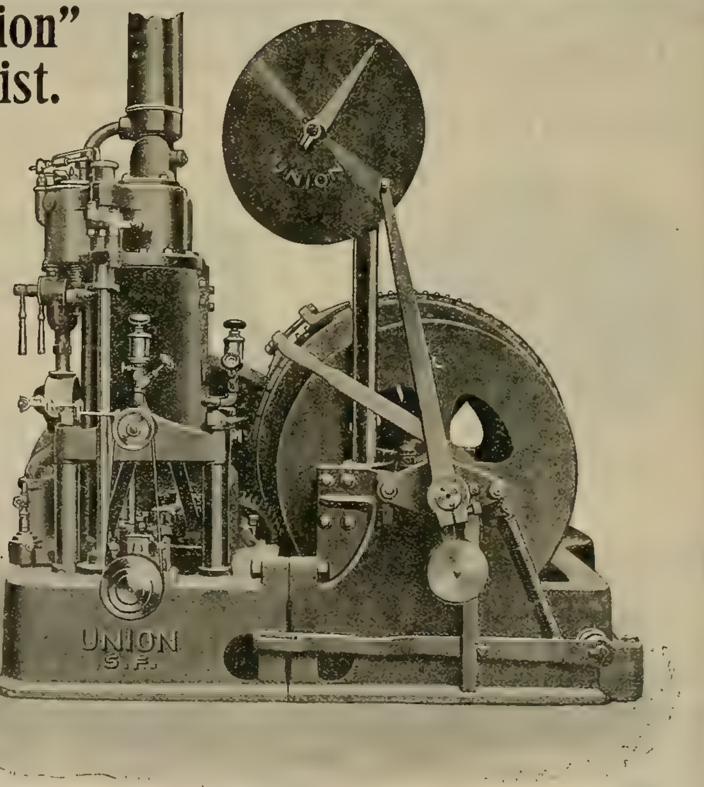


MINING AND MILLING MACHINERY.

DOUBLE CYLINDER SINGLE DRUM HOIST.

THE above form of Hoist has certain features of construction which make it superior to all others. It is mounted on a single solid base, with standboard for the operator. The engines are reversible link-motion and the drum is fitted with post-brakes and helical teeth, which assure quick and safe operation. The design is compact and superior and the construction strong and substantial. We furnish them either with or without clutch pinions. The above cut illustrates an 8½ inch by 10 inch. Other sizes in stock and built to order.

"Union" Hoist.

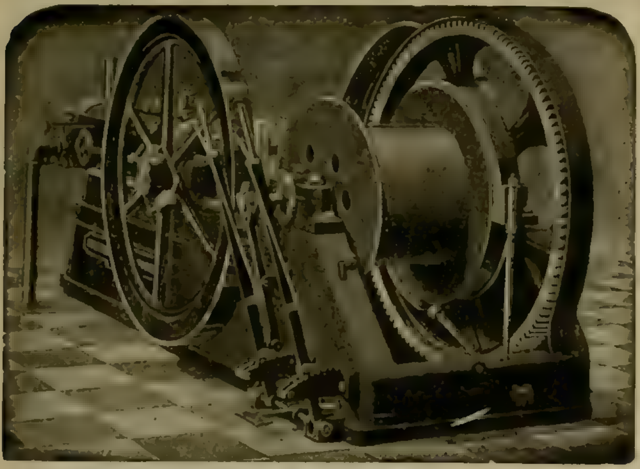


The above illustrates the 25 H. P. double cylinder, single drum "Union" hoist, with all the latest improvements.

THE UNION GAS ENGINE CO.
—BUILD THE—
"Union" Gas Engines,

Which use either MANUFACTURED or NATURAL GAS, ORDINARY STOVE GASOLINE (NAPHTHA or BENZINE), DISTILLATE or KEROSENE.
STATIONARY ENGINES for All Kinds of Work in Sizes from 8 to 300 h. p in actual use.
"UNION" COMBINED HOISTS in Sizes from 2 to 130 h. p. in actual use.
"UNION" COMBINED COMPRESSORS—20, 30, 40 h. p.
HOISTS and COMPRESSORS Can Be Built in Larger Sizes to Order.
"UNION" MARINE ENGINES, 4 to 200 h. p., of Single, Double and Four-Cylinder Types.
FIFTEEN YEARS' EXPERIENCE Building Gas and Oil Engines.
"UNION" ENGINES Are In Use All Over the United States.
"UNION" ENGINES Are Simple, Durable and Economical.

Office, 248 First Street. Works, Corner First and Clementina Streets. SAN FRANCISCO, CAL



FAIRBANKS-MORSE GASOLINE-DISTILLATE GEARED HOISTER.

An efficient and reliable combination of a Fairbanks-Morse Gasoline-Distillate Engine on the same base with a Friction Hoist. Modern and up to date. We publish a special catalogue describing our Hoister which we gladly mail prospective purchasers.

FAIRBANKS-MORSE GASOLINE-DISTILLATE ENGINES.

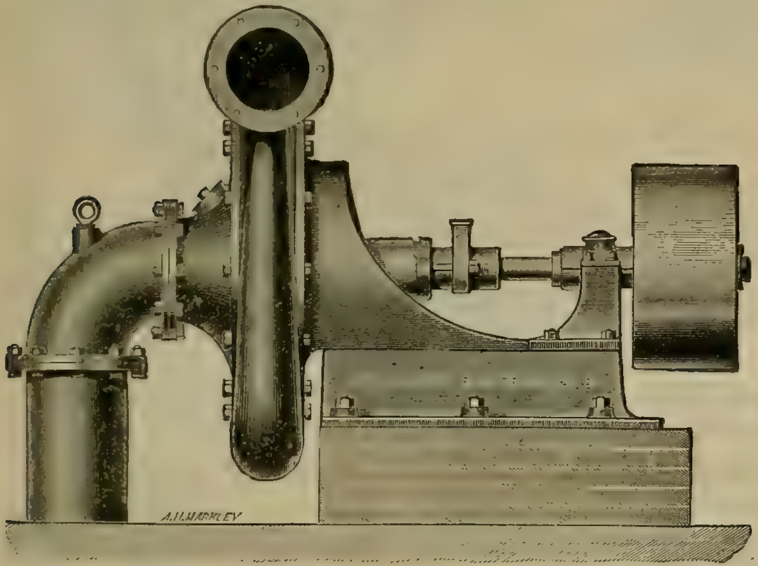
ALL SIZES UP TO AND INCLUDING 54 HORSE POWER.
For Pumping, Milling, Lighting, Air Compressors, Etc.

FOR CATALOGUES AND FULL INFORMATION, ADDRESS

FAIRBANKS, MORSE & CO.,

310 MARKET ST., SAN FRANCISCO, CAL.
201 N. LOS ANGELES ST., LOS ANGELES, CAL.
FIRST AND STARK STS. PORTLAND, OGN.
1600 SEVENTEENTH ST., DENVER, COL.
FRANKLIN AND MONROE STS., CHICAGO, ILL.

THE MOST WATER FOR THE LEAST MONEY!



For low lifts and large volume of water a Centrifugal Pump cannot be excelled.

We make the RICHARDS PATENT CENTRIFUGAL PUMP. Single suction, consequently less tendency to churn. Perfectly balanced runner. Protected bearings. Removable side plates. Accessible runner. Runners made of diameter to suit the lift. Will not churn at high speed.

Our pump catalogue tells about over fifty different kinds of pumps. Free to those interested.

W. T. GARRATT & CO.,

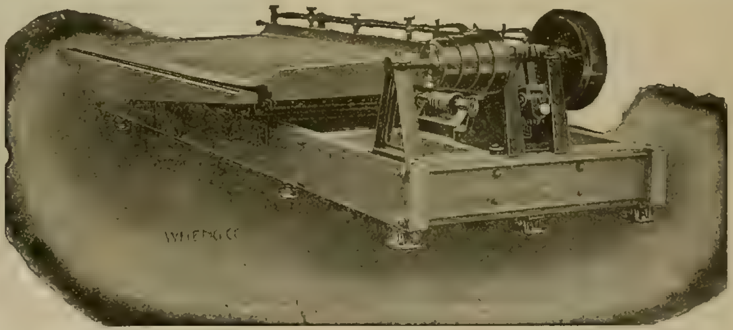
Cor. Fremont and Natoma Sts., San Francisco, Cal.

THE : CAMMETT : CONCENTRATOR.

Designed with some Regard for the Laws of Concentration.

From **The Denver Evening Post**, July 15th, 1900

* * * "Now about concentrating tables. Here's a fellow who says there's nothing equal to the Wilfley, and I am trying to convince him that old man Woodbury over in California makes the finest table in the world." "No, sir," said his comrade, "you're way off. I've tried the CAMMETT too thoroughly to believe there's anything made to equal it."



Manufactured Under U. S. Patent No. 632,892; Dated Sept. 12, 1899.

Denver Engineering Works,---Shepard & Searing,---Sole Manufacturers,

30th and Blake Streets, - - - - DENVER, COLORADO.

CHAS. C. MOORE & CO.,

—ENGINEERS AND DEALERS IN—
MAGNOLIA ANTI-FRICTION METAL,
HAMILTON CORLISS ENGINES, N. Y. SAFETY AUTOMATIC ENGINES,
BABCOCK & WILCOX BOILERS, McINTOSH & SEYMOUR ENGINES,
GREEN'S ECONOMIZERS, HOPPES LIVE STEAM PURIFIERS,
WHEELER CONDENSERS, BARNARD-WHEELER COOLING TOWERS,
EDMISTON FEED WATER FILTERS, BUNDY STEAM TRAPS,
SNOW STEAM PUMPS, QUIMBY SCREW PUMPS,
GOUBERT FEED WATER HEATERS, STRATTON STEAM SEPARATORS,
SPENCER DAMPER REGULATORS, HYATT ROLLER BEARINGS.

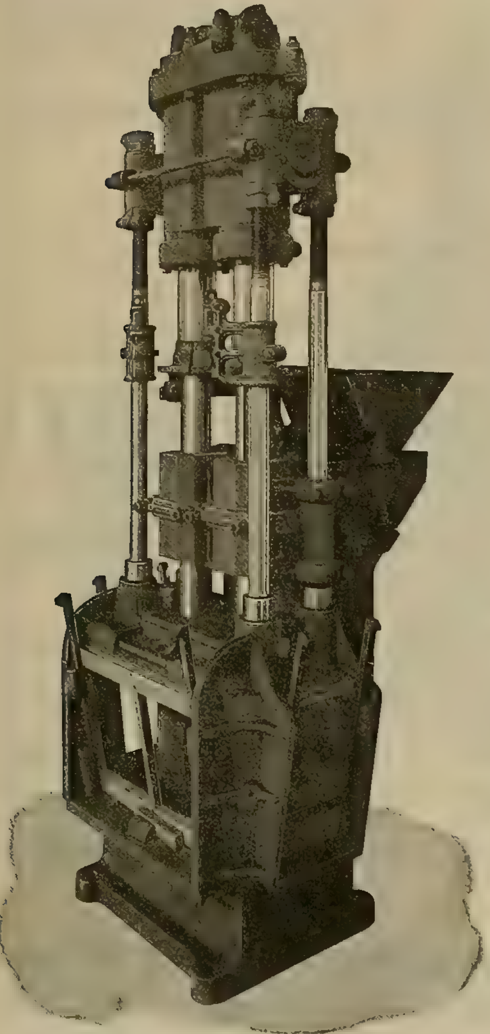
Contracts for Installation of Power Plants,
Any Capacity.

SEND FOR CATALOGUES AND FULL INFORMATION.

32 FIRST STREET, SAN FRANCISCO, CAL.

SEATTLE BRANCH............313 FIRST AVE. SOUTH.
LOS ANGELES BRANCH.......103 SOUTH BROADWAY.

GATES IRON WORKS.



THE TREMAIN STEAM STAMP MILL

has made many fortunes for its owners. It costs but little money. Can be transported anywhere.

A Money Maker in Nicaragua.

MURRA GOLD MINING COMPANY, NICARAGUA, C. A.
NICARAGUA, June 20, 1899.

GATES IRON WORKS, CHICAGO.—GENTLEMEN:

After an experience covering a period of three years with both the first and improved "Tremain Steam Stamp Mill," in every particular I have found it perfection—a money maker, and just the thing for a small capital, while companies organized on a large scale would do well to look into its merits.

I find no difficulty in crushing eight tons of ore per day and running on hard ore. This mill should be a winner.

Very truly yours,
[SIGNED] L. W. ADAMS,
General Manager Murra Gold Mining Co.

Eight Years in Operation Without a Cent for Repairs.

GOLDEN P. O., JOSEPHINE CO., COLO., December 23, 1899.

GATES IRON WORKS, CHICAGO.—GENTLEMEN:

Our Tremain Mill is giving us good results, and although being in operation since 1892 has not cost us $1 for repairs, and to-day is making 180 drops per minute with 95 lbs. steam pressure.

The ore we are working at present is soft and we mill in 24 hours, using No. 10 slot screen, 15 tons.

Yours truly,
M. C. DAVIS,
Superintendent Sarah Belle Mines.

Running Under Compressed Air in West Australia.

293 ST. GEORGE'S TERRACE, PERTH, W. A., February 6, 1900.

F. R. PERROT, ESQ , AGENT OF GATES IRON WORKS, PERTH, WEST AUSTRALIA.

DEAR SIR: In reply to your enquiry as to the working of the Tremain Mill on the Burbanks Grand Junction, I would state that at the start we worked this from the boiler supplied by the Gates Iron Works Company, but owing to certain irregularities of the running, which were in a measure due to the intermittent supply of ore and the short time that we were able to run it per day, I finally laid on air piping from my air compressor, a quarter of a mile distant, and used the boiler as an air receiver, with the result that I got an absolutely constant run, which, I believe, averaged about 105 drops per minute, and this was kept up with great regularity and showed a much better return in the treatment of the ore. The usual air pressure in this case was 80 lbs., whereas under steam we were not so satisfied with the result as worked at 100 lbs. By this we were also saved in cost the charges of stoker, fuel and water, and it was worked with much greater cleanliness, and during the whole time the mill was running—which was several months—it never froze up on us or showed any signs of trouble in that direction.

The mill is now temporarily stopped, but when it is again started I shall most decidedly continue the use of compressed air.

Yours faithfully,
[SIGNED] GEO. HEWER.

Send for Catalogue No. 8.

San Francisco Agents:
AMERICAN M'F'R'S ASSOCIATION,
20 & 22 Fremont St.

MAIN OFFICE AND WORKS:
650 ELSTON AVENUE,
CHICAGO.

Westinghouse Generators

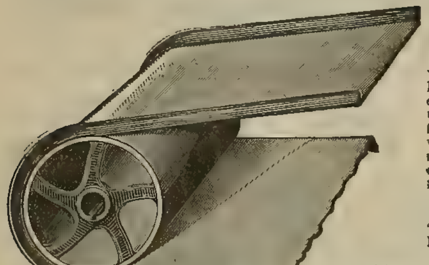
**Supply power to
Westinghouse Motors
operating in all
principal mines
in the
Cripple Creek District.**

Westinghouse Electric
& Manufacturing Co.,

All Principal Cities
in U. S. and Canada.

Pittsburg, Pa.

SPADONE'S CONCENTRATOR BELTS.



PATENTED.

This illustration shows the edge flanging outwardly as it passes over the pulley. This relieves the strain from the top and bottom of the edge by directing the strain automatically to the inside face surface of the edges. Heretofore all belts have been so constructed that when they pass over the pulleys or rolls, a direct strain comes upon the top or at the base of of the edges, causing the edges to break away from the body of the belts in a very short time. *We avoid this Mechanical Defect by our Spadone Curved Edge.* Belts made to fit any machine—4, 5 and 6 feet wide. Prices and samples on application.

AMALGAM PLATE CLEANERS.

Our Amalgam Plate Cleaners are made of Pure Rubber in moulds, thus insuring a plate cleaner which will not scratch the plates and a perfect edge which will clean the Amalgam plates evenly. They are made 6 inches long, 3 inches wide and ⅛ inch thick, making a convenient size to handle. Price by mail to any address, each 75 cents. Correspondence solicited.

Send us your order for Water, Air Drill, Steam, Suction and Fire HOSE, RUBBER BELTING, RUBBER PACKING and LEATHER BELTING.

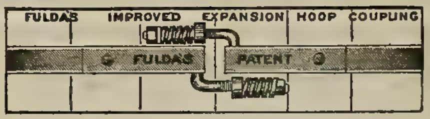
THE GUTTA PERCHA RUBBER AND M'F'G CO.,
30 and 32 FREMONT STREET, Telephone Main 1813. SAN FRANCISCO, CAL.

Fulda's Planing Mills and Tank Manufactory,

30 to 40 SPEAR ST., SAN FRANCISCO, CAL.

— MANUFACTURERS OF —

All Kinds of TANKS and VATS.



Our Patent Self-Tightening Hoop Coupling is the Only Practical Method of Keeping a Tank Tight at All Times Without Any Care or Trouble.

— WRITE FOR PRICE-LIST. —

Are You Confronted With a Difficult Ore-Separating Problem?

THE WETHERILL MAGNETIC SEPARATING PROCESS

may prove the solution. Apply to Wetherill Separating Company, 52 Broadway, N. Y.

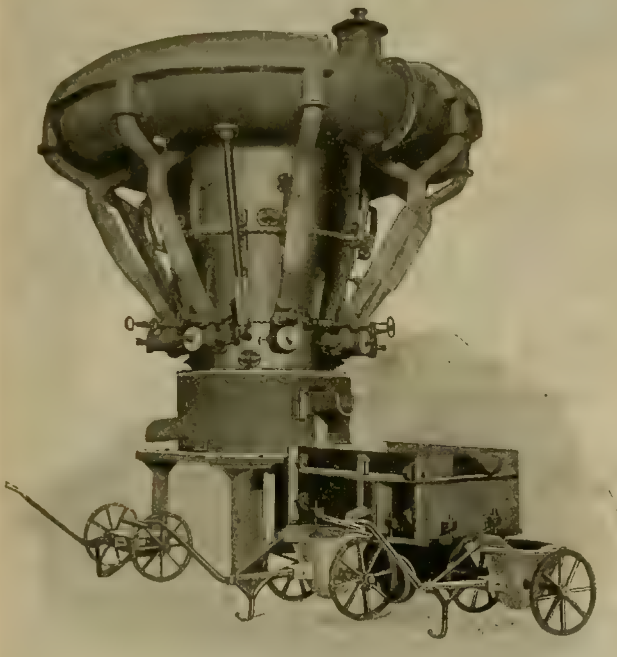
SELBY SMELTING AND LEAD CO.,

REFINERS OF GOLD AND SILVER BARS, GOLD DUST, ETC.

Buyers of Gold, Silver, Lead and Copper Ores, Gold Concentrates, Lead Bullion, Cyanide Product, Etc.

ORE AND BULLION ASSAYERS.

Works at VALLEJO JUNCTION, CAL. Office, 416 MONTGOMERY ST., SAN FRANCISCO, CAL.



THE COPPER FURNACE

Here illustrated has OUR PATENT

WATER VAPORIZING ATTACHMENT.

Experience has proven this to be the best of all methods for applying water for the cooling of jackets. It has the further great advantage of using only about one-eighth the usual amount of water needed for that purpose, and all jackets are kept at the same temperature.

We Manufacture Smelting Furnaces and Equipments

FOR THE TREATMENT OF

GOLD, SILVER, LEAD, COPPER and NICKEL ORES.

of any desired tonnage capacity above forty tons per day, and put them into successful operation under guarantee. Write for catalogue showing different styles of furnaces.

We also design, manufacture and erect Smelter Sulphide Mills for crushing and sampling ores. We are the originators of the Narrow Face, Large Diameter, High Speed Crushing Rolls. A full description of our Crushing Machinery is given in a special catalogue, which will be sent on application.

THE COLORADO IRON WORKS CO.

ESTABLISHED 1860.

DENVER, COLO., U. S. A.

SHOES and DIES

of **SUPERIOR** quality and at prices 20 to 30% lower than any other maker.

FURNISHED BY

ARTHUR KOPPEL, 66 Broad St., N. Y. City.

WRITE FOR PARTICULARS.

MINING CARS of every description.

PORTABLE RAILWAYS, Rolling Stock, Railway Outfits for Mines of every description. Export Work a specialty.

ARTHUR KOPPEL, 66 Broad St., N. Y. City.

SEND FOR CATALOGUE AND ESTIMATES.

Pacific Coast Agents, Baker & Hamilton, San Francisco and Sacramento.

ELECTRICITY.

Standard of the World.

THE Economical Solution OF THE MINING PROBLEM.

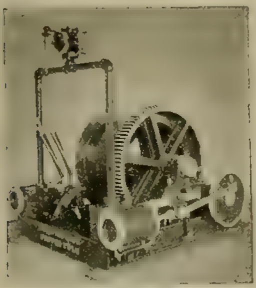
PUMPS, HOISTS and LOCOMOTIVES.

Hoist Driven by Electric Motor.

REFRACTORY MINES RENDERED PROFITABLE.

GENERAL ELECTRIC COMPANY,

SAN FRANCISCO, CAL., Claus Spreckels Building. DENVER, COLO., Kittredge Building.
PORTLAND, OR., Worcester Building. SALT LAKE CITY, UTAH, Templeton Building.



The above cut illustrates my new and improved Hoister.

Hoisting Engines

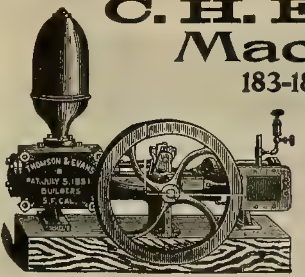
A SPECIALTY.

REVERSIBLE, LINK-MOTION, GEARED and FRICTION CLUTCH HOISTS carried in stock.

Special Machinery Built to Order.

GEO. G. JACKSON,

1724-34 Wynkoop St., DENVER, COLO.



C. H. EVANS & CO.,

Machine Works,

183-185-187 FREMONT STREET,

Where, with Enlarged and Increased Facilities, they are better than ever prepared to do

First-Class Machine Work

Promptly, and at Reasonable Prices, and will continue the manufacture of

Thomson & Evans Steam Pumps,

Deep Well Pumps, Power Pumps, Etc,
Also Marine Engines, Ship and Steamboat Work, Pipe Cutting, General Jobbing and Repairing.

MINE BELL SIGNALS. Adopted, Used and in Force in Accordance with Law.

We print in legal size, 12x36 inches, the Mine Bell Signals and Rules provided for in the Voorhies Act passed by the California Legislature. The law is entitled "An Act to Establish a Uniform System of Bell Signals to Be Used in All Mines Operated in the State of California, for the Protection of Miners." We furnish these Signals and Rules, printed on cloth so as to withstand dampness. **50 Cents a Copy.**

MINING AND SCIENTIFIC PRESS, 330 Market St., San Francisco, Cal.

Mining Hoist.

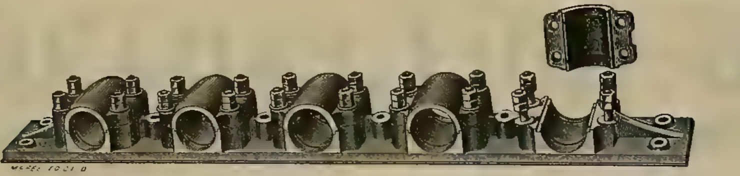
THE GOLDEN GATE GAS ENGINE
Will raise more ore than any other AT LESS COST.

MANY IN USE, Giving Satisfaction.

Built for any Capacity and for any Purpose.
Pumping Water, Propelling Boats, Hoisting Ore, Machine Shop Power, Etc.

Send for Particulars and Catalogue.

ADAM SCHILLING & SONS,
213 & 215 Main St., San Francisco, Cal.



Globe Battery Stem Guide.

PATENTED AUGUST 24, 1897.

RIGID. SIMPLE. DURABLE. EFFICIENT. ECONOMICAL.

Effect a Saving in Friction Losses. No Trouble to Install.
No Alterations of Mill Necessary. No Keys or Wedges to Adjust.

MANUFACTURED ONLY BY

GLOBE IRON WORKS, STOCKTON, CAL., U. S. A.

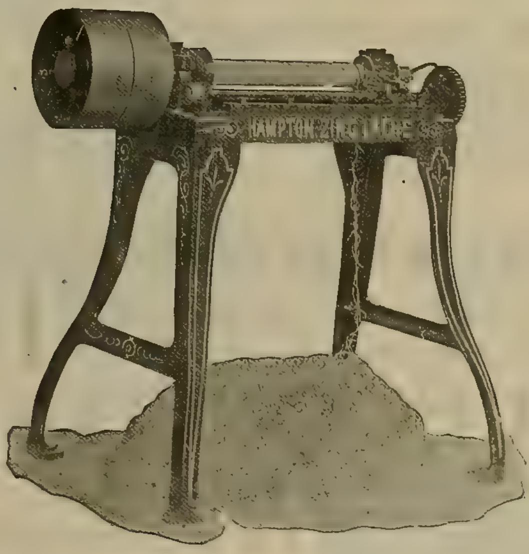
Manufacturers of All Classes of Mining Machinery. Estimates Furnished.

TANKS!

AND COMPLETE

CYANIDE PLANTS.

ILLUSTRATED CATALOGUE



MAILED FREE.

Zinc Lathes with Automatic Feed

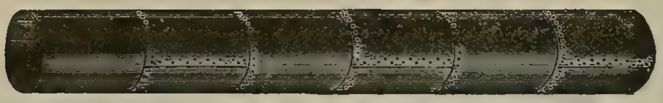
FOR CUTTING ZINC SHAVINGS.

Pacific Tank Co., Manufacturers.

348 East Second Street,
Los Angeles, Cal.

35 Beale Street,
San Francisco, Cal.

RIVETED IRON AND STEEL PIPE



FOR HYDRAULIC MINES, IRRIGATION AND POWER PLANTS. Manufactured from the best grades of IRON or STEEL by MODERN MACHINERY.

AGENTS FOR THE Celebrated **CANTON STEEL.**

Schaw, Ingram, Batcher & Co.,

539 Mission St.,
SAN FRANCISCO.

211 to 219 J St.,
SACRAMENTO.

MACHINERY BARGAINS.

I have some splendid Air Compressors, Hoisting Engines, Rock Drills, Rock Crushers, Channeling Machines, Steam Pumps, Boilers, Steam Shovels, Locomotives and Relaying Rails, all in splendid condition. Send for printed list and specify your requirements. I can save you money. WILLIS SHAW, 627 New York Life Building, CHICAGO.

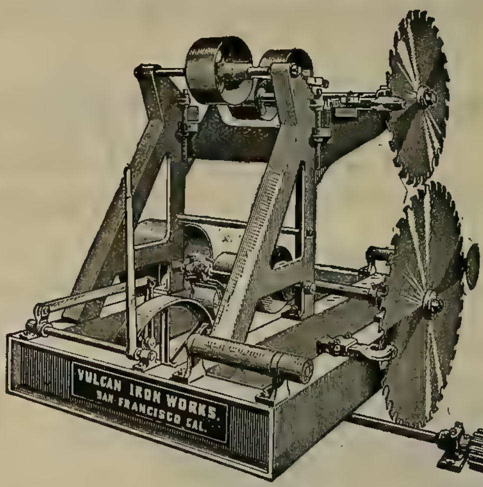
Portable Saw Mills.

No. 0
Single Circular.
4000 – 6000 feet per day.

No. 1
Single Circular.
8,000 – 10,000 ft. per day.

No. 2
Double Circular.
15,000–20,000 ft. per day.

No. 3
Double Circular.
20,000–25,000 ft. per day.



For
Mining
Companies
—OR—
Other Consumers
of Lumber at
Remote Points.

SEND FOR CATALOGUE.

Manufactured by

VULCAN IRON WORKS, Office, 505 Mission Street,
SAN FRANCISCO, CAL.

MINING, MILLING and SMELTING MACHINERY.

LEYNER AIR DRILLS,
AIR COMPRESSORS,

POWER, PUMPING & BLOWING ENGINES.
MILWAUKEE, WIS., U.S.A.
THE EDWARD P. ALLIS COMPANY.
FLOUR MILL, SAW MILL, AND MINING MACH'Y.

ROASTING FURNACES,
STAMP MILLS,
and ORE CRUSHERS.

REYNOLDS CORLISS ENGINES.

CATALOGUES UPON APPLICATION.

THE MARION STEAM SHOVEL CO.,

Steam Shovels
Dredges and
Traction Dredges

Suitable for all kinds of Excavating Work, making a specialty of

PLACER MINING MACHINES,

separate or self-contained, either as a dry land excavator or floating dredge.

The Marion Steam Shovel Co.
MARION, OHIO.

GEO. W. BARNHART, No. 4 Sutter St., San Francisco, Cal.

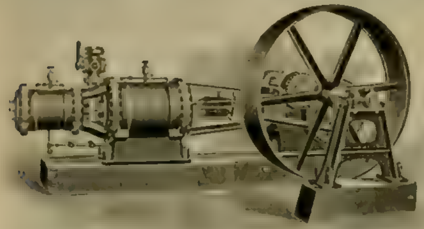
SECOND-HAND MACHINERY

SPECIALTIES:
PULLEYS, SHAFTING,
BELTING, BOXES,
BOILERS, ENGINES,
HOISTERS,
STAMP MILLS,
RAILS, CABLE,
and all but little used.

THE S. S. MACHINERY CO.,
Sixth and Market Sts.,

Denver, Colo.

Write or Ask for Descriptive Circulars.



WHY NOT have our catalogues, specifications and prices before you purchase

AIR DRILLS OR COMPRESSORS?

Our guarantees are strong; our customers are satisfied. We can satisfy YOU.

J. Geo. Leyner,
729 Seventeenth St.,
DENVER, COLO.

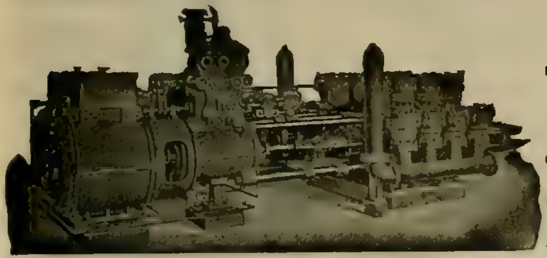
The only roofing without a fault

P & B Ready Roofing

Paraffine Paint Co
116 Battery Street—San Francisco

The best builders in America use P & B Ready Roofing. Shingles may warp, slate may chip, tin may sweat, tar may run, or iron expand, but P & B will stand any climatic condition—the weather of the west requires it

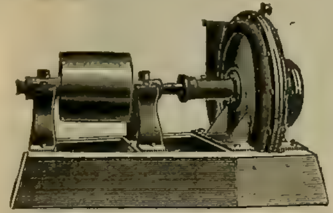
Demand it of your dealer



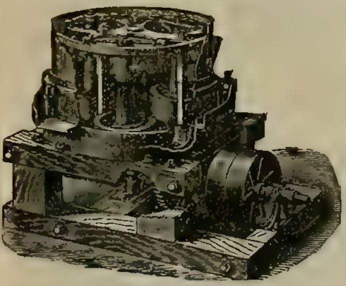
The Best MINE PUMPS in the World.
COMPOUND CONDENSING AND TRIPLE EXPANSION STATION PUMPS.
We carry in our Denver store a stock of Improved Pattern Sinkers and Duplex Station Pumps, with duplicate parts for repairs.
Write for Catalogue and Estimates.

Jeanesville Iron Works Co.,
JEANESVILLE, PA

Western Office,
Columbia Hotel Building,
1328 17th St
Denver, Colo.
Telephone 2298 A
A. MIDDLEBROOK, Manager.



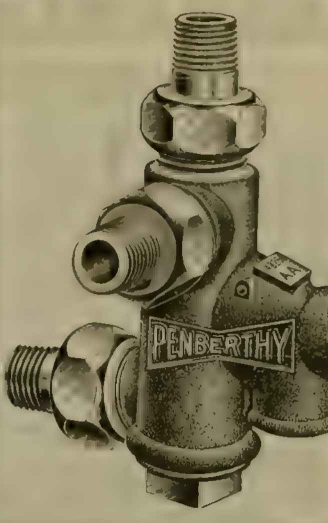
CENTRIFUGAL PUMPS
COMPLETE PUMPING PLANTS INSTALLED.
JOHN WIGMORE & SONS CO.,
117-123 S. Los Angeles St., LOS ANGELES, CAL.



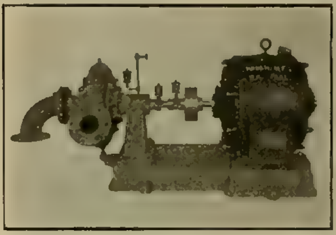
Centrifugal Roller Quartz Mill.

F. A. HUNTINGTON,
—Manufacturer of—
CENTRIFUGAL
Roller Quartz Mills.
CONCENTRATORS and ORE CRUSHERS.
Mining Machinery of Every Description.
Steam Engines, Shingle Machines.
Room 1, 3d Floor, Mills Building,
SAN FRANCISCO, CAL.

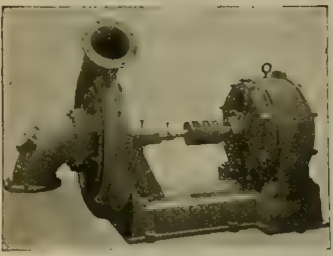
STRICTLY C. P. ACIDS and C. P. AMMONIA
MANUFACTURED BY
The Western Chemical Co.,
DENVER, COLO.
For Laboratory Use and Fine Chemical Work.
PURITY GUARANTEED.
Also COMMERCIAL ACIDS.



TRADE **PENBERTHY** MARK.
AUTOMATIC INJECTOR.
14 Years in the Market.
SALES 200,000.
The result of a business established on MERIT and built up by the production of Injectors unequaled for SIMPLICITY, RELIABILITY AND ECONOMY.
Penberthy Injector Co.,
DETROIT, MICH.

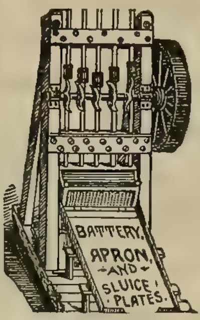


MODERN MINING MACHINERY.
QUARTZ MILLS of any capacity,
IN UNITS OF TWO AND FIVE STAMPS.
Acme Amalgamators for CAPE NOME
and other placer mining. Successfully applied to quartz mills in addition to or displacing plates.
Successful Gravel Mill Recently Improved.
Special Gold Dredging Pumps and Machinery. Concentrators, Feeders. Rock Breakers and Power Plants.
Largest manufacturers of Irrigation and Reclamation Pumps in the United States.
Catalogues: No. 20, Pumps; No. 22, Cape Nome; No. 25, Mining.
KROGH MANUFACTURING CO., 9-17 Stevenson St. and 134-136 Main St., San Francisco, Cal.



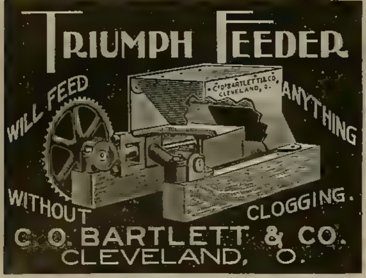
CENTRIFUGAL PUMPS
—FOR—
Mine Draining or Hydraulicking.
WE DESIGN PUMPS FOR ALL CONDITIONS.
WRITE FOR CATALOGUE.
BYRON JACKSON MACHINE WORKS, - SAN FRANCISCO, CAL.

STEEL RAILS, TRACK FIXTURES,
PRODUCT PENNSYLVANIA STEEL COMPANY.
BAR, SHEET AND BOILER STEEL,
STRUCTURAL MATERIAL,
Cold Rolled Shafting.
GEORGE W. GIBBS COMPANY,
33-39 Fremont Street, 38-40 Beale Street,
CORRESPONDENCE SOLICITED. SAN FRANCISCO, CAL.


BATTERY, APRON -AND- SLUICE PLATES

To Gold Miners!
Silver Plated Copper Amalgamating Plates
For Saving Gold in Quartz and Placer Mining.
ONLY BEST COPPER AND REFINED SILVER USED. OLD MINING PLATES BOUGHT OR TAKEN IN EXCHANGE FOR NEW PLATES. GOLD EXTRACTED FROM OLD PLATES AT A MODERATE COST. OLD PLATES REPLATED. GOLD, SILVER, NICKEL, COPPER AND BRASS PLATING.
Denniston San Francisco Plating Works,
632 Mission Street, Cor. Annie, San Francisco, Cal.
E. G. DENNISTON, - - - - - - - - - Proprietor.
—:Send for Circular.:—

W. H. BIRCH & CO.
OFFICE AND WORKS:
127-129-131-133-135 First St., San Francisco, Cal.
WRITE FOR A CIRCULAR ON THE
"BIRCH" Improved Two-Stamp Mill.
IRON FRAME. TRIPLE DISCHARGE. 850-LB. STAMPS. FORGED STEEL SHOES AND DIES.
Price, $450 f. o. b.
Manufacturers of the LIGHTNER QUARTZ MILL.


TRIUMPH FEEDER
WILL FEED ANYTHING WITHOUT CLOGGING.
C. O. BARTLETT & CO. CLEVELAND, O.
C. O. BARTLETT & CO. CLEVELAND, O.

PRICE, $50.00.

Mining, Mill, Driving Lamps

—AND—

Locomotive Headlights.

◆◆◆◆◆◆

SIZES ON HAND:
24-inch,
20 "
17 "
14 "
12 "
10 "
8 "
6 "

Boesch Lamp Co.,

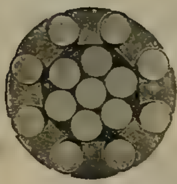
Pacific Lamp and Reflector Factory,
585 MISSION STREET, : : : : : SAN FRANCISCO.

THE PATENTED

Locked-Coil Cables AND Webber Compression Grips

Are features of the patented **BLEICHERT WIRE ROPE TRAMWAY** And other systems of aerial transportation.

Bleichert Tramway of the Maine Insane Hospital, Augusta, Me. View of Loading Terminal and Dock Hoist.



Manufactured by

The Trenton Iron Co.,

TRENTON, N. J.

Engineers and Contractors, and sole licensees in North America for the Bleichert System. Also, **Wire Rope Equipments for Surface and Underground Haulage, Etc.**

FOR PARTICULARS, ADDRESS

NEWTON M. BELL, Agent, 308 Market St., S. F.

☞ A full stock of the Trenton Iron Co.'s Wire Ropes, made from "SPECIAL" Crucible and Plough Steel, carried in San Francisco.

JOHN A. ROEBLING'S SONS Co.
IRON & STEEL
WIRE ROPE
TELEGRAPH WIRE, COPPER WIRE
Works at Trenton, N.J.
WAREHOUSES,
117 LIBERTY ST., NEW YORK.
25 FREMONT ST., SAN FRANCISCO.
173 LAKE ST., CHICAGO, ILL.
INSULATED MAGNET WIRE & ELECTRIC WIRES.

OUR 24-INCH WRENCH IS ESPECIALLY ADAPTED FOR MINE WORK.

The Johnston Patented Pipe Wrench.

A Strictly High-Grade Tool---Drop-Forged---Warranted.

THE STRONGEST, SIMPLEST AND BEST.

Never Jams, Self-Adjusting, Self-Releasing.

MADE IN 3 SIZES:

	10 in.	16 in.	24 in.
Pipe	⅛ to 1 in.	¼ to 1½ in.	½ to 2½ in.
List	$2 25	$3.00	$6 00

WM. B. VOLGER,
SOLE MANUFACTURER,
88 Chambers St., NEW YORK.

Agencies: THE MINE & SMELTER SUPPLY CO., Denver and Salt Lake City.

TRADE MARK.

(M'ARTHUR-FORREST PROCESS.)

CYANIDE PROCESS.

The MacArthur-Forrest Cyanide Process is the Best

For the Treatment of Refractory and Low Grade Gold and Silver Ores and Tailings. We are the Originators of the Cyanide Treatment, and have kept up with the times in all Improvements in Cyanide Methods.

Successful Plants in Operation in all Western Mining States.

Samples Assayed and Fully Reported Upon. Properties Examined Designs Furnished. For Terms and Particulars, Address

The Gold and Silver Extraction Co. of America, Ltd.
GEO. A. ANDERSON, General Manager,
208-210 McPhee Building, Denver, Colo.

Testing Works: 1716 Blake Street, Denver, Colo.

ALMARIN B. PAUL, Agent, 27 Crocker Building, San Francisco, Cal.

"PNEUMATIC" CYANIDE PROCESS.

(Patented in U. S., So. African Republic, New Zealand, Victoria, New So. Wales, So. Australia.)

WILL DO IN 7 HOURS WHAT REQUIRES FROM 2 TO 6 DAYS BY OLDER METHODS.

SEND FOR PAMPHLET.

THE PNEUMATIC CYANIDE PROCESS CO., 306 Boston Bldg., Denver, Colo.

FRANCIS SMITH & CO.,

—MANUFACTURERS OF—

FOR TOWN WATER WORKS.

Hydraulic, Irrigation and Power Plants, Well Pipe, Etc., all sizes.

46 FREMONT STREET, - - - - SAN FRANCISCO, CAL.

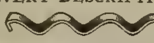
Iron cut, punched and formed, for making pipe on ground where required. All kinds of Tools supplied for making Pipe. Estimates given when required. Are prepared for coating all sizes of Pipes with Asphaltum.

CARY SPRING WORKS,

240 & 242 WEST 29th STREET, NEW YORK, U. S. A.

Telephone, 3346—38th St.

WIRE SPRINGS OF EVERY DESCRIPTION.



MANUFACTURERS OF
All kinds of ROUND AND FLAT WIRE, TEMPERED AND UNTEMPERED.
SPRINGS
For Machinery, Rolling Shutters, Motors Etc.

MUSIC BOX AND FINE SPRINGS OUR SPECIALTY.

SMOOTH-ON
TRADE MARK

CASTINGS.

An iron cement for repairing leaks or fractures in steam or hydraulic work. When hard it will withstand a red heat, steam, water or oil, and expands and contracts with heat and cold the same as iron, insuring a tight joint at all temperatures. Difficult flange connections can easily be made with Smooth-On, as it adapts itself to the flanged faces whether parallel or not. Connections are easily taken apart. Unequaled for boiler patching, and repairing blemishes in iron castings. Write for catalogue and prices. Sole proprietors and manufacturers: Smooth-On Mfg. Co., Jersey City, N. J., U. S. A.

MESSRS. MADISON, BRUCE & SELLERS,

34-36 STEUART ST., SAN FRANCISCO, CAL........................AGENTS FOR PACIFIC COAST

WEST COAST OF MEXICO.

WÖHLER, BARTNING Suc's, Mazatlan (Sinaloa), Mex.

Bankers, Importers, Exporters and Commission Merchants.

Representatives and Agents of the principal Mining Companies in the State of Sinaloa and the dependencies of the Pacific coast in the States of Durango, Chihuahua, Sonora, Lower California and Jalisco.

ORE BUYERS AND EXPORTERS. - MINING SUPPLIES.

EFFECTING ECONOMY IN

Steam and Power Plants

IS MY BUSINESS.

DOES IT INTEREST YOU?

Howard H. Fielding,
1328 Seventeenth St., DENVER, COLO.

MICHIGAN COLLEGE OF MINES.

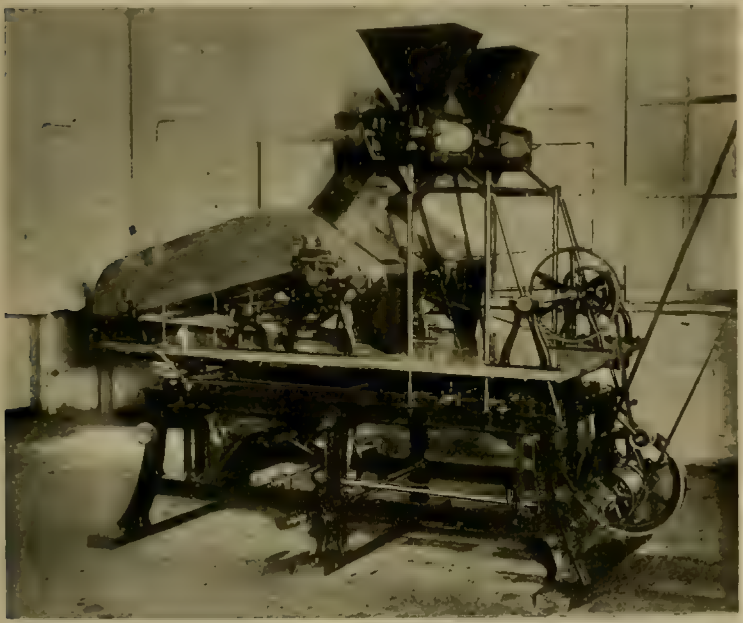
An Engineering School with unique location, giving it unusual facilities. Distinctive methods of instruction. Special courses. For catalogue giving occupation of graduates, address
F. W. McNAIR, President, Houghton, Mich.

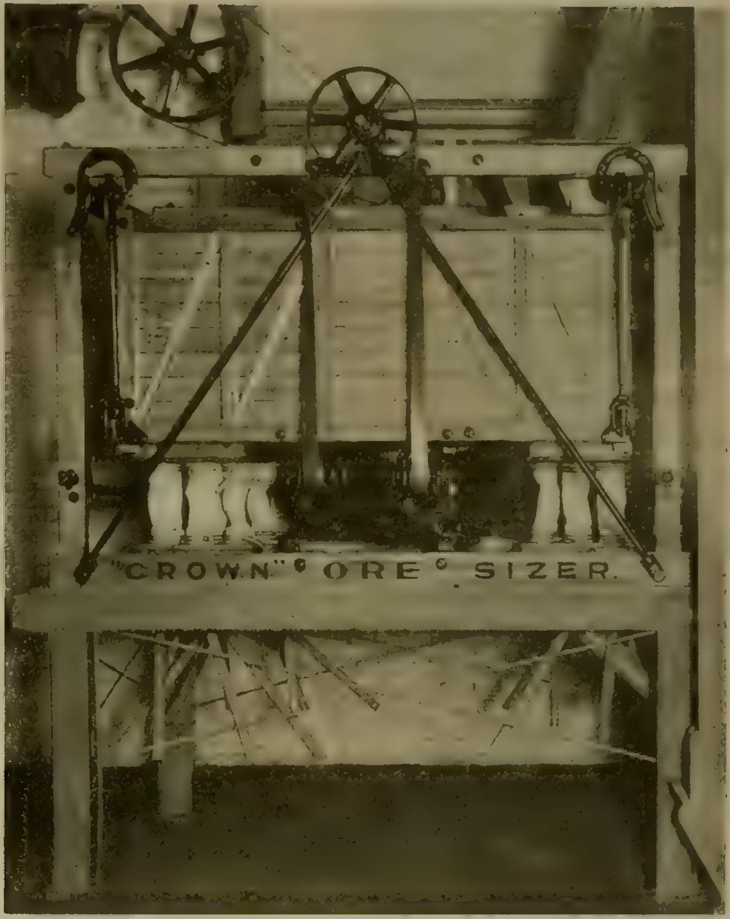
THE CALIFORNIA DEBRIS COMMISSION, having received applications to mine by the hydraulic process from F. E. Thomas, in the Gold Run Placer Claim near Quincy, Plumas Co., to deposit tailings on a flat; from Walter C. Robinson, in the Deadwood Hill Mine, near Meadow Valley, Plumas Co., to deposit tailings in Deadwood Creek; from W. B. Meek, in the Indian Hill Mine, near Camptonville, Yuba Co., to deposit tailings in Indian Creek; from the La Porte Consolidated Gold Mining Co., in the Dutch Mine, near La Porte, Plumas Co., to deposit tailings in Rabbit Creek; from J. T. Birmingham, in the Strawberry Mine, at Strawberry Valley, Yuba Co., to deposit tailings in a worked-out pit; and from C. M. Jurgenson, in the Garden City Mine, near Gibsonville, Sierra Co., to deposit tailings in a ravine, gives notice that a meeting will be held at Room 59, Flood Building, San Francisco, Cal., on August 13, 1900, at 1:30 P. M.

CROWN GOLD MILLING CO.

Manufacturers of the "CROWN" CONCENTRATOR and CROWN ORE SIZER. A dry process of sizing and concentrating ore, sand or gravel. Designed to accord fully with the laws of specific gravity, and especially adapted to refractory ore or localities where there is no water.

The chief claims for the Crown Concentrator are that it occupies less floor space and has nearly four times the capacity of any wet concentrator; that it will concentrate ores containing base and refractory metals that ordinarily slime and carry off values; that it effects a saving of values far above the ordinary methods of concentration.



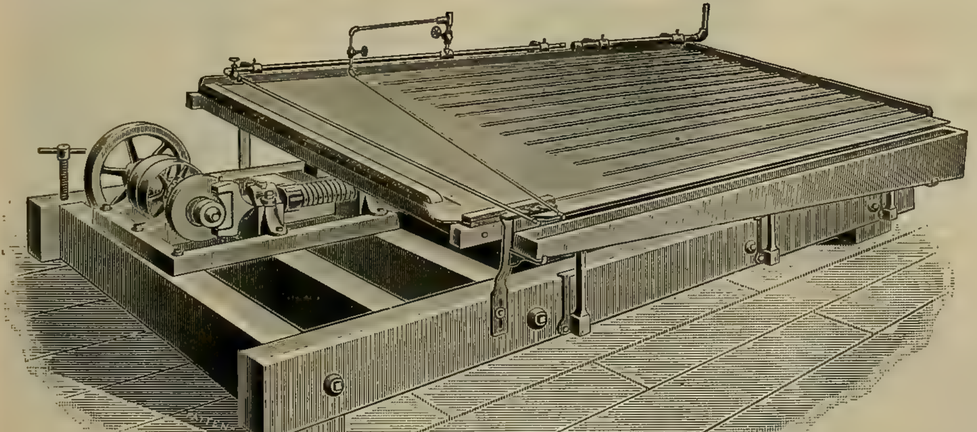


Works, 23 Stevenson St. Office, 230 Post St. SAN FRANCISCO, CAL.

GATES FINE CRUSHER.

The result of ten years' solid work. Success at last. What we wanted, and the public demanded, was a Gates Gyratory Rock and Ore Breaker (always adjustable and indestructible) so modified in design as to make one-half-inch product from three-inch sizes, rapidly and cheaply. The H Fine Crusher will do this work. It takes the place of expensive big rolls and often prepares ore, without further crushing, fine enough for coarse concentration or cyaniding. In any event, it is the greatest and best intermediate machine between the coarse breaker and the pulverizer.

Ask for No. 1 Catalogue. :: **GATES IRON WORKS, Dept. UU, 650 Elston Ave., CHICAGO.**



WOODBURY'S IMPERIAL CONCENTRATING TABLE.

THE Imperial Concentrating and Amalgamating Table is the latest invention of Mr. Geo. E. Woodbury, whose fame as one of the pioneer concentrator builders is world wide, machines of his manufacture being in general use in every country on the globe where the milling of ores is carried on. This Table is, however, built on entirely new lines, differing materially from either the well-known belt or bumping table types of concentrators.

SIMPLE IN ITS CONSTRUCTION.

SAVES FINE SULPHURETS.

WITHOUT LOSS IN TAILINGS.

MAKES HIGH PRODUCT.

CAPACITY FROM 5 TO 10 STAMPS.

GEORGE E. WOODBURY,

Send for Catalogue. *'Phone Main 1766.* **223 First St., San Francisco, Cal.**

DEWEY, STRONG & CO., Patent Agents, 330 Market St., S. F., Cal.

PROFESSIONAL CARDS.

R. H. POSTLETHWAITE, M.I.E.E.
Hydraulic Mining Engineer.
River Dredging for Gold a Specialty.
1315 Leavenworth St........San Francisco, Cal.

THEO. F. VAN WAGENEN, E. M.
Consulting Mining and Hydraulic Engineer.
1508 Fillmore St., DENVER, COLO.

D. B. HUNTLEY,
Mining Engineer and Metallurgist,
De Lamar, Owyhee Co., Idaho.

BERNARD MACDONALD,
Consulting Mining Engineer.
General Manager British America Corporation, Ltd., Rossland, B. C.

DRAPER & McLEOD,
Assayers, Chemists, and Mining Engineers,
1736 CHAMPA STREET,
DENVER.................. ....COLORADO.

JOHN DWYER, Mining Engineer,
MEXICO.
Address 762-17th Street......East Oakland, Cal.

RICKARD & FROST,
ASSAYERS, 1752 Champa St., Denver, Colo. Formerly assayers at Argo smelter. Specimen, Control and Umpire Work. Prompt attention given to all mail and express samples.

Established 1879.
CHAS. B. GIBSON,
Chemist, Metallurgist and Mining Engineer,
81 CLARK ST., CHICAGO, ILL.

E. H. BENJAMIN, Mining Engineer.
A. M. HUNT, Mechanical & Hydraulic Engineer.
WYNN MEREDITH, Electrical Engineer.
EXPERT EXAMINATIONS. ADVISORY REPORTS.
CONSTRUCTION SUPERVISION
331 Pine Street,..........San Francisco, Cal.
Telephone Main 1870. Cable Address "Edben."

JOHN W. GRAY,
Mining and Hydraulic Work.
Prospecting Operations and Exploration Work.
Examinations, Surveys, Development, Equipment of Mines, Gold-Bearing Gravels, and Water Supplies.
923 Linden St.,..................Oakland, Cal.
Cable "Espra." Correspondence invited.

ABBOT A. HANKS,
CHEMIST AND ASSAYER.
Successor to Henry G. Hanks, est. 1866. The supervision of sampling of ores shipped to San Francisco a specialty.
—531—
California Street,
San Francisco.

RICHARD A. PEREZ, E. M.
Assayer and Analytical Chemist,
120 North Main St., - Los Angeles, Cal.

S. W. TYLER,
Mining and Metallurgical Engineer,
6 Windsor Hotel Block.
Cable: Retyl, Denver. DENVER, COLORADO.

The SPOKANE BUREAU OF MINING,
N. E. LINSLEY, Manager.
SPOKANE, : : WASHINGTON.
Consulting Mining and Milling Engineer.
Will Examine and Report on Mines.

W. J. ADAMS, E. M.,
Mining Engineer and Metallurgist.
Graduate of Columbia School of Mines.
Author of "Hints on Amalgamation," etc., etc.
ROOM 14, 434 CALIFORNIA STREET,
SAN FRANCISCO, CAL.

CLARENCE HERSEY,
Assayer and Chemist,
(Established 1879.) LEADVILLE, COLO.
Gold, Silver and Lead..................$1.00.
Any two of above 75c; any one of above 50c.
Copper analysis..............................$1.00.
Platinum, Nickel or Tin, each.............$5.00.
Twenty-one years successful experience in the mining metropolis of Colorado.
Write for mailing envelopes and price list.

ALMARIN B. PAUL, M. E.,
ROOM 27, CROCKER BUILDING, SAN FRANCISCO.
Will act as AGENT for the sale of RELIABLE Mining Property. SPECIAL AGENT FOR
MacArthur-Forrest Cyanide Process
for California north of and including Mono, Madera and Merced counties; also for State of Nevada. Will act as agent for Eastern parties owning mining interests in California.

F. H. HARVEY,
GALT, CAL.,
Mining and Metallurgical Work in All Branches.
Assays, Chemical Analysis of Ores and experiments on rebellious ores for treatment by cyanide or other processes. Surveys and reports upon mining properties.

COBB & HESSELMEYER,
Designing and Consulting
MECHANICAL AND HYDRAULIC
ENGINEERS.
421 Market St., Cor. First St.,
Telephone BLACK 3882....San Francisco, Cal.

Simonds & Wainwright,
Mining Engineers,
Assayers and Chemists,
159 Front Street,
NEW YORK.

DAVIDGE & DAVIDGE, Attorneys and Counsellors at Law, Corcoran Building, Washington, D. C. Practice in the Supreme Court of the United States, the Court of Claims, the Courts of the District of Columbia, and the General Land Office. Western Union Code.

Geo. W. Schneider, E. M.,
Mining Engineer,
U. S. Deputy Mineral Surveyor.
Mineral Properties examined and reported on.
Central City, Colorado.

A. F. WUENSCH, M. E.
Inspection and Valuation of Mines.
Ref. D. H. Moffat, Pres. 1st Nat'l Bank, Denver.
827 Equitable Bldg..................Denver, Colo.

WM. VAN SLOOTEN,
Consulting Mining Engineer and Metallurgist.
Cable address: "Yadoplata."
35 WALL STREET........... ....NEW YORK, N. Y.

R. J. WALTER,
1452 Blake St., DENVER, COLO.
Mining Engineer and Metallurgist.
Reports on mining properties.
Assay office and chemical laboratory. Established in Colorado 1879.

SAM'L A. RANK,
MINING ENGINEER,
U. S. DEPUTY MINERAL SURVEYOR.
Mine Examinations and Reports.
514 Cooper Building,
DENVER ....COLORADO.

EDWARD L. HAFF,
MINING ENGINEER,
U. S. DEPUTY MINERAL SURVEYOR.
Mine Examinations and Reports.
National Annex Block,
P. O. Box 21. CRIPPLE CREEK, COLO.

FRANK C. MANDELL,
MINING ENGINEER,
U. S. Deputy Mineral Surveyor for Idaho and Oregon.
Mine Examinations, Surveys and Reports.
HAILEY, IDAHO.

ERNEST H. SIMONDS,
Late Instructor in Assaying, University of California.
ASSAYS AND ANALYSES.
LABORATORY TESTS OF ORES.
Special Attention Given to the Instruction of Students.
521 Sacramento St., Cor. Leidesdorff. S. F., Cal.

RALPH E. STEVENS,
ATTORNEY AND COUNSELOR,
43-44 Jacobson Building, **DENVER, COLO.**
Special attention to examination of titles. Corporation, commercial, mining law. Collections receive prompt attention. Notary in office. Refers to Denver representative of Mining and Scientific Press.

FRED H. BROWN,
Electrical Mining Expert.
Inventor of the Electro-Geodetic Mineral Locator. Patented March 20, 1900.

Will electrically survey mines and lands for mineral; furnish charts showing run of ore, extensions, pay streaks, and their approximate depth from surface.

References include scientific men, and miners for whom we have located rich mines.

Address, 1025 West 7th St.,
LOS ANGELES, CAL.

W. C. WYNKOOP, M. E.
Woodbury (Cochiti District),
New Mexico.
Economic Geology and Mine Examinations.

School of Practical Mining, Civil,
Mechanical and Electrical Engineering.
Surveying, Architecture, Drawing, Assaying, Cyanide Process and Metallurgy.
933 Market St., S. F., Cal. OPEN ALL YEAR.
A. VAN DER NAILLEN, President
Assaying of Ores, $25; Bullion and Chlorination Assay, $25; Blowpipe Assay, $10. Full course of Assaying, $50. Established 1864.
☞ Send for Circular.

DANIEL G. JEWETT,
Metallurgist and Assayer.
Specialty: The Mining and Smelting of Copper or Lead Ores.
P. O. BOX 5, GUFFEY, PARK CO., COLO.

HUDSON H. NICHOLSON,
Consulting Mining Engineer,
Rooms 216 and 217, Boston Building,
DENVER, COLO., U. S. A.
Cable address: Aichen, Denver.
Expert examinations of and advisory reports on mining propositions.
Specialty: The chemical treatment of ores

MINERS' ASSAY OFFICE.
(JNO. HARRIGAN)
10 Stevenson Street, - San Francisco, Cal.
Telephone Clay 972.

Assaying, Analyses, Sampling, Grinding and Pulverizing of all kinds.

Practical Working Tests of Ore by all Processes. Mining Machinery Bought and Sold. Check Assays. Instructions given in Assaying. All Work Guaranteed. **Mines Examined, Sampled and Reported on by M. P. BOAG, M. E. and Cyanide Expert.**

LOUIS FALKENAU,
STATE ASSAY OFFICE,
434 California St., near Montgomery.

Analysis of Ores, Metals, Soils, Waters, Industrial Products, Foods, Medicines, etc., etc.

Court Experting in all branches of Chemical Technology. Working Tests of Ores and Investigation of Metallurgical and Manufacturing Processes. Consultations on all questions of applied chemistry. Instructions given in assaying and all branches of chemistry.

RELIABLE ASSAYS.

Gold...............	$ .50	Gold and Silver....	$ .75
Lead	.50	Gold, silver, copper	1 50

Samples by mail receive prompt attention.
Rich Ores and Bullion Bought.
OGDEN ASSAY CO.,
1429-16th St., Denver, Colo.

E. E. BURLINGAME & CO.,
ASSAY OFFICE AND CHEMICAL LABORATORY
Established in Colorado, 1866. Samples by mail or express will receive prompt and careful attention
Gold & Silver Bullion Refined, Melted and Assayed OR PURCHASED.
Concentration Tests—100 lbs. or car load lots. Write for terms.
1736-1738 Lawrence St., Denver, Colo.

J. W. RICHARDS,
(Late of Aspen, Colo.)
ASSAYER AND CHEMIST. 1754 Champa Street. DENVER, COLO.
Ore Shippers' Agent. Write for Terms.

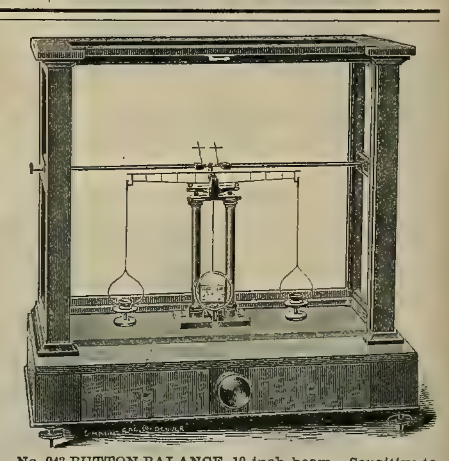
CHAS. BUTTERS & CO., Limited.
E. S. LEAVER, Manager.
Ore Testing Works,
Chemical and Metallurgical Laboratory,
Assay Office,
DOOLY BLOCK, - SALT LAKE CITY, UTAH.

Telephone, MAIN 5104. —◆ ESTABLISHED 1869. ◆— A. H. WARD.
Cable Address, LUCKWARD.

C. A. LUCKHARDT CO.,
NEVADA METALLURGICAL WORKS,
71 & 73 STEVENSON STREET, - - - - SAN FRANCISCO, CAL.
Assaying, Analyses, Sampling.
PRACTICAL WORKING TESTS OF ORE BY ALL PROCESSES.
STAMP MILL AND CONCENTRATOR IN OPERATION ON PREMISES.

Thomas Price & Son,
Assay Office, Sampling Works
And Chemical Laboratory.
526 Sacramento Street, San Francisco, Cal.

The above illustration shows an operator taking an incline above the horizontal with BRUNTON'S PATENT POCKET MINE TRANSIT. The instrument is made especially for mining engineers, mine managers and superintendents, but its light weight and the ease with which it can be handled render it admirably adapted to the taking of topography and for geological field work. Write for catalogue B, giving full description of the instrument and all its uses, to



No. 043 BUTTON BALANCE, 10-inch beam. Sensitive to 1-100 Milligramme. This is a double-column button balance with all latest improvements, including our new adjusting device and rider rod lock. It is accurate and as rapid as a beam of this length can be. For an office doing a moderate amount of work, it is the best balance to be had for both gold and silver. For complete description and prices of this and other balances send for catalogue A to

Wm. Ainsworth & Sons,
(Successors to Wm. Ainsworth.) Denver, Colo., U. S. A.

PACIFIC COAST AGENTS:
JOHN TAYLOR & CO., 63 First St., San Francisco, Cal.
F. W. BRAUN & CO., Los Angeles, Cal.

JAMES ANGUS SNEDAKER,
Mining Engineer,
721-722 Equitable Building, Denver, Colo., U. S. A.

Samples by Mail or Express Will Receive Prompt Attention.
ALBERT I. GOODELL,
ASSAYER AND CHEMIST,
1430 Stout Street......................DENVER, COLO.

MILL PLANS.
Cyanide, Concentration, Smelting, Sampling
F. D. BAKER, Mech. Eng., DENVER

HERMANN J. VAN DIEREN,
Assayer and Metallurgist,
1407 Seventeenth St., DENVER, COLO.
Stamp Mill and Reduction Works: 19th St. and Platte River.

Buyer of every description of Ores and Precious Stones. Rights for sale for process of treating refractory gold ores; also process for treating low grade copper ores. Write for particulars.

Independent Assay Office.
ESTABLISHED 1866.
D. W. Reckhart, E. M., Proprietor.
Agent for Ore Shippers.
Assays and Chemical Analysis.
Mines Examined and Reported Upon.
BULLION WORK A SPECIALTY.
P. O. Box 88. Office and Laboratory:
Cor. SAN FRANCISCO & CHIHUAHUA Sts.
EL PASO, TEXAS.

ALVIN PHILLIPS & CO.,
Chemists, Mining and Metallurgical Engineers,
1761 MARKET STREET,
DENVER, - COLO.

Complete Ore-Testing Works — capacity ten pounds to two tons. Modern Methods of Lixiviation, Cyanide and Chlorination. Concentration on Bartlett Table. Assaying and Bullion Refining. Chemical Analyses of Oils, Coal, Water, and all solutions. WRITE FOR PRICES.

HENRY E. WOOD, ASSAYER,
1734 Arapahoe St., DENVER, COLO.
Ore Tested in Carload Lots.
Write for Circular.

The State Ore Sampling Co.
DENVER, COLO.

We buy Gold, Silver, Lead, Copper, Bismuth, Uranium, Wolframite, Cobalt, Molybdenite and Antimony Ores. We have modern sampling mills, also test ore for the new processes of ore reduction.

Our long experience in the market enables us to obtain the highest prices for all marketable ores. Write for our "Reference Book." Send analysis of your ore for prices and information.

BAILY & MONNIG, Managers.

Hoskins' Patent Hydro Carbon Blow-Pipe and Assay Furnaces.

No dust. No ashes. Cheap, effective, economical, portable and automatic.

SEND FOR PRICE LIST TO
W. HOSKINS, 81 South Clark St., Room 55, CHICAGO, ILL.

SMITH & THOMPSON,
Manufacturers of Fine
ASSAY BALANCES.
Write for Catalogue.
2219 Stout St.,
Denver, Colo.

THE ROESSLER & HASSLACHER CHEMICAL CO.,
100 William Street, New York.

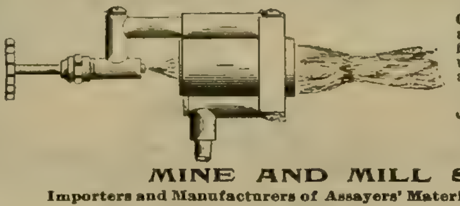
CYANIDE
Peroxide of Sodium
Hyposulphite of Soda
Chloride of Lime
Sulphide of Iron
And Other Chemicals for Mining Purposes.

10,000 Boiler Feed Waters Are Being Treated by Dearborn Methods.

Send us a jug of your feed water for analysis and let us prepare you a compound to suit.

DEARBORN DRUG & CHEMICAL WORKS,
Manufacturing and Analytical Chemists. Makers of Boiler Compounds.
29, 30, 31, 32 and 33 Rialto Bldg. - - - CHICAGO, ILL.

Taylor's Coal Oil and Gasoline Burner
(PATENTED)



A new heating burner for Assayers and Chemists, or for brazing, in which coal oil at 33 deg. to 45 deg., Beaume and 150 deg. fire test, or gasoline at 74 deg. test can be used for fuel. Adapted to crucible, muffle and brazing work. Price $6. For sale by

JOHN TAYLOR & CO.,
63 FIRST STREET,
SAN FRANCISCO, CAL.

MINE AND MILL SUPPLIES.
Importers and Manufacturers of Assayers' Materials, Chemicals and Acids, Etc.
CATALOGUE ON APPLICATION.

IMPROVED BONE ASH.

It is 100% better than Bone Ash now being used; will absorb more lead, will never crack or split in the Muffle, can be dropped before or after using without breaking. Cupels can be made and used at once; no drying required. Excessive heat has no effect on them. Will stand shipping any distance. It takes up none of the precious metals in cupeling. Cupels much quicker. Once used always used. Sold under a positive guarantee or money refunded. Now being used by all smelters and assayers who have tried it.

Price of Improved Bone Ash, $60.00 per ton; $3.50 per 100 lbs.; or manufactured Cupels, $1.50 per hundred.

CUMMINGS & SWEARS, Sole Mfrs.,
Telephone Clay 972. 10 STEVENSON ST., SAN FRANCISCO, CAL.
For Sale by Justinian Caire Co., Dealers in Assay Goods and Mining Supplies, 521-523 Market St.

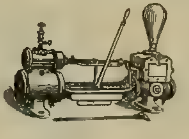
PIONEER REDUCTION CO.
Established 1858. Nevada City, Cal.
Buyers of Gold, Silver and Copper Ores and Concentrates.
HIGHEST PRICES PAID FOR COPPER ORES.
WRITE FOR RATES.

ESTABLISHED 1856.
Controls AND Check Assays
(A SPECIALTY.)
MARINER & HOSKINS,
ASSAYERS AND CHEMISTS,
Mining Engineers and Metallurgists.
81 South Clark Street.
Rooms 51-55,
CHICAGO, ILLINOIS.
SEND SAMPLES BY MAIL OR EXPRESS.
MAILING SACKS ON APPLICATION. : :

ST. LOUIS SAMPLING & TESTING WORKS,
1225 and 1227 Spruce St.,
ST. LOUIS, MO.

The Largest and Most Complete Ore Testing Works in Existence for Making all Kinds of Practical Working Tests of Ore, etc., to Determine the Most Suitable Method of Treatment.

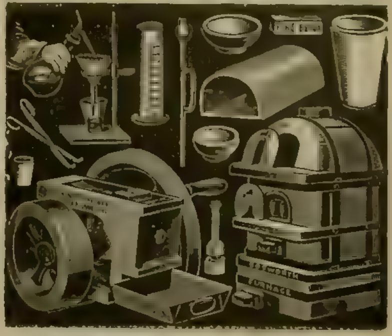
PLANT FOR COAL WASHING, COKING AND STEAMING TESTS OF FUELS. ASSAYS, ANALYSES, CHEMICAL AND PHYSICAL INVESTIGATIONS OF ALL KINDS. MINERAL PROPERTIES, MINES AND METALLURGICAL PROCESSES EXAMINED AND REPORTED UPON. CORRESPONDENCE SOLICITED.



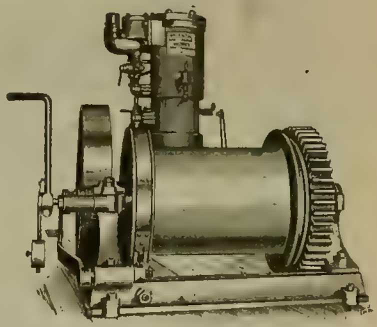
SOLE AGENCY
Worthington Steam Pumps and Water Meters.
Pumping Plants of any Capacity.
TATUM & BOWEN,
34-36 Fremont Street, San Francisco, Cal. 29-35 First Street, Portland, Or.
MACHINERY—ALL KINDS

TELEPHONE MAIN 5303
Union PHOTO-ENGRAVING Co.
DESIGNING
HALF-TONES
ZINC ETCHING
523 MARKET ST
SAN FRANCISCO, CAL.

THE DENVER FIRE CLAY CO.,
1742 to 1746 Champa St., DENVER, COLO.



Manufacturers, Importers and Dealers in
Chemicals, Apparatus and Assayers' Supplies, Fire Brick and Tile.
Sole Agents for the "AINSWORTH BALANCES."
WRITE FOR CATALOGUES.



This cut illustrates our 4 H. P. to 8 H. P. **HOISTING PLANT.**

Larger sizes built to suit the demands of our customers.

It is strong and exceedingly simple and durable, being entirely under the control of the operator, by the use of a single hand lever for hoisting, while the lowering is governed by a foot lever and brake.

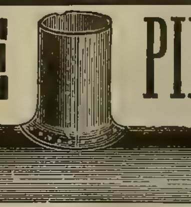
No better device has been designed for this purpose. For prices and further information address the builders.

Oriental Gas Engine Co., 227 Folsom St., S. F.

THE LITTLE ALASKA GOLD WASHER.
Price **$6.** Saves the Gold. *Weighs only* 7 1-2 Lbs.

After several years' practical use in different fields, our washer has established its superiority over all placer or beach washers. It is just the washer for Cape Nome; it was used extensively in Alaska last year with every success. In working the operator does not have to wet his hands and can stand in an upright natural position. It is just the washer for the poor man who has not the money to put in expensive machinery. It will do the work of ten men with gold pans. It is just the washer for the prospector, being light and easy to pack. Don't fail to write us if in need of a washer; we can save you *time, labor* and *money*. RUSSELL & KINSEY, 1237 Magnolia Ave., Los Angeles, Cal.

PIPE PIPE



PIPE for Hydraulic Power and Irrigation.
OIL STORAGE TANKS.
GENERAL SHEET IRON WORK.
Lacy Manufacturing Co.,
LOS ANGELES.

HEALD'S
BUSINESS COLLEGE.
24 Post Street, - - - San Francisco.

MINING AND CIVIL ENGINEERING DEPARTMENT: Mathematics, Draughting, Strength of Material, Chemistry, Assaying, Blow-Pipe Analysis, Geology, Mineralogy, Surveying, etc., under the direction of Prof. O. H. Packer, an engineer of national reputation.

ELECTRICAL DEPARTMENT: Theory and Practice; Construction,

BUSINESS: Bookkeeping, Shorthand, Typing, Modern Languages, etc.

Twenty teachers; individual instruction; can enter at any time; Catalogue and Journal free.

Notice the Shape of
GLOBE BOX---THE BEST BABBITT.

Send for trial order, Ladle free.

The Globe wire lace makes the smoothest joint, runs the stillest and lasts the longest of any lacing. Sent on approval. Write us for booklet with instructions, etc. J. M. HAYDEN & Co., 58 Pearl St., Grand Rapids, Mich

BULLOCK DIAMOND DRILLS

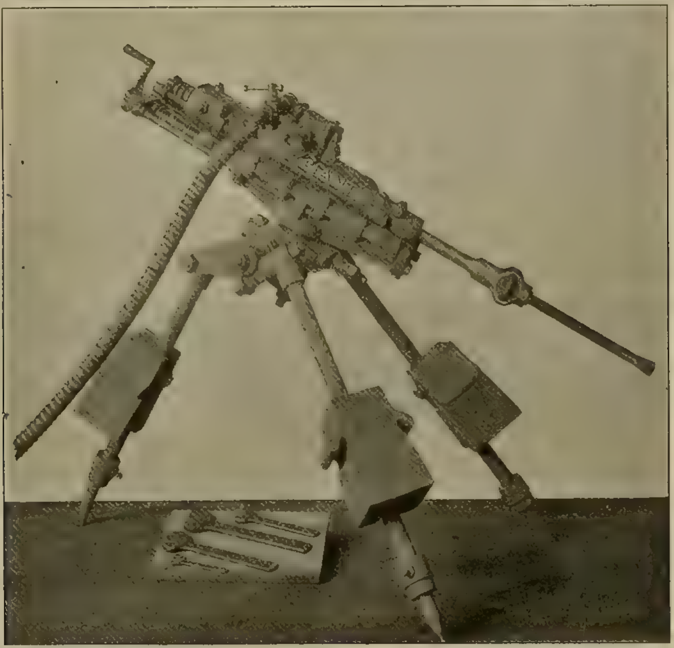
If you are interested in prospecting send for our new Diamond Drill Catalogue (No. 33).

BULLOCK MINING MACHINERY

PORTABLE HOISTS—Send for our new Catalogue (No. 40). CHAMPION MINE VENTILATORS—Send for our new Catalogue (No. 35).
HOISTING AND HAULAGE PLANTS, ORE CARS, SKIPS, CAGES, ETC., ETC.

PARKE & LACY CO., Agent,
21 & 23 Fremont St., San Francisco, Cal.

M. C. BULLOCK MFG. CO.,
1172 West Lake St., Chicago, Ill., U. S. A.



"GIANT" DRILLS AND COMPRESSORS
ARE THE BEST.
"GIANT" BABY DRILLS CHEAPEN MINING.
WRITE US FOR PARTICULARS.
THE COMPRESSED AIR MACHINERY CO., 11-13 First St., San Francisco, Cal.

SULLIVAN

Diamond Core Drills
FOR PROSPECTING. Catalogue 29.
The most extensive line of sizes and styles ever offered.
CONTRACTORS FOR PROSPECTING WITH DIAMOND DRILL.

ROCK DRILLS
FOR MINING. Catalogue 30.
Superior valve and ratchet motions. The highest possible grade.
Send for Our New Catalogues.

Sullivan Machinery Co.,
New York. Pittsburg. Claremont, N. H.
Main Office, CHICAGO......................54 to 60 N. CLINTON ST.
Western Office, DENVER...................332 SEVENTEENTH ST.
Pacific Agency, SAN FRANCISCO, HENSHAW, BULKLEY & CO.
Cable Address, Diamond, Chicago. Codes: A. B. C. 4th Edition, Postal Directory, Western Union, Liebers.

Established 1837.

I. C. Yawger,
Successor to VICTOR BISHOP & CO.

IMPORTER OF CARBONS FOR DIAMOND DRILLS.

21 Maiden Lane, - NEW YORK

DIAMOND DRILLS
FOR PROSPECTING.
AMERICAN DIAMOND ROCK DRILL CO.
120 LIBERTY ST N.Y.

THEODOR LEXOW, 14 JOHN STREET, N. Y.
......Importer of......

CARBONS
(BLACK DIAMONDS)
For DIAMOND DRILLS and all Mechanical Purposes.
HENRY DEMMERT.

RAND ROCK DRILLS and Drill Mountings.

HIGHEST DEGREE OF PERFECTION ATTAINED. ∴ INDISPENSABLE IN MINING, TUNNELING & EXCAVATING.

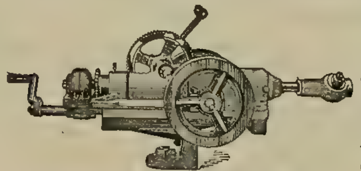
AIR —AND— Gas COMPRESSORS.

STANDARD TYPES! SPECIAL PATTERNS! ALL SIZES!

RAND DRILL CO., 100 BROADWAY, New York, U. S. A.

San Francisco Office: 223 First St.
1328 Monadnock Blk., CHICAGO, ILL.

THE JACKSON HAND POWER ROCK DRILL.



Works in Any Rock, in Any Position.
Write for Circulars and References.

THE JACKSON DRILL & M'F'G CO.,
1756 Larimer Street, DENVER, COLO.

Sole Licensees for all Foreign Countries and Eastern United States: THORNTON N. MOTLEY COMPANY (INC.), 43 John St., New York.

AGENTS: The Joshua Hendy Machine Works, 38 Fremont St., San Francisco, Cal.; Chas. B. Boothe & Co., 126 So. Los Angeles St., Los Angeles, Cal.

FIRTH'S DRILL STEEL,
16 cents per pound.

The best drill steel on the market. Has no equal for hard rock drilling. Miners cannot afford to use an inferior steel when FIRTH'S can be bought at the above price.

Abner Doble Company, Gen. Agts.,
Fremont and Howard Sts., SAN FRANCISCO, CAL.

THE Best None Too Good
When in Hard Rock.

CANTON DRILL STEEL.

UNEQUALED IN ROCK-CUTTING QUALITIES. Ask Your Dealer for CANTON Brands.
—— FOR SALE IN CALIFORNIA BY ——
SCHAW, INGRAM, BATCHER & CO, Sacramento — San Francisco.
HARPER & REYNOLDS CO., Los Angeles.

WE HAVE MOVED TO LARGER QUARTERS.

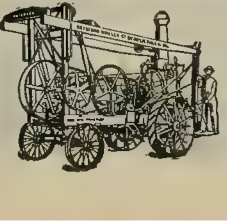
TRUAX ORE CARS

CARS ALWAYS IN STOCK TO FILL RUSH ORDERS.

WE MAKE CARS FOR YOUR CAGE AND SKIPS FOR YOUR INCLINE SHAFT.

SEND FOR PAMPHLET AND REFERENCES.

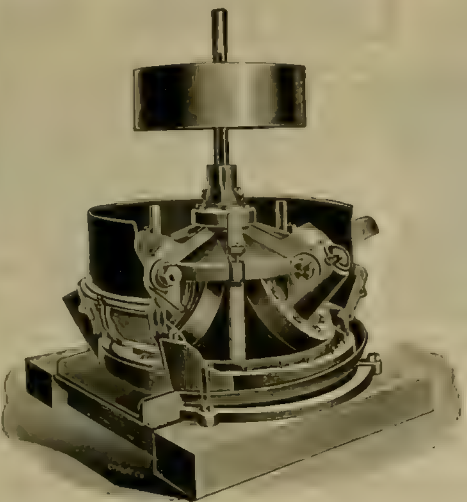
Truax Mfg. Co., 69 STEVENSON ST., S. F.



Prospecting Machinery.

Multitudes in use for testing for minerals. Sizes and equipments to suit any and all conditions. Unexcelled for Placer Testing, Oil Wells, Water Wells, testing for Lead and Zinc, Iron and Coal; goes through anything; brings up everything. Large sizes drill as much as 1500 feet. In use all over the world. Every purchaser pleased. Used on boats for testing river and lake beds. Water no hindrance. No skilled labor required.

KEYSTONE DRILLER CO., Beaver Falls, Pa., U. S. A.



THE GRIFFIN
THREE ROLLER
ORE MILL.

The Griffin Three Roller Ore Mill is a simply constructed Mill, suitable for working all kinds of ores that require uniformly fine crushing by the wet process. This Mill is a modification of the well-known Chilian Mill, but the rollers run upon a crushing ring or die, which is inclined inwardly at an angle of about 30 degrees, the rollers themselves also being inclined to the central shaft of the Mill, thus utilizing the centrifugal force, as well as the weight of the rollers themselves as a crushing agent. The Griffin Three Roller Ore Mill is therefore a Mill of great strength, and has few wearing parts. We construct these Mills with extreme care, using only the best of raw materials, which are most carefully worked by men who are specialists as mill builders. We sell the Griffin Ore Mill on its determined merits, and will gladly supply full information regarding it to any one.

SEND FOR FREE ILLUSTRATED AND DESCRIPTIVE CATALOGUE TO

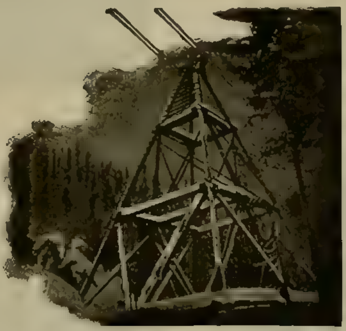
Bradley Pulverizer Co., Boston, Mass.

THE MINE AND SMELTER SUPPLY CO.,
DENVER, - - COLORADO.
Mining and Milling Machinery and Supplies.

We beg to call your attention to

THE FINLAYSON PATENT
WIRE ROPE TRAMWAY—

the latest and best system of double-rope automatic aerial tramway in the market.
If interested in the most economical system of transporting ores from mine to mill and to shipping stations, send for our special tramway catalogue.



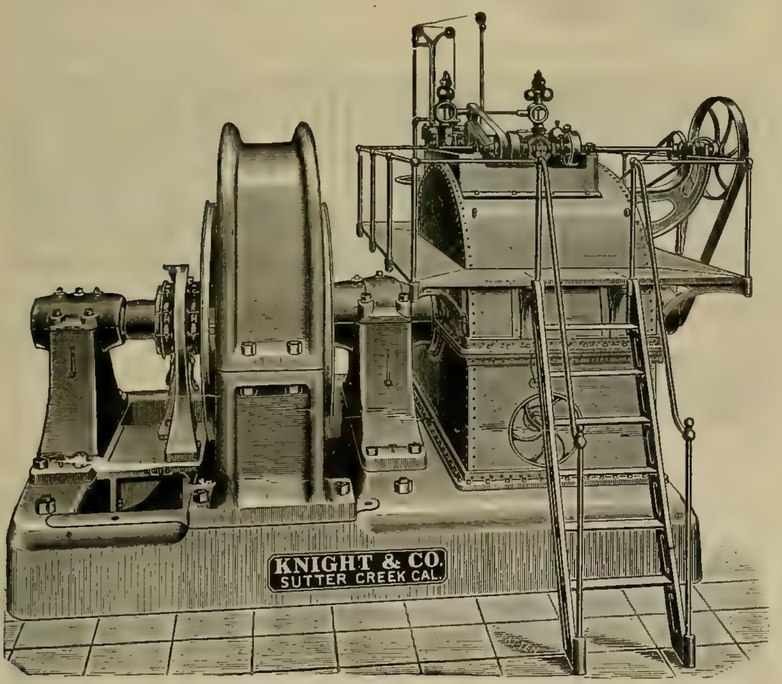
We carry a complete stock of Machinery and Supplies for immediate delivery.

Send for our special catalogues on Mining Machinery, Milling Machinery, Wilfley Concentrators, Tramways, Power Transmission Machinery, Machine Tools, Etc.

THE MINE AND SMELTER SUPPLY CO.,....................Denver, Colorado
THE MINE AND SMELTER SUPPLY CO.,................Salt Lake City, Utah
THE MEXICO MINE AND SMELTER SUPPLY CO.,
No. 16 San Francisco St., City of Mexico.

BOILERS, ENGINES, STEAM HOISTERS, ELECTRIC HOISTERS, ROLLS, CRUSHERS, WILFLEY TABLES. CARS, CAGES, ORE BUCKETS, RAIL, PIPE, FITTINGS, BELTING, ETC., ETC.

KNIGHT'S WATER WHEEL.


KNIGHT & CO.
SUTTER CREEK CAL.

The accompanying cut shows the general arrangement of **The Knight Water Wheel,** direc-coupled to a 750 kilowatt generator, with governor mounted on top of wheel casing.
These wheels are designed for **100 to 2500 H. P. Highest efficiency and regulation guaranteed.**
WHEELS FROM 6 TO 24 INCHES, ENCLOSED IN CAST-IRON CASING.
Wheels for mill and reversible hoisting works a specialty.

KNIGHT & CO., Sutter Creek, Cal.
For full particulars, send for descriptive catalogue.

GENERAL PHOTO-ENGRAVING CO.
[SUCCESSORS TO DEWEY ENGRAVING CO.]
FINE ZINCOGRAPHS, HALF-TONES, AND DESIGNING.
ENGRAVINGS OF MACHINERY OUR SPECIALTY.
SEND FOR SAMPLES AND PRICES.
TELEPHONE BLACK 1466.
NO. 536 CLAY STREET,
SAN FRANCISCO, CAL

THE
Pelton Water Wheel Company

Gives exclusive attention to the development and utilization of water powers by the most modern, economic and improved methods. An experience of more than fifteen years, involving both the theory and practice of hydraulic engineering as relates to power development in its widest range of application, is at the service of its customers.

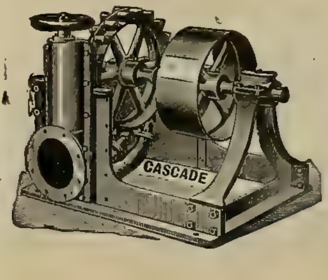
Nine Thousand Wheels Now Running,
Averaging some 700,000 H. P.

ELECTRIC POWER TRANSMISSION.

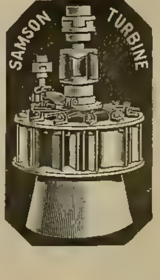
Pelton wheels afford the most reliable and efficient power for such service and are running the majority of stations of this character in the United States, as well as most foreign countries. Highest efficiency and absolute regulation guaranteed under the most extreme variations of load.

The Pelton Water Wheel Company,
121 & 123 MAIN STREET, SAN FRANCISCO, CAL.

TURBINE AND CASCADE WATER WHEEL
Adapted to all Heads from



3 Feet to 2000 Feet.
Our experience of 38 YEARS building Water Wheels enables us to suit every requirement of Water Power Plants. We guarantee satisfaction.
State your Head and requirements. Send for pamphlet.
JAMES LEFFEL & CO.
SPRINGFIELD, OHIO, U. S. A.



Founded by Mathew Carey, 1785.

HENRY CAREY BAIRD & CO.,
INDUSTRIAL PUBLISHERS, BOOKSELLERS & IMPORTERS,
810 Walnut St., Philadelphia, Pa., U. S. A.

☞ *Our New and Revised Catalogue of Practical and Scientific Books, 92 pages, 8vo; a Catalogue of Books on Steam and the Steam Engine, Machinery, etc.; a Catalogue of Books on Sanitary Science, Gas Fitting, Plumbing, etc., and our other Catalogues and Circulars, the whole covering every branch of Science applied to the Arts, sent free and free of postage to any one in any part of the world who will furnish his address.*

Valuable Books for Prospectors and Miners.

Orton.—Underground Treasures: How and Where to Find Them. A Key for the Ready Determination of all the Useful Minerals within the United States. By James Orton, A. M., late Professor of Natural History in Vassar College, N. Y.; etc. Illustrated................................**$1.50**

Osborn.—The Prospector's Field Book and Guide in the Search for and Easy Determination of Ores and other Useful Minerals. By Prof. H. S. Osborn, LL.D. Author of "A Practical Manual of Minerals, Mines and Mining." Illustrated by 58 engravings. Fourth edition, revised and enlarged. 315 pages, 12mo. Price........................**$1.50**

Osborn.—A Practical Manual of Minerals, Mines and Mining: Comprising Suggestions as to Localities and the Associations of all the Useful Minerals. Full descriptions of the Most Effective Methods of Both the Qualitative and Quantitative Analyses of Each of these Minerals and Hints upon the Various Operations of Mining, including Architecture and Construction. By Prof. H. S. Osborn, LL.D. Illustrated by 171 engravings. Second edition, revised and enlarged. 393 pages, 8vo. Price..**$4 50**

☞ *The above or any of our Books sent by mail, at publication prices, free of postage to any address in the world.*

☞ *Illustrated circulars of the above Books, showing full Tables of Contents, will be sent free to any one who will furnish his address.*

HENRY CAREY BAIRD & CO.,
INDUSTRIAL PUBLISHERS, BOOKSELLERS & IMPORTERS,
810 Walnut St., Philadelphia, Pa., U. S. A.

DELINQUENT SALE NOTICE.

NATIONAL CONS. MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Rich Gulch, Shasta County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 12) levied on the 4th day of June, 1900, the several amounts set opposite the names of the respective shareholders, as follows:

Name.	No. Cert.	No. Shares.	Amt.
F. Knottner	20	1,000	$50 00
F. Knottner	110	500	25 00
F. Knottner	111	500	25 00
L. Knottner	112	150	7 50
E Knottner	113	150	7 50
O. Knottner	114	100	5 00
G. Knottner	115	100	5 00
J. Gretz (balance)	186	1,500	70 00
F. E. Hartmann	223	250	12 50
C. A. Mueller	226	500	25 00
C. A. Mueller	229	500	25 00
G. Berbert	228	350	17 50

And in accordance with law, and an order from the Board of Directors, made on the 4th day of June, 1900, so many shares of each parcel of such stock as may be necessary, will be sold at public auction, at the office of the company, 773 Mission street, San Francisco, California, on MONDAY, the 20th day of August, 1900, at the hour of 1 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

GEO. W. FLEISSNER, Secretary.

Office—773 Mission street, San Francisco, California.

PATENTS

Our U. S. and Foreign Patent Agency presents many and important advantages as a Home Agency over all others, by reason of long establishment, great experience, thorough system, intimate acquaintance with the subjects of inventions in our own community, and our most extensive law and reference library, containing official American reports, with full copies of U. S. Patents since 1872. All worthy inventions patented through DEWEY, STRONG & Co.'s Patent Agency will have the benefit of a description in the *Mining and Scientific Press*. We transact every branch of patent business, and obtain patents in all countries which grant protection to inventors. The large majority of U. S. and foreign patents issued to inventors on the Pacific Coast have been obtained through our agency. We can give the best and *most reliable* advice as to the patentability of new inventions. Our prices are as low as any first-class agencies in the Eastern States, while our advantages for Pacific Coast inventors are far superior. Advice and circulars free.

DEWEY, STRONG & CO.,
PATENT AGENTS,
330 Market Street, San Francisco, Cal.

THE MINES OF
Eastern Oregon

Which are now attracting so much attention are reached only by the lines of the

OREGON RAILROAD & NAVIGATION CO.

For Descriptive Pamphlets, Through Rates, Etc., Address

E. C. WARD, Gen. Agt.,
630 Market Street, San Francisco.

WHITEWASHING —AND— TREE SPRAYING PUMPS.

Prices from $4 to $60. Nozzles from 75 cts. to $1.00. Catalogues. WM. WAINWRIGHT, 1411 Jackson St., San Francisco. Telephone Hyde 2986.

ASSESSMENT NOTICES.

MARIPOSA COMMERCIAL AND MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Mariposa County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 11th day of July, 1900, an assessment (No. 17) of Ten ($10) Dollars per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 320 Sansome street, room 24, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 14th day of August, 1900, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 4th day of September, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

JOSEPH H. MOOSER, Secretary.

Office—320 Sansome street, room 24, San Francisco, California.

SIERRA NEVADA SILVER MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Virginia Mining District, Storey County, State of Nevada.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 9th day of July, 1900, an assessment (No. 119) of fifteen cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Room 14, Nevada block, No. 309 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on Tuesday, the 14th day of August, 1900, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 3d day of September, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

E. L. PARKER, Secretary.

Office—Room 14, Nevada block, No. 309 Montgomery street, San Francisco, California.

THE JEFFREY MFG. CO.
Columbus, Ohio, U. S. A.

JEFFREY WATER ELEVATOR.

Best and Cheapest Pump for Irrigating and Drainage Purposes.

Estimates and Plans Submitted.

COMPLETE LINE
Elevating, Conveying & Power Transmission Machinery.

Western Branch,
Equitable Bldg.,
DENVER, COLO.

Send for Catalogue.

DENVER & RIO GRANDE R.R.
SCENIC LINE OF THE WORLD

The ∴ Mining Man's Favorite Route

BETWEEN

Denver, Colorado Springs, Pueblo and Florence, Cripple Creek, Leadville, Glenwood Springs, Aspen, Gunnison, Lake City, Creede, Durango, Silverton, Telluride and Ouray,

Reaching all the Mining, Milling, Cyaniding, Chlorinating and Smelting centers in Colorado and Utah, and all mining points in California, British Columbia and the Pacific Northwest by close connections and a perfect system of through car service.

Pullman Palace and Tourist Sleeping Cars between Denver and San Francisco and Los Angeles, and Pullman Palace and Tourist Sleeping Cars and Free Reclining Chair Cars between Denver and Portland. : : A Perfect Dining Car Service on All Through Trains. : :

For Illustrated Pamphlet, address

W. J. SHOTWELL,
G. A. D. & R. G. R. R.,
126 California St.,
San Francisco, Cal.

S. K. HOOPER,
G. P. & T. A.,
Denver,
Colo.

COLORADO'S GOLD

Output for 1899 is unequaled by any State in the Union. Cripple Creek, Leadville, and all the important mining towns are reached by

THE COLORADO & SOUTHERN RY...

For copies of our publications on the Swandyke and Pine Creek Gold Districts, or our pamphlet "Hints to Prospectors," address

T. E. FISHER, GEN. PASS. AGT., DENVER, COLO.

INVENTORS, Take Notice!
L. PETERSON, MODEL MAKER,
544A MISSION STREET, bet. First and Second Sts., SAN FRANCISCO. Experimental machinery and all kinds of models. Tin and brasswork. All communications *strictly confidential.*

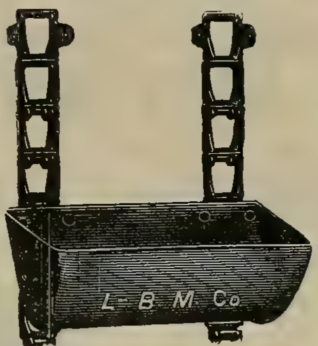
THE IDEAL CONVEYOR BELT

Is the one that will carry stone, ore, coal, wet or dry material, holding buckets firmly and securely; will stand all kinds of exposure, and resist the heaviest strains during a long period of service. This is what the **LEVIATHAN BELT** has done, and we quote the following from a letter from the New York Steam Co.:

"We have used Leviathan Belting for four years, up to 24-inch by 8-ply, elevating and conveying coal. Some of the Belting is outside, exposed to freezing weather; some in a steam bath. In both conditions the results have been very gratifying, over 500 tons having been handled in ten hours time."

MAIN BELTING COMPANY,
1225-41 Carpenter Street, Philadelphia.
55-57 Market St., Chicago. 120 Pearl St., Boston.
SEND FOR PRICE LISTS AND SAMPLE.

Small Portable Saw Mills and DRAG SAWING MACHINES FOR RANCHES AND MINES.



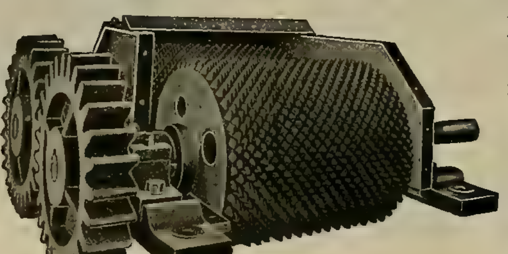
Woodworking Machinery.

LINK BELTING, SPROCKET WHEELS,
ELEVATOR BUCKETS & BOOTS,
TAKEUPS, FRICTION CLUTCH
PULLEYS, ETC.

ALL STYLES AND SIZES IN STOCK FOR IMMEDIATE DELIVERY.

JNO. D. EBY,
17 & 19 MAIN STREET, - SAN FRANCISCO, CAL.

LINK-BELT ELEVATORS —AND— CONVEYORS.



BREAKER ROLLS,
PICKING TABLES,
MALLEABLE IRON BUCKETS,
SHAFTING, PULLEYS,
GEARING, CLUTCHES, Etc.

Catalogue Upon Application.

LINK-BELT MACHINERY CO.,
Engineers, Founders, Machinists,
CHICAGO, U. S. A.
DENVER, 1328 17th St.,
A. E. LINDROOTH, Manager.

For handling Ore, Coal, Tailings and Dredgings. Catalogue mailed on application.
ROBINS CONVEYING BELT CO., Park Row Building, NEW YORK.

PIPE BARGAINS.

Suitable for Water Mains, Mining, Irrigation, Air, Oil, etc., etc. New Spiral Welded Asphalted Steel Pipe with any style coupling desired.

460 ft. 6-in.	3,480 ft. 10-in.	1,828 ft. 14-in.	1,077 ft. 18-in.
50,000 " 8 "	2,428 " 12 "	520 " 16 "	1,623 " 24 "

All Sizes Wrought Pipe, Well Casing and Straight Riveted Pipe in Stock. Equipment of All Kinds for Mine, Railroad and Contractors' Outfits. Write for Prices and Particulars.

BOWES & CO., 23 Lake St., Chicago, Ill.

ANY BOOK

ON ANY SUBJECT Connected with Mining, Metallurgical, Mechanical or Industrial Interests,

WILL BE SENT ANYWHERE, POSTPAID,

AT PUBLISHER'S PRICES.

SEND FOR CATALOGUE OF LINE DESIRED.

ADDRESS BOOK DEPT. MINING AND SCIENTIFIC PRESS,
NO. 330 MARKET STREET, SAN FRANCISCO, CAL.

Two Styles:
STAR and U.S.

Made in Brass Also. ★

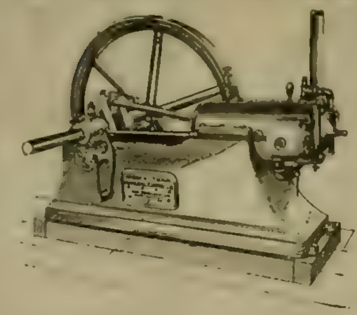
STAR PATTERN for Heavy Pressure.
U. S. PATTERN for Ordinary Pressure.

We warrant them for all service where a quick reliable action is required.

It will pay you to investigate.

Full particulars from any jobbing supply house, or direct from the manufacturers.

THE WM. POWELL CO., CINCINNATI, O.



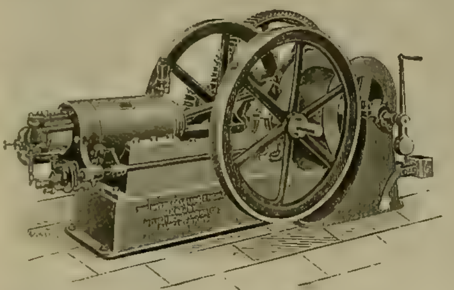
Distillate Engines and Hoists.

Air Compressors.

HADWEN SWAIN MFG. CO.,
215-217 SPEAR ST., SAN FRANCISCO, CAL.
CATALOGUES MAILED.

WITTE GASOLINE HOISTS

ARE MONEY EARNERS.



Made for use in places far from factory. Are built in parts and in duplicate. Renewals easy and quick to get. Strong, substantial and reliable.

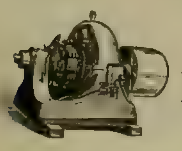
Operate on GAS, GASOLINE or DISTILLATE.

There Are Others, but None as SAFE AND RELIABLE.

Write for Illustrated Catalogue G.

WITTE IRON WORKS CO.,
515 WEST 5th ST.,
KANSAS CITY, MO., U. S. A.

Hendrie & Bolthoff Mfg. & S. Co., Denver, Colo.
C. B. Boothe & Co., Los Angeles, Cal.
Tracy Engineering Co., San Francisco, Cal.



FLINT & LOMAX,

DENVER, COLO.

Electrical AND MECHANICAL Engineers.

— DEALERS IN —

BOILERS, ENGINES, DYNAMOS, MOTORS, ICE MACHINERY, SHAFTING, HANGERS, BELTING, PULLEYS, and

ELECTRICAL SUPPLIES OF EVERY KIND.

OPERATING MACHINE, PATTERN, BLACKSMITH AND PLATING SHOPS. MAKERS OF SPECIAL APPARATUS TO ORDER.

McFARLANE & CO.,

1734 FIFTEENTH ST., DENVER, COLO.

Mining and Milling Machinery.

STAMP AND CONCENTRATING MILLS BUILT AND ERECTED.

STEAM AND ELECTRIC HOISTS, CRUSHERS, ROLLS, REVOLVING SCREENS, JIGS, ORE CARS, CYANIDE TANKS, CORNISH PUMPS, CORLISS ENGINES.

THE WM. HAMILTON MANUFACTURING CO.,
LIMITED,

MINING MACHINERY,

PETERBOROUGH, ONTARIO,

CANADA.

TO SECURE GOOD RESULTS BUY

JESSOP'S STEEL

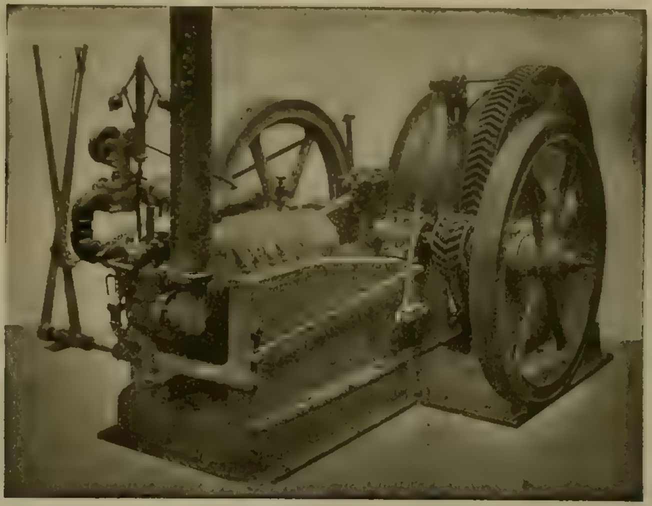
FOR TOOLS, MINING DRILLS, ETC.

Chief American Office,
91 John St., New York, N. Y.

Wm. Jessop & Sons, Ltd.
Manufactory, Sheffield, England.

I. WILLARD BEAM, Agent,
29 MAIN STREET,
SAN FRANCISCO, CAL.

HERCULES HOISTS Are Sold the World Over.

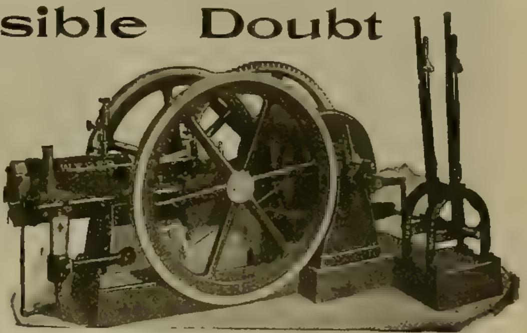


Hercules Gasoline Hoist--Speed 385 Ft.; Load 2500 Lbs.

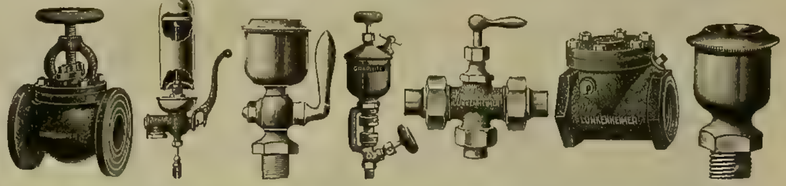
HERCULES GAS ENGINE WORKS,............141-143 FIRST STREET, SAN FRANCISCO, CAL.

No Possible Doubt

about the usefulness of Weber Gasoline or Oil Engines and Hoists. They are in use everywhere under all sorts of conditions, and are making friends right along. Ask for full particulars.



WEBER GAS & GASOLINE ENGINE CO.,
430 S. W. Boulevard,
Kansas City, Mo.

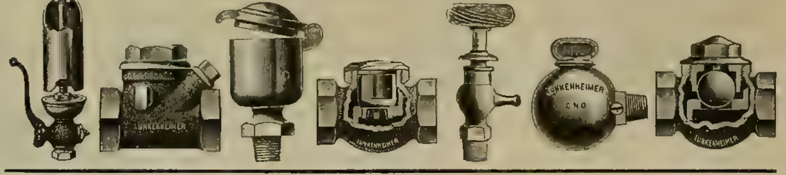


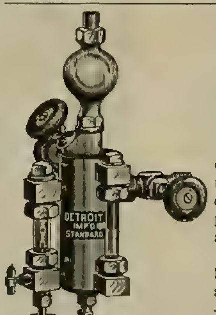
The Lunkenheimer Brass and Iron Specialties For STEAM, WATER, GAS, AIR, OILS, etc.

Comprising an endless variety of Valves, Whistles, Lubricators, Oil and Grease Cups, etc., are unsurpassed where thorough, reliable service is the first requisite. A trial order demonstrates their fitness and invariably results in their adoption. Have you need for such goods? If so, specify "LUNKENHEIMER" make. Write for catalogue.

The Lunkenheimer Company — BRANCHES: NEW YORK. LONDON. — GENERAL OFFICES AND FACTORIES, Cincinnati, U. S. A.

BRANCHES: NEW YORK, 26 Cortlandt St.; PHILADELPHIA, Bourse Bldg.; LONDON, S. E., 35 Gt. Dover St.; MEXICO CITY, Puente de San Francisco No. 6.





☘ ☘ ☘ ☘ ALL ABOUT ☘ ☘ ☘ ☘

Sight Feed Lubricators.

Our new catalogue for 1900 is ready for distribution. It explains in detail the principles governing the operation of **Sight Feed Lubricators,** using sectional view to show the internal construction, and containing cuts of the different styles in parts before being assembled into the complete lubricators, thus enabling every one to understand their construction and operation thoroughly.

In addition it shows our full line of **Glass Oilers, Oil Pumps, Oiling Devices, Multiple Oilers, Valves, Etc.** It will be sent to any address on application.

DETROIT LUBRICATOR CO., DETROIT, MICH.

THE BUCYRUS COMPANY,

DESIGNERS AND BUILDERS OF

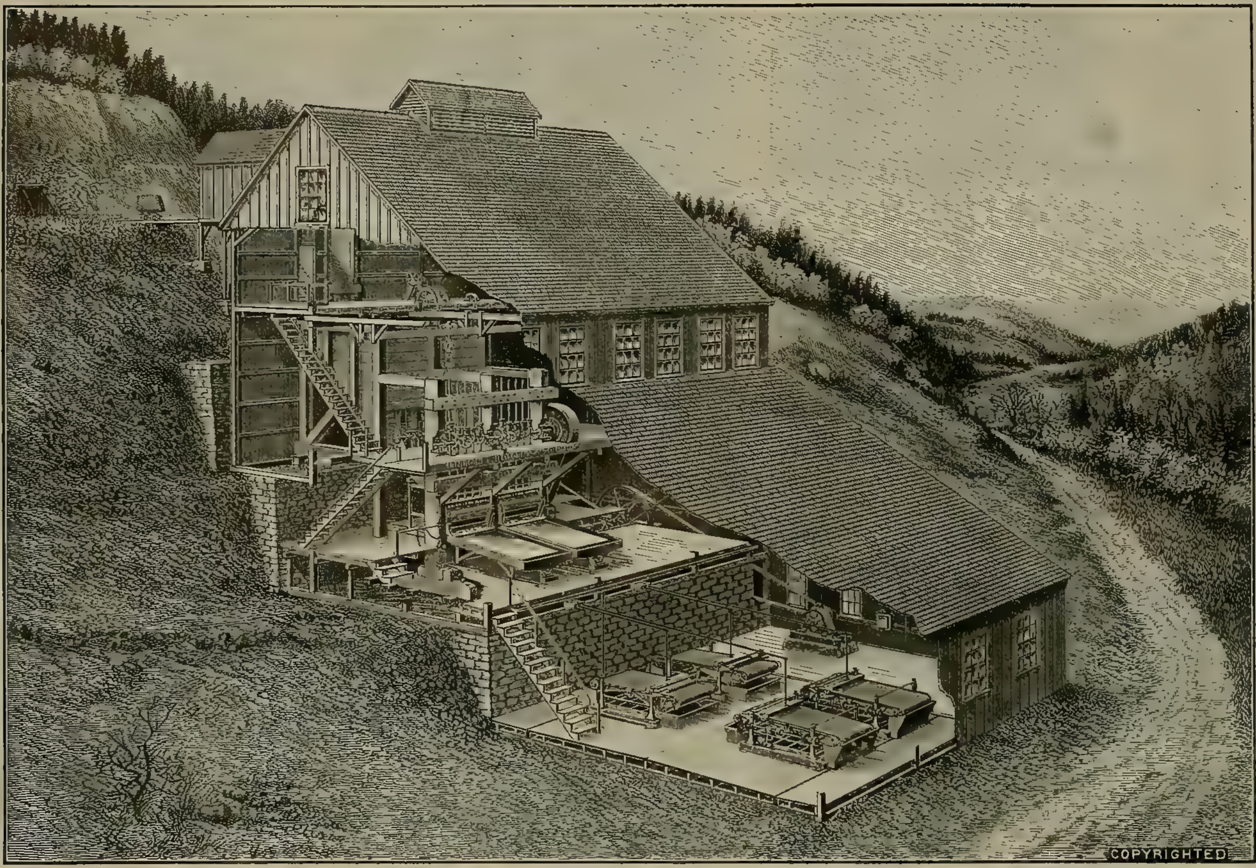
DREDGES, STEAM SHOVELS, EXCAVATING MACHINERY, WRECKING CARS, LOCOMOTIVE CRANES, PILE DRIVERS, CENTRIFUGAL PUMPS, WITH SIMPLE, COMPOUND OR TRIPLE EXPANSION ENGINES,

MACHINERY FOR PLACER MINING.

SOUTH MILWAUKEE, WISCONSIN.

UNION IRON WORKS,

222 Market Street, San Francisco, Cal.



The above is an illustration of a First-Class Modern 10-Stamp Gold Mill.
For particulars, send for Catalogues.

✻ ✻

Builders
of
All Classes
of
Mining
Machinery.

✻ ✻

THE HALLIDIE ROPEWAY

For Transporting Ore, Fuel, Earth, Sugar Cane, etc., by Wire Ropes.

SIMPLE, ECONOMICAL, PRACTICAL, DURABLE.

LOADS MECHANICALLY. DUMPS AUTOMATICALLY.

WIRE TRAMWAYS (Single and Double Rope Systems),

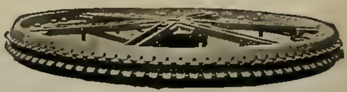
Cableways, Transmission by Wire Ropes,
Incline Planes, Cable Grips,
Logging by Cables, Automatic Loaders,

PLOWING, SCRAPING AND TRANSPORTING by Wire Ropes,

DESIGNED, SUPPLIED AND ERECTED. Estimates Furnished.

Improved GRIP PULLEY.

Patents Nos. 483,442; 610,353.



EFFECTIVE, SIMPLE, AUTOMATIC.

Saves Wear on Wire Rope and Cable.

Send for Illustrated Pamphlet.

Correspondence Solicited.

CALIFORNIA WIRE WORKS, - 9 Fremont St., San Francisco, Cal.

THE "JAMES" AUTOMATIC ORE FEEDER.

THE "JAMES" ORE FEEDER,

as illustrated on this page, is a machine of improved design for the automatic feeding of ores to stamp batteries and other crushing machinery. It is perfectly adjustable while in operation, and will feed equally well ores wet or dry, coarse or fine.

* * *

Shipping weight, with wood frame, - 800 pounds.
" " " iron " - 1000 "

ADVANTAGES

The advantages of this ore feeder, over any others that are in the market, are, that the feed is positive and will not gig back no matter how slight the motion to the arm; it can not possibly spill ore of any character and will definitely measure out from one to fifty tons per day of any class of ore.

Licensee for the Manufacture and Sale, **PARKE & LACY CO.,** 21 & 23 FREMONT STREET, San Francisco, Cal.

SOLE AGENT FOR

INGERSOLL-SERGEANT ROCK DRILLS and AIR COMPRESSORS.
KNOWLES PUMPS and PULSOMETER PUMPS, BULLOCK DIAMOND DRILLS.

CATALOGUES FREE ON APPLICATION.

P6.
CALIFORNIA STATE LIBRARY
This Paper not to be taken from the Library. ✦✦✦✦

MINING AND SCIENTIFIC PRESS.
AND PACIFIC ELECTRICAL REVIEW.

No. 2090.—VOLUME LXXXI. Number 6. SAN FRANCISCO, SATURDAY, AUGUST 11, 1900. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

Testing Oils.

A good way to test oils is to place them side by side on blotting paper, and place this for a short time on the cylinder chest or on a steam heater. The oil which penetrates the blotting paper quickest and spreads widest over it is always the poorest oil; the oil which spreads widest in part and leaves a defined ring in the center, must be a compounded oil, as it shows by its lightness and quicker disappearance of the outer ring that it is compounded from material of a very light gravity. If on longer exposure to heat, or by giving it more time, the whole of the oil on the blotting paper disappears, the sample must be composed entirely of mineral oil; and when an inner ring with a well-discernible ridge is formed and remains longer, a proportion of paraffine-holding stock must have been compounded with a lighter mineral oil; and when a center ring of decided outline and darker color is formed, and no permanent translucency imparted to the paper, the compound must have been made of light hydrocarbon oil with an addition of still residuum stock, however well defined or bleached.

Stoping: Empire Mine, Grass Valley, Nevada Co., Cal. (See page 152.)

◆

The highest voltage used for electrical transmission outside of California is in the Provo plant of the Telluride Power Transmission Co. in Utah, which transmits power 35 miles to the Mercur mills at 40,000 volts. Raising transformers are three in number and are connected in the star form. Each transformer has a capacity of 250 kilowatts. The middle points of both the high-tension and low-tension circuits are grounded. In general design these transformers resemble the transformers used in the high-tension tests at Telluride, the design and construction having been under the direction of the same man in both cases. The line extends from Provo at an elevation of 4500 feet to Mercur, at 2000 feet above Provo, and the line reaches an extreme height of about 10,000 feet above the sea level. Three miles of the line are strictly mountain construction. The lightning protection is afforded by choke coils and non-arcing metal arresters. The insulators are of glass. The design was based on the tests at Telluride and they were made especially for this plant. The insulators are held on special pins of oak which are thoroughly paraffined. The lower part of the insulator is 5 inches above the cross-arm.

Ophir Hill Vein, Empire Mine, Nevada Co., Cal., Near 1800-Foot Level, Showing Several Smaller Veins Between Foot and Hanging Walls. (See page 152.)

MINING AND SCIENTIFIC PRESS.

ESTABLISHED 1860.

Published Every Saturday at 330 Market St., San Francisco, Cal.

ANNUAL SUBSCRIPTION:

United States, Mexico and Canada........$3 00
All Other Countries in the Postal Union........4 00

Entered at the S. F. Postoffice as second-class mail matter.

J. F. HALLORAN........Publisher.

Special Representatives:

EASTERN.
E. H. HAVEN........150 Nassau St., New York City.
MIDDLE WEST.
CHAS. D. SPALDING........153 La Salle St., Chicago, Ill.
INTER-MOUNTAIN.
W. A. SCOTT........43 Jacobson Building, Denver, Colo.
SOUTHERN CALIFORNIA.
W. D. CURTIS........223 W. Second St., Los Angeles, Cal.

San Francisco, August 11, 1900.

TABLE OF CONTENTS.

ILLUSTRATIONS.—Stoping—Empire Mine, Grass Valley, Nevada Co., Cal.; Ophir Hill Vein, Empire Mine, Nevada Co., Cal., Near 1800-Foot Level, Showing Several Smaller Veins Between Foot and Hanging Walls, 150. Drifting with Machine Drill, Empire Mine, Grass Valley, Nevada County, Cal , 152. Signal Device for Mines, 153. Gould & Curry Concentrating Plant, Virginia, Nevada, 154. Latest Mining and Metallurgical Patents, 155. Concentrator; Sizer, 156. Compound Duplex Pressure Pump for Mines, 158.
EDITORIAL.—Concerning the Mining Industry, 150.
MINING SUMMARY.—159-160-161-162.
LATEST MARKET REPORTS.—163.
MISCELLANEOUS.—Testing Oils; Highest Voltage Outside of California, 149. Concentrates, 151. The Empire Mines, Past and Present; Some Facts About Para Rubber, 152. Signal Device for Mines; Saving the Copper, 153. Gould & Curry Plant; A Good Example; Colorado Mining Decisions, 154. Latest Mining and Metallurgical Patents; How to Find a Pocket, 155. New Concentrating System; Smelting to be "Revolutionized;" Not Published in New York, 156. Silver Mining in Mexico; New Metallurgical Process, 157. Notes on the Occurrence of Platinum in North America; May's Gold Extraction Process; Compound Duplex Pressure Pump for Mines, 158. Personal; Commercial Paragraphs: List of U. S. Patents for Pacific Coast Inventors; Recently Declared Mining Dividends, 162-163.

Concerning the Mining Industry.

In last week's issue mention was made of the commendable character of the practical work being done by the U. S. Geological Survey and its immediate value to the miner. It was the intention this week to go further into the subject. The subsequent receipt of a monograph by Director Walcott of the U. S. G. S., read before the Washington meeting of A. I. M. E., on "The Work of the U. S. Geological Survey in Relation to the Mineral Resources of the U. S.," shows that in that paper the head of the Survey goes into the discussion, and puts it about as it was intended to editorially discuss it. Hence as a subject of great general interest is herewith given in a condensed form some of what Director Walcott has to say concerning the connection of the economic work of his Bureau with the mining industry.

The general principle upon which the Survey has been doing its economic mining work is, that it should endeavor to accomplish for the mining industry, as a whole, what the individual mining engineer or mine owner cannot succeed by his unaided exertions in doing; that it should not undertake to do what could be done as well, if not better, by individual exertion; that it should not interfere, either favorably or unfavorably, with the private business of individuals or corporations, or enter into competition in their legitimate occupations with professional men, such as mining engineers, etc.

If it were more generally understood that such is a proper limitation of the work of the members of the Survey, they would not be asked, as they frequently are, to tell some individual or corporation whether his or its land contains valuable mineral deposits, since all the information they are at liberty to impart with regard to that land is contained in the published maps and reports, which may be obtained by all. If the individual or corporation is unable to deduce from these publications all the commercial data that may be desired, a mining engineer should be employed for the purpose. An attempt by the Survey to acquire and communicate such information respecting any parcel of land would be in the nature of a report for private parties, which would be an interference with the business of the mining engineer and a violation of law. Neither should the Survey be called upon to assay or analyze ores for private parties, for that is manifestly interference with the business of the assayer; nor should it be called upon, as it sometimes is, to tell a man what process, or which of two or more processes, is best adapted for the treatment of his ores. Even if the members of the Survey were fitted to pass judgment upon the relative value of technical processes or machines, and should pronounce such judgments, they would naturally be regarded as interfering unwarrantably with the business of the person or corporation owning a process or machine which was not favorably considered in their report. If it were proper that work of this nature should be done, it would be impossible to acquire the knowledge necessary to meet such demands with the amount of money at present available, or even with ten times that amount.

In the field of more purely geologic investigation, the general object has been the determination of laws which govern the formation of deposits of the useful minerals, and of the rock formations in which they are most likely to be found. This object can be attained only by long and careful study of many and varied deposits—as far as possible in the condition in which they were originally formed. Ore deposits are as a rule the result, not of a single process, but of many successive concentrations of minerals; and in those deposits which are found near the present surface, the effects of the latest of these processes—weathering or the action of surface waters—are likely to have obscured all others. In order best to accomplish the object sought, the first studies were made of mining districts in which mining developments have been most extensive, the mines are deepest, and the most varied forms of ore deposits have been disclosed.

In the prosecution of these studies, the geologists often obtain results of immediate value to the miners and mine owners of the particular district under investigation, such as the determination of the probable direction which the ore bodies will take in unexplored ground, the faults which are likely to cut them off, and other obvious limitatations which geologic conditions may suggest. These results are often of secondary importance as compared with the more general deductions, being useful to only a few persons interested in a limited district, while the general deductions, if correct, are of benefit to the whole mining community.

A brief statement of the underlying principles which govern our choice of fields of work is made, because that work has been frequently criticised: the criticsm made by miners being that the Survey chooses developed districts, where the general facts with regard to ore deposits are already known, rather than undeveloped districts, where the predictions might be of more use to those who own mines, and might actually help in their development. From a partially developed district we can usually learn only superficial facts, which are not likely to yield any contribution to general laws. Whatever may be said of the probable value of such a district belongs to the province of the mining engineer rather than to that of the Government geologist, since it involves such preliminary work as sampling of ores, prospecting, development, etc., which the geologist cannot do.

Another criticism has been that more work is done in one State than in another. But if it be admitted that the principles mentioned should govern our work, it is evident that we cannot be guided by geographic or political considerations, but that we must study ore deposits where they can be studied to the best advantage. In the topographic work of the Survey a more or less general geographic distribution has been possible, and it is also desirable, but in geology the Survey must continue to be the judge of the importance and interdependence of the problems to be solved, and of the best method of solving them.

A correct geologic map is the first and most essential basis for the study of a mining district; and where the deposits are beds in sedimentary strata, as is the case with coal, and sometimes with iron ore and other substances, it furnishes practically all that the mining engineer needs for opening and exploiting the mines. By the folio publication, however, a new avenue is opened for disseminating geologic information promptly and without waiting for a final and exhaustive report. Where important groups of mines are concentrated within small areas, special maps of size to fit the folio are made of those areas, on the largest practicable scale, accompanied by sections and explanatory texts setting forth in concise terms the main facts of importance to the miner, and these are published as special folios; that is, folios that do not form an integral part of the regular Geologic Atlas of the United States. In this form there have already been published folios covering Cripple Creek and Tenmile districts in Colorado, the Nevada City in California, and the Butte district in Montana. A folio of this form often supplements a monographic report, as it meets the demand of the mine owner for more prompt issue, and may be produced at smaller cost than a monograph. On the other hand, it is less likely to result in scientific deductions of general applicability, unless it is followed by a monographic report.

It may be anticipated that in the course of time the incidental areal surveys and studies of special minerals will gradually supersede those of the small groups of important mines; but at present we have plans made for surveys of a dozen or more mining districts in the western portion of the United States, and of several in the central and eastern parts, which, under the present appropriations, can only be taken up one at a time and at considerable intervals.

In the line of what may be considered technical studies, the duties of the Survey toward mining industry are less easy to define; for in this line there is more danger of encroaching upon the legitimate field of the mining engineer or metallurgist. Yet the same general principle is applicable here; namely, that the Survey should confine itself to those investigations which it is better fitted to make than is the individual. Thus, in our early work on Leadville, where lead smelting had recently reached a stage of development hitherto unknown in this country, it was thought that a scientific discussion of the processes involved, in the light of the improvements made in practical methods, would be of advantage to the smelting community throughout the country. It was found, however, that so great was the commercial importance of the industry, and so rapid the advancement in metallurgic science, that the delays inherent in a Government publication greatly impaired, if they did not altogether nullify its value.

It is evident that the investigation of technical processes in their commercial application is not a legitimate function of the Survey. Its employes are expressly shut out from a commercial use of their knowledge, and are chosen for their proficiency in geology rather than in technology. There may arise cases, however, in which it will appear possible for them to determine the underlying principles or laws that should govern some widely applied technical process, and in which it will seem advisable and proper for them to undertake such investigations.

It seems evident that the collecting of accurate statistics of the mineral productions of the country, which form the most important basis of all mining business, is a prime duty of the Survey. No branch of statistical science is in greater need of technical knowledge and thorough system than that which deals with mineral production, and none is more liable to be led into error, if the collector's opinions are in any way biased by his interest. There is no body of men more absolutely disinterested than the employes of the Survey, since, under the law, they can have no commercial interest in the subjects which they treat. Their field of work is so wide that, by one or another, a certain personal familiarity with all the sources of supply of the various mineral products of the country is acquired, which is available for the guidance of the statistical division.

At the last session of the Fifty-fifth Congress an amendment was introduced establishing a Division of Mines and Mining in the Survey. This extended its sphere of statistical work to gold and silver, and made a special appropriation for the division. It also provided means for the more prompt publication of its reports. Had this amendment passed, it is believed that the scope of usefulness of the work of the Survey would have been very materially increased. All of its various economic branches would then have been conducted under the supervision of a single chief, by which means a more uniform and comprehensive system, both of field work and of publication, might have been inaugurated.

When the division abandoned the subject of mining technology, its designation was changed to the Division of Mineral Resources. In accordance with the duties implied by this title, more and more attention has been paid to statements of the geologic and geographic distribution of our mineral wealth, whether developed or not; and the immediate future will see this important work of the Survey expanded.

For more than ten years the Division of Hydrography of the Survey has been making measurements of streams and computations of their daily discharge at various points. At the same time, it has been investigating the movements of underground waters and the causes which give rise to them. The results have economic importance to the miner in his underground operations, as he must often contend with water, and his ability to dispose of it successfully may govern the question of profits. He often seeks in flowing water the power for operating, directly or indirectly, mines, mills, etc. In many sections the location of reduction works is governed largely by the question of water supply and its permanence through seasons and years. The results of the investigations of the hydrographers are sought in considering the erection of plants of this character.

There is also an indirect way in which the question of water supply affects the feasibility or profits of mining. Throughout the western third of the United States, from the Rocky Mountain region westward, there are great deposits of ore, the value of which per ton is so small that they cannot be profitably worked unless many conditions are favorable, such as cheap foodstuffs and ready transportation, by which the cost of living and of labor may be reduced. The region as a whole is arid, and farm and other products, brought from the humid regions, are expensive. By the development of agriculture through irrigation, and the building up of small producing communities throughout the semi-arid and arid West, the cost of living is greatly reduced, and it becomes practicable to work to advantage mineral deposits otherwise unprofitable. This dotting of the country with farms and villages is possible through a careful conservation of the available waters, such as can result only from a thorough knowledge of the natural conditions. This knowledge is being obtained, through the Division of Hydrography, as rapidly as the means available will permit.

Concentrates.

THE atomic weight of tellurium is 127.9.

THE temperature of the Bunsen flame is 1,820° C., or 3,308° F.

THE acetylene light is produced by a gas made by dropping water on broken pieces of calcium carbide.

ENGINEERS say that up to 100,000 gallons wooden tanks are best; above that capacity some recommend steel tanks.

ALUMINUM melts at 625° C., or 1.157° F. It can be alloyed with copper, nickel, tungsten, manganese, chromium, zinc or tin.

A MAN'S salary is determined by what he is able to earn, and it is very seldom the case that he long continues to get less.

A DEBTOR who pays the debt to the original creditor after notice of an assignment of the debt is not absolved from liability to pay it to the assignee.

PATENTS have been granted for sundry forms of electro-magnetic ore stamps; but, so far as known, no device of that nature is in commercial use.

ALL water has action on copper; hard water has little action on lead, but soft water and highly carbonated water dissolves lead in considerable quantity.

IN the absence of misconduct or want of good faith in an arbitrator, the fact that the award seems too high or too low is not ground for a judicial interference.

ENGINEERING has been defined as being "the art of making a dollar earn the most interest." Art is applied science, and science is simply organized knowledge.

THE pressure on a stationary square yard of surface exposed to a 60-mile wind, is the same as the pressure on a square yard of surface moving at the rate of 60 miles per hour through still air.

THE average tensile strength per square inch of copper is as follows: Cast, 19,000 pounds; sheet, 30,000; bolts, 36,000; wire, 16,500. The average tensile strength of cast brass is 18,000 pounds per square inch.

ON this earth the important constituents of the atmosphere are nitrogen, oxygen, argon, carbon dioxide, water vapor and ammonia, and their densities are, respectively, 14, 16, 20, 22, 9, 8.51, hydrogen being taken as unity.

ELECTRICITY in mining is probably used to a greater extent in Cripple Creek district, Colorado, than in any other similar area. The most advanced "scientific mining" is considered by many to be best exemplified in the copper mines of Lake Superior.

IT is entirely feasible to build and successfully operate a steam railway with a 2-foot gauge, and a road with that gauge can be built and equipped at a cost not to exceed 25% of the cost of building and equipping a line 4 feet 8½ inch gauge.

CALAMINE is the hydrous silicate of zinc; color white, bluish, green or brown; luster, sub-pearly; translucent; hardness, 5; composition, zinc oxide 67.5%, silica 25%, water 7.5%. Under the blowpipe it gives off fumes of zinc on charcoal which cover the latter.

TO PRODUCE the purple of cassius, the appearance of which will indicate the presence of gold, take four ounces of finely pulverized gold ore, cover with an equal amount of bromine water, and, after standing and agitating for one hour, filter the solution, adding tin chloride solution to the filtrate.

THE value of a water-wheel governor is measured by the promptness and ease with which it will move the water-wheel gates to the correct position and stop them when they get there, and its ability to compensate by adjustment of the gate for the kinetic energy in the moving water column.

SPONTANEOUS COMBUSTION of coal is induced by condensation and absorbtion of the oxygen of the atmosphere by the coal. Action of moisture on sulphur of pyritous coal readily induces it taking fire. Coal importers say coal should be mined at least a month before being loaded for long sea voyage.

AN oil pipe line in Kern county, Cal., or elsewhere, made of glass, might be practicable. There is a concern at Port Allegany, near Bradford, Pa., that claims to be able to make glass tubes that will carry oil, and a 100-mile pipe line made of glass is said to be in successful operation in southeastern Ohio.

WHEN an investor has been induced by fraud to buy stock that has no adequate property security, he may have legal redress for the proven fraud without waiting for default in payment of interest or dividends, and the mere payment of interest is an unimportant factor in determining if the stock is what it was represented to be.

FOR cores for light castings, such as pump work, motors, valves and small cylinders, where the core is almost wholly surrounded by iron and the layer of metal is very thin, foundrymen say that white, or "sugar" sand, is best; if mixed with flour the proportion should be 20 sand to 1 flour; if resin is added, about 1 resin to 25 sand.

THERE are several electrically-driven centrifugal pumps. An example may be found at Bakersfield, Cal. It is understood that for constant speed the discharge of a centrifugal pump for any lift varies with the square root of the difference between the actual lift and the hydrostatic head created by the pump without discharge.

MUCH has been already said herein regarding "learning mining engineering or the science of mining through correspondence schools." Those schools are not without merit, and are not to be decried; doubtless one could learn to play the piano or run a bank the same way, but many men will follow the old way of oral instruction, accompanied by personal experience.

HOWEVER interesting from a laboratory standpoint liquid air may be, there is much exaggeration in the claims made for its commercial application, and serious attention is not to be given to projects "for using it as an explosive in mining." The slightest accession of heat occasions so rapid a return to its normal state as to preclude practical possibility of use in that way.

MILLMEN of experience think that it is rarely necessary that the stamp should weigh over 1000 pounds, and some look upon that weight as the maximum for efficiency. A lighter stamp with sufficiently higher drop to insure sufficient momentum is generally preferred. In this, as in everything else about a stamp mill, the ore is the thing to be suited. Whatever is best for the ore is the best to use. And this can only be determined by individual experiment.

MOST of the gold in the old copper plates may be extracted by heating the plates over a charcoal fire, placing the lower side of the plate next to the fire, heat to about boiling point of water, then remove it from the fire and scrape with a broad chisel. This will remove most of the gold and silver amalgam, which melt into a base bar. If the plates are very old and brittle by becoming saturated with quicksilver, the only method is to melt the entire plate and refine.

PROPER foundation is as necessary for a gas engine as for any other form of power application. In setting a horizontal gas engine there should be a slight slope longitudinally, downward, from the head end of the cylinder toward the crank; about ½ inch, in the length of the cylinder will suffice, this to cause a flow of the waste oil toward the open end of the cylinder. Otherwise its tendency is to settle at the head end, and this interferes with the working of valves and igniter.

IN dressing plates when well coated with amalgam it is the practice of many millmen not to stir clear to the bottom, where it is thickest. Washing with a hose and a slight stirring of the surface with a whisk broom dipped in the dressing mixture suffices to remove adhering dross. Thus a heavier coating of amalgam may be carried, in a manner similar to the usual treatment of a chuck block. In the final brushing little riffles are formed: and if it be done crosswise the channels fill up with sulphides. This interferes with the gold coming in contact with that portion of the plate surface, and it is therefore thought better to finish lengthwise.

A GOOD BELT DRESSING (liquid) for summer use is composed of beeswax 4 lbs., pitch 5 lbs., resin 3 lbs., neat's-foot oil 13 lbs. Melt the beeswax first and add the other ingredients in the order named. For winter use the neat's-foot oil should be increased to 15 lbs. If a solid dressing is required, for summer use—beeswax 6 lbs., pitch 5½ lbs., resin 7 lbs., neat's-foot oil, 1 lb.; for winter use make the resin 6½ lbs. The fluid dressing is the best, but more wasteful; the solid is more economical.

TO NOTE so small a quantity as .025 ounce gold to the ton of ore, place four ounces of finely pulverized ore in a bottle, add an equal volume of tincture of iodine and agitate the mixture for at least an hour, letting it occasionally settle. There should then be introduced into the clear solution a strip of Swedish filter paper and dried; the introduction of the strip and subsequent drying should be repeated six times, to saturate the paper thoroughly. Upon burning the strip, the ashes, in case gold is present, will show a purple coloration which will quickly disappear upon pouring bromine water over it, if gold be present—an indication of its presence.

THE results of measurements of various rivers and the observations of height have been published by the U. S. G. S., in a series of "Water Supply" papers, Nos. 35 to 39, inclusive, arbitrary division into five parts being necessary by the requirements of law limiting these papers to 100 pages each. They are as follows: No. 35 (Part I), "Rivers Flowing Into the Atlantic Ocean From Maine to Virginia;" No. 36 (Part II), "Rivers Flowing Into the Atlantic South of Virginia;" No. 37 (Part III), "Rivers Flowing From the Eastern Rocky Mountain Area; No. 38 (Part IV), "Rivers Tributary to the Colorado, the Interior Basin and Columbia River;" No. 39 (Part V), "California Streams and Rating Tables." Application for these papers should be made to Members of Congress, by whom 4000 copies of the 5000 printed are distributed, or to the Director U. S. Geological Survey, Washington, D. C.

CARBONS for electric arc lights are made from a coke which is a by-product of the process of petroleum refining, being the solid residuum left in the refining stills after the oils have been driven off. This material is calcined to drive off volatile matter, then ground and bolted to free it from coarse particles. In this condition it is almost pure carbon, and before being molded it is mixed with a binding material. Two processes are in use for molding the carbons. In the first they are molded under hydraulic pressure in split molds, eighteen or twenty carbons being molded at once. In the second method the material is forced through dies by means of heavy hydraulic presses, the carbons being molded in 4 or 5-foot lengths and afterward cut to the required size. They are then baked in kilns for eight or ten days, and afterward sorted and tested. In some cases the carbons are plated with copper by means of special machines.

ACETYLENE is one of those bodies the formation of which is attended with the disappearance of heat, and for this reason termed an endothermic compound, in contradistinction to those bodies which evolve heat in their formation, which are called exothermic. Such endothermic bodies are nearly always found to show considerable violence in their decomposition, as the heat of formation stored up within them is then liberated as sensible heat, and it is undoubtedly this property of acetylene gas which leads to its easy detonation by either heat or a shock from an explosion of fulminating mercury when in contact with it while under pressure. If acetylene be heated in contact with air to a temperature of 480° C. it ignites and burns with a flame, the appearance of which varies with the way in which the acetylene is brought in contact with the air. With the gas in access, a heavy lurid flame, emitting dense volumes of smoke, results, while if the gas be driven out in a sufficiently thin sheet it burns with a flame of intense brilliancy and almost perfect whiteness.

CYANIDE SOLUTION from a leaching tank contains free cyanide, caustic potash, gold potassium cyanide, silver potassium cyanide, and compounds of the baser metals. The gold and silver are precipitated from the solution by means of zinc shavings (and at Mercur, Utah, by zinc dust) as a blackish powder on the zinc. The zinc itself goes into the solution. During the process hydrogen gas is evolved. From five ounces to one pound of zinc is required for every ounce of gold recovered. In cleaning up the zinc box, the blackened, undecomposed shavings of the first box are transferred to an iron pan, the gold slime remaining on top of the screen is stirred to make it pass through, after which the screen is removed and washed. The cock at the bottom of the compartment is opened, and the slime settled there is drawn off in a bucket, where it again settles, after which the clear cyanide is decanted and returned to the zinc box. The collected slime is put on a filter, drained of cyanide, and washed with water. The slime consists of metallic gold, silver and copper precipitated from the cyanide. In refining the precipitates, they are placed in a cast iron pan, subjected to a dull red heat in a muffle furnace. Clean slime appears like a fine black mud. When the roast is complete the precipitate is treated with hydrochloric acid in pans having mechanical agitators. The residue is washed and dried in filters, fluxed and replaced in the roasting pan for drying, afterwards smelted into a bar and sent to the mint or U. S. assay office.

The Empire Mines, Past and Present.

NUMBER II.

Written for the MINING AND SCIENTIFIC PRESS by GEORGE W. STARR, Resident Manager.

In 1878 the Empire Mining Co. was controlled by the estate of W. B. Bourn, the managers of which, after having the mine examined by three well known experts, concluded that it was worked out and too deep for profitable working, and were about to abandon the property when W. B. Bourn, Jr., returning from Europe, after an extended visit to Grass Valley decided to take over the management and formed a new company, called the Original Empire, which acquired all the assets of the old Empire Co. The shareholders of the Empire were invited to join, all declining except the late J. B. Fargo, who accepted, and his estate retains to-day the interest acquired by him in 1856. The reconstructed company took possession in 1879, shortly afterwards commencing pumping operations and soon resuming shaft sinking. Operations were conducted under the greatest difficulties, financial and otherwise, for this was a period when belief in California quartz mining was at its lowest ebb. Faith and energy triumphed, and in 1883 the old Empire entered a new era of prosperity. In 1884 water power was introduced at a cost of $100,000, the plant reconstructed and improved, and in 1886 the 20-stamp mill was increased to forty stamps.

MINING AND SCIENTIFIC PRESS

Drifting With Machine Drill, Empire Mine, Grass Valley, Nevada County, Cal.

It was the successful reopening of the Empire that inspired Mr. Bourn to purchase and reopen the North Star, one of the oldest properties in Grass Valley, and from the early '50s to 1870 a very large producer. In 1884 Mr. Bourn purchased the property from W. E. Dean, Thos. Bell, J. A. Faull and others for $16,000, formed a company with a working capital of $40,000, which, with an assessment of $20,000, and the profit of the mine, sufficed to thoroughly reopen and equip the property with what was in 1886 the model plant in California. The successful reopening of the Empire, followed by the wonderful results at the North Star, gave Grass Valley quartz mining an impetus that was felt throughout the State.

In 1887 Mr. Bourn and associates sold the control of the North Star to J. D. Hague and associates of New York, and in 1888, with an idea of retiring from mining, Mr. Bourn sold the control of the Empire and retired from active management.

My connection with the Empire commenced in December, 1881, succeeding to the superintendency on the resignation of V. M. Clement in 1887. In 1893, accepting a call to South Africa, I tendered my resignation, after expressing my faith in the property to the management with the hope that discouragement would not follow the splitting up of the Ophir ledge into several leaders at the 1700 level. (See lower engraving, front page, of split Ophir ledge.) Some exploitation work was carried on during the years 1892–93–94–95, but the mine did not pay expenses, and in 1896 the interest sold by Mr. Bourn was repurchased by him.

Shaft sinking was then resumed and the 1800, 2000 and 2100-foot drives or levels extended. In 1898, returning from South Africa, the management of the property being tendered me was accepted, after I had made a thorough examination and had prevailed upon the executive committee to adopt fixed plans and policies laid down in the report I submitted to them. The essence of this report is, in my opinion, applicable to gold mining generally in California. I found that by extending the drives my former theory of the split in the Ophir vein had been proved true, and that as soon as the large "horse" had been driven through the vein was as strong and true as ever. The 2100 north drive I found had penetrated a rich ore body which then had cut 540 feet of good ore. Good ore was in the face of the drive and the ground above was virgin to the surface, this drive being farther to the north than any of the old levels. Very large areas of north and south ground were unexplored. A probable valuable reserve was in a parallel vein known as the Rich Hill (which had not been worked since 1880), in other parallel veins and in extralateral rights. Lack of sufficient development was the chief cause of all underground troubles. The surface conditions were deplorable, the mine having outgrown the plant. As a condition of acceptance I asked for a fund of $200,000 to properly equip and open up the property, explaining that, while the proposed outlay would require that amount, it was probable that the actual outlay might be less if the old hoist and pumping plant would live long enough to allow mining and milling to continue. The executive committee did not think the ore in sight would justify such an expenditure. My answer to this was that I would admit no large quantity of ore was in sight, but that they controlled a property with a record of forty-seven years' continuous working, with a very limited area of its holdings exploited, a production of more than $7,000,000, with but a small percentage profit, the chief cause being lack of development and a plant not suited for economical or expeditious working under existing or future conditions, and that, in my opinion, the mine justified the expenditure. This letter soon followed:

SAN FRANCISCO, May 9, 1898.

Geo. W. Starr, Esq., The Empire Mines, Grass Valley—DEAR SIR: I have the pleasure to inform you that the executive committee have accepted your ideas and that you were this day appointed managing director by the board of directors. You will be given a free hand in the equipment and development of our property, with the understanding that if necessary to carry out your plans the sum of $200,000 will be furnished you, and that on the completion of the plant the necessary expenditure for 600 feet per month of development, consisting of shaft sinking and drives, will be allowed.

We sincerely trust that, including the cost of the above development, you will succeed in bringing all costs down to $7 per ton. Yours very truly,

(Signed) W. B. BOURN, President.

With the responsibility thus resting upon me, I concluded to first try and force underground development, with a result that far exceeded my expectations. The 2100 drive was rushed ahead and continued in good ore; the total length of this ore body along that level has since been found to be 1740 feet, raises above the 2000 level showed most encouraging results; shaft sinking was continued under difficulties. In the meanwhile plans and estimates were under way for a new plant and on July 6, 1898, the work of pulling down and reconstructing was commenced. All immediately necessary working parts were completed on January 7, 1899. It is interesting to note that this re-creation was accomplished without hanging up more than ten stamps at a time, and the change from the tracks of the old incline and hoist to the tracks of the new thirty-pound rails in shaft and on headgear was made in forty-two hours, during which time forty stamps were dropping. I had no occasion to call upon the company for expenditures, but had the pleasure of producing sufficient to not only pay for all improvements, but to give the shareholders a dividend.

(TO BE CONTINUED.)

Some Facts About Para Rubber.

It is reported that a new rubber producing area in the Amazon section, South America, recently discovered and as yet untouched, is larger than that now being worked. The State of Para produces about two-thirds of the rubber shipped from the port of that name, the remainder coming from the States of Amazonas, Peru and Bolivia.

The rubber tree in appearance resembles the English ash. It grows to a height of more than 60 feet. The leaves are trifoliate. Rubber trees thrive the best on islands and low ground near the rivers, where the banks are inundated. Ground that is above water at all times, or that has no drainage, is not suitable. The peculiarity of the rubber tree, the "hevea," is that it will not grow satisfactorily on cleared or open ground. It requires the shade of other trees and still air from the time its growth begins until it becomes an adult tree. Without these conditions the supply of milk or sap is much affected. The hevea requires about fifteen years to mature.

The area known to produce Para rubber amounts to 1,500,000 square miles. It is believed that further exploration will show that this area is underestimated. On the river Acre, one of the tributaries of the rives Purus, 200 trees yield as much as 3 tons of rubber a year. Great quantities of hevea are known to exist on the banks of the Japura, but that territory has not yet been opened.

It was at one time imagined that the excellence of Para rubber was largely due to the kind of fuel used in curing it. In the Amazon region the fuel used in a clay funnel consists generally of the nuts of certain palms. The reason these nuts are selected is because they emit a continuous dense smoke and are more portable than other obtainable fuel. The palms that furnish the fuel were at one time transplanted in Africa, with a view of making Para rubber there. The experiment was unsuccessful. When none of the palms is accessible bark and twigs are used as fuel.

All workmen in the forest carry a wood knife, the blade of which is 26 inches long and 2 inches broad. One of its principal uses is to cut the fuel for the preparation of rubber. Owing to the damp climate, the blades are electroplated to prevent their becoming rusty before they are marketed. The knives, which resemble the Cuban machete, are all imported from the United States. The rubber collector carries a small ax to chip a smooth surface on the bark before attaching a cup to the tree. The handling of the ax requires skill in order not to injure the bark. A smooth surface is made to prevent impurities mixing with the sap. The cups are clay or tin. The former are attached to the bark by means of a little clay.

Their weight, however, makes them inconvenient to carry when the trees to be tapped are far apart. The collector then prefers to carry tin cups. They easily penetrate the bark by means of the sharp edges and hold to the tree without the use of clay. The use of the tin cup, however, is said to be injurious to the tree.

Part of the collector's outfit consists of a light gourd—large enough to carry the contents of from 500 to 700 cups. A clay bowl is next required to receive the contents of the gourd, of sufficient size to contain the product of several days' work before it is cured. The calabash tree provides calabashes, which are employed to ladle the milk from the clay bowl into the mold. A broad-bladed wooden paddle is used as a mold and is made locally. This completes the outfit for the rubber collector.

The collector has to use his knife to cut his way through the undergrowth, and also to cut down a sapling occasionally to bridge a rivulet. At times he is knee-deep in ooze or up to his waist in water. On arrival at a rubber tree, he chips away the rough parts of the bark, makes a more or less smooth surface, attaches a cup, and makes a small gash above for the sap to fall into the cup, and repeats this process in a line around the tree until he has attached six or seven cups. Then he proceeds to the next tree and does the same. He continues this process until he has tapped from 75 to 150 trees, which can be done in a day if they are not too far apart. On the following days the gashes in the trees are made a trifle lower down than the first ones. Some collectors tap the trees in the morning and return to collect the sap in the evening, whereas others tap in the evening and collect in the morning. An expert gathers seven pounds daily in the lower Amazon; in the upper Amazon three times this amount is collected.

When the accumulation of rubber is sufficient—usually in three or four days—the collector lights a fire in the hut he has erected, places the funnel over a fire, pours a thin coat of milk over the paddle and holds it over the smoke to coagulate. The process is repeated until a large cake has been formed. To release the paddle from the cake it is necessary to make a slit on one side. The paddle mold makes a cake of uniform and even shape, and is in general use in the State of Para. In other parts, a spit is placed on two upright forked sticks and given a rotary motion. By this means the rubber is cured with greater ease. Paddle smoked rubber is preferred, as it is drier and seemingly more carefully cured.

Many attempts have been made to introduce improved curing apparatus. Up to this writing, however, they have not been received with popular favor, because the common method, although very primitive, possesses the advantages of being simple and inexpensive. The process of curing rubber is extremely injurious to the eyes. Many cases of total blindness result therefrom.

There are three grades of Para rubber, viz.: fine, medium and coarse. If rubber is not uniform and contains impurities, it is classified as medium. The coarse quality, or "Sernamby," consists of scraps that have not been cured.

Insufficient labor is the most serious difficulty in the rubber industry. It would scarcely seem advisable to invest money in rubber estates, unless the owner first can see his way clear to obtain sufficient labor with which to collect the rubber. In reality, the genuine owner of the produce of the forest is the collector, not the landowner.

As a rule, the landowner makes advances to the collectors for their outfit, food, etc., and in return receives the rubber collected by them. He sells the produce on the collector's account, retaining 20% for himself, and continues making advances in such manner that the collector always remains in his debt and consequently in his service. It frequently happens, however, that the collector takes the advance and fraudulently disposes of the rubber to any buyer who may be on hand. A great deal of leakage occurs in this way, and no method of preventing it is in successful practice. This is another of the difficulties of the landed proprietor. One of the methods in practice is to lease the trees in lots of 75, 150 or 200 at a given sum per annum, and to stipulate that the lessee should sell the rubber and purchase all his supplies from the owner. The lessee works his lot to the utmost, and usually earns a handsome profit after paying the rent, and, although the owner does not obtain the full value of the lots rented, he makes up for it by charging commission on goods supplied, etc.

The profits of the rubber industry would seem to be large, because the employer keeps 20% and makes about the same on the goods supplied the employes; but it must be considered that out of 100 employes, whose outfit and traveling expenses have been advanced, at least 75 die, desert, or return to their homes on account of illness. The expense incurred for them is accordingly a dead loss, and when this is deducted from the total income the profit is greatly reduced.

The "aviador" is a person who advances supplies and capital to the rubber collector in exchange for rubber. The principal "aviador" resides at the chief centers, and finances a number of small "aviadores," who travel about in the rubber industries. The exporters of rubber are mostly agents of United States and British importers. They buy from the "aviadores" in the principal centers.

Signal Device for Mines.*

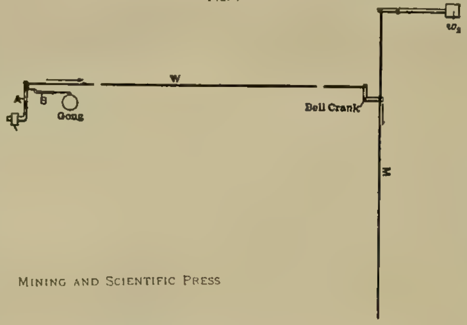
By C. S. Herzig.

Some time ago, in Mexico, our signal bells in a 700-foot shaft caused us considerable annoyance by continually getting out of order, each time so delaying our hoisting operations that we naturally desired to remedy this evil. There were two ways open: either to patch up the old bell, which was of the ordinary pattern, every time it failed to work, or else to devise some new arrangement. On consultation with our foreman we devised a signal device which, during the number of months I watched its operation, worked satisfactorily, without once getting out of order.

We sought to produce a simple device, in which no greater pull on the lever would be necessary from one level than from another; to counterbalance independently the weight of the pendant bell rope, so that there would be no direct weight on the working parts of the bell itself, and likewise to arrange it so as to necessitate only a light pull on the lever in signaling; and, finally, to make some sort of trip arrangement, so that whenever the signaling lever underground passed through a certain arc the signal would be given in the engine room. By this means we wished to obviate the ill effects of sudden heavy pulls and rough usage in general, such as all signaling systems encounter underground at the hands of careless or mischievous employes.

The bell rope we had in use was a galvanized iron rope $\frac{7}{32}$-inch in diameter; and, after determining the length needed, we calculated its weight, so that we might be able to counterbalance it properly. On locating the bell in the engine room, a wire, W, is led off horizontally, and, by means of a bell crank, is connected to the main signal rope, M, passing down the shaft (see Fig. 1). The weight w_2 counterbalances M and should be heavy enough to carry the wires back to a normal position; therefore, it must be equivalent to the weight of the pendant rope, M, plus a factor to overcome friction.

Fig. .

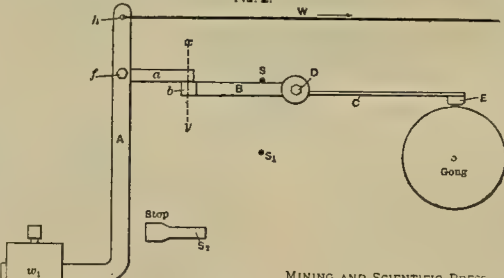


Mining and Scientific Press

DIAGRAM SHOWING GENERAL ARRANGEMENT AND CONNECTIONS OF SIGNAL AND METHOD OF COUNTERBALANCING PENDANT ROPE.

The working parts of the bell itself are shown in Fig. 2. A is a weighted lever, to the upper end of which the connecting wire W is attached; the arm a projecting from it is made of steel, about 5 inches long, and has a bearing surface of 1 inch at its further end, resting on a similar surface b on B. A cross-section through x y is shown in Fig. 3.

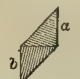
Fig. 2.



Mining and Scientific Press

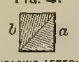
SKETCH SHOWING DETAILS OF SIGNALLING DEVICE.
One-tenth full size.

Fig. 3.



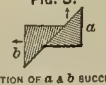
SECTION THROUGH x–y (FIG. 2.) a & b AT REST, READY FOR SIGNALLING.
½ full size.

Fig. 4.



a & b ENGAGING AFTER SIGNAL HAS BEEN GIVEN.
½ full size.

Fig. 5.



A POSITION OF a & b SUCCEEDING THAT SHOWN IN FIG. 4.
½ full size.

Mining and Scientific Press

B is a piece of flat spring steel about 8 inches long, at the end of which is the bearing surface b. D serves as a hub, to which B and C are attached, C being a flat spring similar to B, but about 12 to 14 inches long, at the end of which is the knocker E. It should be observed that B is vertical, whereas C lies flat, and that C should not be as heavy a spring as B.

When the bell rope is pulled to signal the engineer, the wire W moves in the direction of the arrow, and the arm a, traveling downward in a circular path, around f as a center, forces b to move downward around D as a center, until the arcs in which they are traveling diverge far enough for gravity to carry B–C back again to its normal position, B being arrested by the stop s; however, the force with which the arm flies back causes the knocker to strike the gong and thus give the signal. As soon as the bell rope is released, the arm A is carried back to its original position, and in so doing the triangular surface on the end of a slides upon the inverted triangle b (see Fig. 4), forcing it to one side (see Fig. 5), until a rests in its normal position on top of b, when it is ready for another pull, as shown in Fig. 3.

In counterbalancing the weight of the pendant bell rope, sufficient weight must be added to the counterbalance to bring the levers underground back into position automatically. The counterweight may be located at any convenient place on the headframe, providing it is above the bell crank to which W is attached.

In order to prevent the pull necessary for signaling from becoming excessive, it is desirable to reduce friction as much as possible. A force equivalent to a 10-pound weight should be sufficient for pulling the levers in a well arranged signaling system. To accomplish this, I think it advisable to bring a bell rope into proper alignment by means of plumb lines and to hold the rope in position by means of old iron pipe 2 to 3 inches long, instead of by means of staples, as is so commonly done. In inclined shafts the bell rope should be supported at frequent intervals on some form of roller. The spools on which connecting wire comes make good rollers, in the absence of anything better.

That there may be no mistake, the arm C should be long enough, and the knocker E heavy enough to cause their instant return to position when the paths of a and b part company. For this purpose it is also advisable to put a stop, s_1, below B, so that by no possible chance can it fly beyond its balance point.

By increasing or diminishing the bearing of the triangles a and b, the arc traveled can be changed. In my opinion, it is not advisable to increase this bearing above the inch mentioned before. The triangles, as shown in section, Fig. 3, should have bases of about ¾ inch, with perpendiculars of ¾ to 1 inch. The bearings of the two points f and d should be good ones, so that there will be no lateral motion, which might make a fail to engage properly with b. Any play at d or f is considerably magnified at the triangles; but, by making the bases of these triangles large enough, the chances of their not working properly are greatly lessened. By moving the position of h with respect to the center f, the arc of pull underground necessary to signal can be regulated.

The spring B must be quite stiff and of good material; but it must be borne in mind that the stiffer the spring the heavier must be the weight w_1, and, in consequence, the greater the effort required to pull the levers; nevertheless, w_1 must be heavy enough to bring back the wire W and to overcome the resistance of the spring B. If the arm A is made sufficiently heavy, the use of a counterweight (w_3) may be dispensed with, although it is preferable to arrange as shown in Fig. 2; for by this means it can be properly adjusted. If w_1 is too heavy, the arm A has a tendency to pound against the stop s_2. While w_1 must not be too heavy, its weight must not be cut down to such an extent as to impair the instant return to position of the arm A.

The whole apparatus may be mounted on a board and placed at some convenient spot in the engine room.

Saving the Copper.

To the Editor:—The following is clipped from a Utah paper:

> In Butte City the Anaconda Co. realizes thousands of dollars annually from the cupriferous waters by holding this water in tanks into which are plunged great quantities of scrap iron, etc. The iron is freed and a unit of copper deposited in its place. At the Mikado mine recently old pieces of submerged iron rails were found changed to copper on the same chemical principle. Might not the waters from those mines contain sufficient copper in solution to make the proposition worth testing?

The suggestion is a good one. The matter has been given trial in this camp. There is copper in the water below the mouth of the Starlus tunnel, at Bingham, and Mr. Lee, the manager, some time ago had made a series of small tanks; he filled them with scrap tin and ran the spring water through them, securing accumulation of precipitant. The water was clear, no discoloration being perceptible, but carried an average of one-fourth of 1% copper. Within twenty-four hours after the tin was immersed it showed precipitation which accumulated, sloughed off and sank. In seven to eight days the tin disappeared, being disintegrated by the action of natural sulphuric acid in the water. As a precipitating agent tin is superior to naked iron, not enough oxidization taking place to interfere with the process. The "plant" consisted of five tanks, each 18 feet long, 12x12 inches wide and deep, and one 4 feet long, 3 feet wide and 4 feet wide.

Bingham, Utah, Aug. 1. E. D. S.

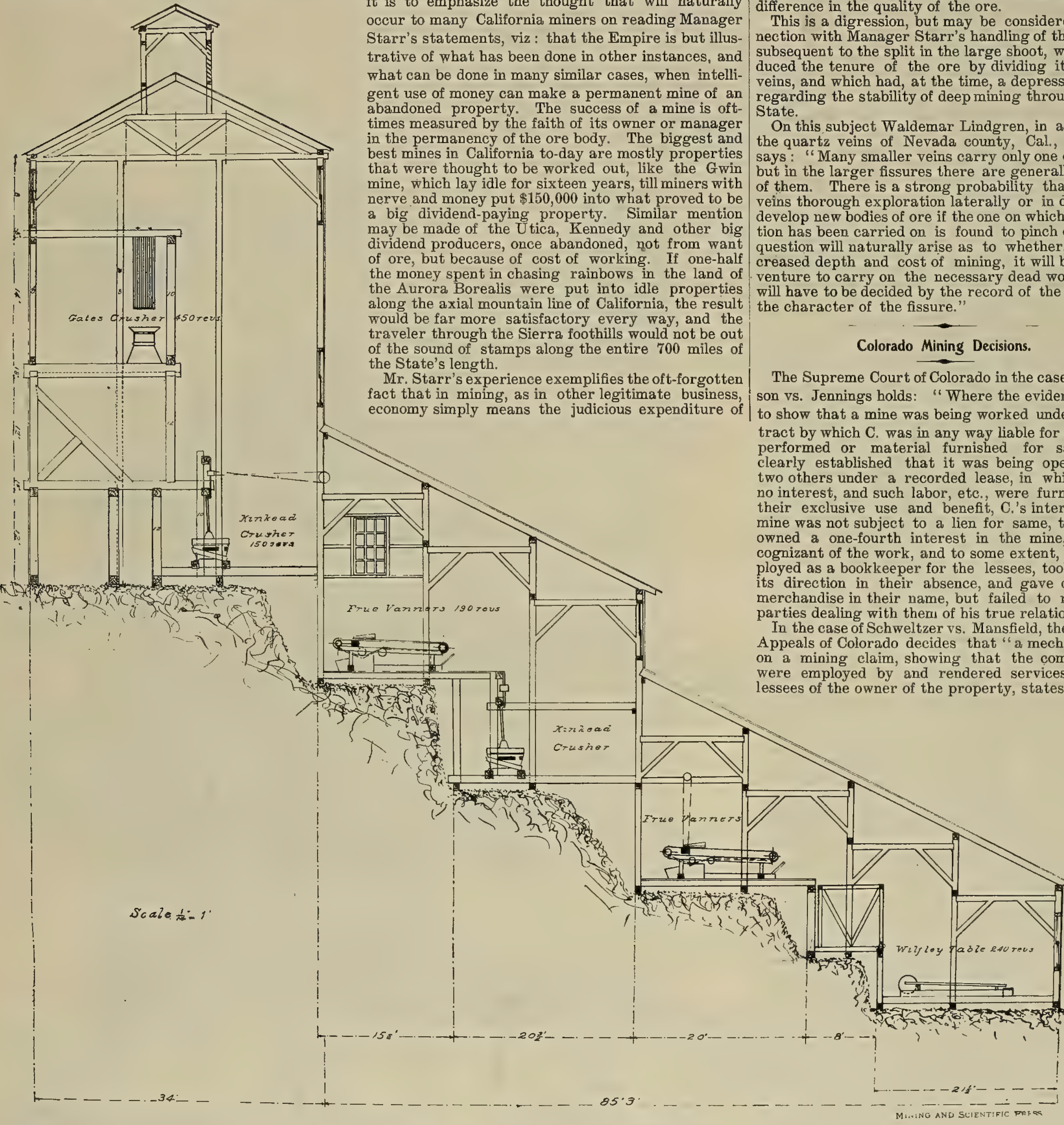
---

*Canadian meeting, August, 1900, Am. Inst. M. E.

Gould & Curry Plant.

Among the new evidences of life on the Comstock, Nevada, is the new concentrating plant of the Gould & Curry, now nearing completion. The accompanying zincograph is from an official drawing furnished by Mr. Allan Kinkead, and reduced therefrom, the scale being proportionately reduced—one-fourteenth of an inch to the foot as it appears on this page. The engraving will convey to practical miners a better idea of the appearance and arrangement of the plant than a page of description.

The new concentrating plant being erected by the Gould & Curry G. M. Co. at Virginia, Nevada, will have a daily capacity of 100 tons. The ore will be run from the lower tunnel (425-foot level) and dumped over a grizzly into the mill bins, the coarse ore passing to a Gates rock breaker and broken to 2-inch mesh. On the first floor below the bins the ore passes to five heavy Kinkead mills where it is crushed through 20-mesh screens, sized and carried to Frue vanners on the second floor below the bins. The tailings from the first set of vanners are then carried to four Kinkead mills, located on the third floor below the bins, where they are reground through 60-mesh screens, sized and carried to the second set of vanners, located on the fourth floor below the bins. The slimes are then separated from the sand and run into a large V-shaped settling tank, 40 feet long, 10 feet wide at the top and 10 feet deep, from which the slimes are fed to the third set of vanners, located on the fifth floor below the bins. By this arrangement it is claimed that 90% of the values can be recovered by the one continuous operation. The mill will be driven by electric power transmitted from the Truckee river, a distance of 28 miles.



Gould & Curry Concentrating Plant, Virginia, Nevada.

A Good Example.

The article on pages 149 and 152 of this issue deserves notice, being a plain statement of past and existing conditions in the oldest continuously worked gold mine in the United States, written by a man fully familiar with the facts. The idea in referring to it is to emphasize the thought that will naturally occur to many California miners on reading Manager Starr's statements, viz: that the Empire is but illustrative of what has been done in other instances, and what can be done in many similar cases, when intelligent use of money can make a permanent mine of an abandoned property. The success of a mine is ofttimes measured by the faith of its owner or manager in the permanency of the ore body. The biggest and best mines in California to-day are mostly properties that were thought to be worked out, like the Gwin mine, which lay idle for sixteen years, till miners with nerve and money put $150,000 into what proved to be a big dividend-paying property. Similar mention may be made of the Utica, Kennedy and other big dividend producers, once abandoned, not from want of ore, but because of cost of working. If one-half the money spent in chasing rainbows in the land of the Aurora Borealis were put into idle properties along the axial mountain line of California, the result would be far more satisfactory every way, and the traveler through the Sierra foothills would not be out of the sound of stamps along the entire 700 miles of the State's length.

Mr. Starr's experience exemplifies the oft-forgotten fact that in mining, as in other legitimate business, economy simply means the judicious expenditure of money: it is economy in making a mine, as in making anything else of profit, to spend necessary money, and no form of industry brings surer or more permanent return.

The first part of the article in last week's issue related to the early history of the mine. In this week's installment of the article Mr. Starr makes reference to the split in the Ophir vein. His ability to prove that his theory regarding that split was correct, is of value and encouragement as concerning deep mining in California, and goes far towards favorable consideration of similar conditions.

It is occasionally the experience of miners that large bodies of ore pinch out with depth; the Sierra Buttes mine, in Sierra county, Cal., is an example; but it is a more common experience with large ore shoots that they continue to the deepest levels. In the same district as the Empire mine the ore shoot of the North Star extends 2500 feet in depth, measured along the plane of the vein; the Eureka–Idaho shoot held its own uniformly over a distance of 5000 feet; in the Maryland mine high-grade ore was found on the same shoot at a vertical depth of 1500 feet, and a small ore shoot was found near the bottom of the Idaho shaft at a depth of 2200 feet. Gold quartz veins in that vicinity show a vertical extension of 3500 feet, within which there is no evidence of any gradual change in the character or quality of the ore. In the same county, near Washington, good quartz is mined 600 feet below the river level in the Eagle Bird, and 2000 feet above the river level on the north ridges of the river; in that 2600 feet there being no distinct difference in the quality of the ore.

This is a digression, but may be considered in connection with Manager Starr's handling of the Empire subsequent to the split in the large shoot, which produced the tenure of the ore by dividing it on three veins, and which had, at the time, a depressing effect regarding the stability of deep mining throughout the State.

On this subject Waldemar Lindgren, in a work on the quartz veins of Nevada county, Cal., correctly says: "Many smaller veins carry only one ore shoot, but in the larger fissures there are generally several of them. There is a strong probability that in such veins thorough exploration laterally or in depth will develop new bodies of ore if the one on which exploitation has been carried on is found to pinch out. The question will naturally arise as to whether, with increased depth and cost of mining, it will be a good venture to carry on the necessary dead work. This will have to be decided by the record of the mine and the character of the fissure."

Colorado Mining Decisions.

The Supreme Court of Colorado in the case of Davidson vs. Jennings holds: "Where the evidence failed to show that a mine was being worked under a contract by which C. was in any way liable for the labor performed or material furnished for same, but clearly established that it was being operated by two others under a recorded lease, in which C. had no interest, and such labor, etc., were furnished for their exclusive use and benefit, C.'s interest in the mine was not subject to a lien for same, though he owned a one-fourth interest in the mine, and was cognizant of the work, and to some extent, while employed as a bookkeeper for the lessees, took part in its direction in their absence, and gave orders for merchandise in their name, but failed to notify the parties dealing with them of his true relation."

In the case of Schweltzer vs. Mansfield, the Court of Appeals of Colorado decides that "a mechanic's lien on a mining claim, showing that the complainants were employed by and rendered services for the lessees of the owner of the property, states no cause of action against the property."

The same court, in the case of the Little Veleria G. M. & M. Co., holds that "a complaint by miners to enforce a miner's lien against the owner of the mine, alleging that they had been employed by sublessee in accordance with the provisions of the original lease, and that their wages had not been paid, but failing to show that the owner of the claim was connected with the contracted employment, or in any manner obligated for the payment of their wages, is insufficient to hold him or his interest in the property."

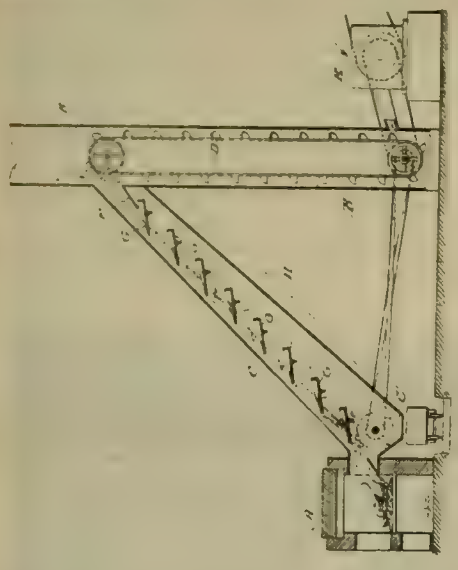
A SPECIAL MEETING of the executive committee of the California State Miners' Association will be held at the Union League rooms, San Francisco, Aug. 13, at 8 P. M.

Mining and Metallurgical Patents.

Patents Issued July 31, 1900.

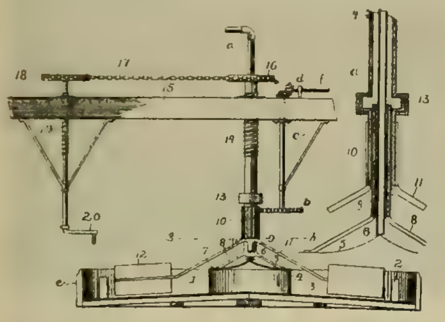
Specially Reported for the MINING AND SCIENTIFIC PRESS.

CALCINING FURNACE.—No. 654,640; G. Hughes, El Paso, Tex.



Combination of chute having slots J, dumping plates pivoted and provided with stop projections extending through slots, bearing rollers K and chain having tripping projections engaging bearing rollers. A roasting apparatus for roasting ore comprising in-lined series of dumping plates pivotally supported whereby discharge edges may be lifted and dropped, stop to limit dropping movement of dumping plates and chain provided with projections arranged to engage plates and lift and release discharge edges hereof, whereby they will drop upon their stops and ause roasted material to discharge.

ORE SEPARATING MACHINE.—No. 654,662; J. F. Mitchell, Topeka, Kansas.



Ore-separating machine comprising circular tank ith vertical discharge openings 2 in sides 1, gates which operate as vertically adjustable closures for ischarge openings 2, inclined bottom 3 to tank, cenral cylinder 4, having cone-shaped top 5, axle 9 restng on braces 8 attached to it, feed pipe a, elongated, ogged hub 10 turning on axle 9 and having arms 11 ttached to and radiating from near its base, fans 2 attached to arms 11 near outer extremities, screw 4 attached to top of hub 10 by swivel connection 13, ulley wheel 16 attached to upper end of screw 14, onnected by endless chain 17 or belt, to pulley wheel 8, supported by upright screw 19, terminating at wer end in handle 20 or crank, cog wheel b conected with hub 10 and attached to lower end of perendicular shaft c, which has cog connection d with orizontal shaft f supplying power.

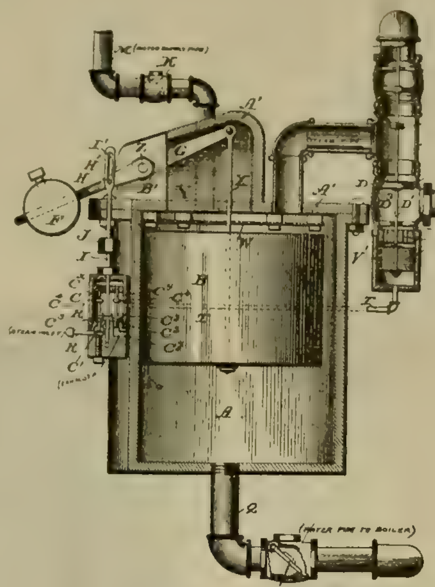
PROCESS OF MAKING BORAX.—No. 654,667; J. L. ovarine, New York, N. Y.

The process of manufacturing sodium borates, consting of following steps: first, reducing crude sodium ilphates at high temperature by means of caronaceous material, treating resulting mixture of odium compounds with water, subjecting natural orate to action of solution thus obtained, filtering or ecanting it off and isolating sodium borates therein ontained through repeated crystallizations.

PROCESS OF OBTAINING OXIDE AND CARBONATE OF INC FROM MATERIALS CONTAINING ZINC.—No. 654,-4; G. Rigg, Swansea, England.

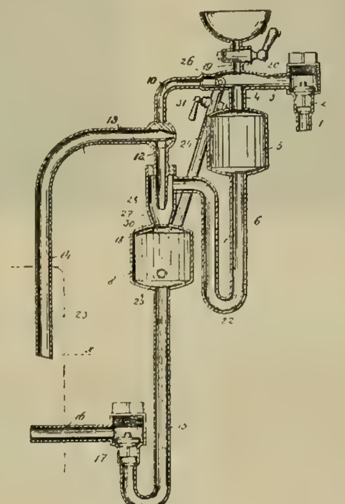
Producing or separating oxide of zinc and carbonate zinc from zinciferous ores or other materials, leachg zinciferous ore or other material with solution of nmonia and carbon dioxide wherein carbon dioxide in such proportion to ammonia as to impart to later an approximately maximum dissolving capacity id subsequently separating from solution oxide of ıc and carbonate of zinc contained therein by altering proportion of active carbon dioxide contained in solution, removing oxide of zinc and carbonate of zinc, and rendering solution fit for leaching again by again establishing proper proportion of carbon dioxide therein.

BOILER FEEDER.—No. 655,064; H. J. Davis, P. G. Ault, W. W. Bailey, J. H. Wideman, Birmingham, Ala.



In apparatus of character described, combination with tank connected with boiler and source of water supply, displacing weight adapted to rise and fall in boiler, rocking lever connected with weight, and adjustable governor or counterbalance weight applied to arm, valve chest, steam inlet valve C′, steam exhaust valve C^2 arranged in chest and provided with shoulder stems, slidable rod having lengthwise slot engaging pin on lever arm, provided with shoulder or collar within valve chest, adapted to engage shoulders on valve stems, steam pipes connecting chest with boiler, steam chest having admission and exhaust valves and piston for operating them.

SELF-ACTING FEED APPARATUS FOR BOILERS.—No. 654,784; A. Coufalik, Krepice, Austria.



Combination in self-acting boiler, condenser 8 located higher than water level in boiler, injector on boiler, water tank connected thereto, tank being situated higher than condenser; water supply pipe, pipe being interposed between same and tank, pipe 10 leading to injector, pipe 12 leading from boiler to pipe 10, cock in pipe controlling communication between pipes 10 and 13 and injector, pipe connection between bottom of condenser and boiler and valve in latter pipe.

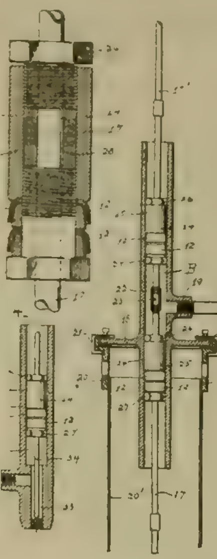
COMPOSITION FOR PREVENTING BOILER INCRUSTATIONS.—No. 655,119; J. L. M. A. Reis, Antwerp, Belgium.

Composition for preventing incrustations in steam boilers, consisting of 58 parts of sugar, 20 parts extract of tannin, 20 parts silicate, 2 parts boracic acid and water, sufficient to bind above ingredients.

GOLD SOLVENT FOR REFRACTORY ORES.—No. 654,-838; D. Mosher, San Francisco, Cal.

Process of treating refractory ores consisting in reducing ore to pulp, adding thereto solution of about 15 pounds of bromine in 120 pounds of commercial hydrochloric acid 21° Baume, then adding potassium permanganate in dry and crystal form to slowly generate chlorine, then precipitating the precious metals.

OIL WELL PUMP.—No. 654,706; H. E. Braymer, Prairie Depot, Ohio.



In an oil-well pump, combination of casing head top having barrel provided with lateral branch, packing head movable therein, and comprising tubular sleeve internally threaded at both ends, externally threaded plugs adapted to threaded engagement with ends of sleeve and provided with orifices to receive sucker rod, compressible cylindrical gland with sleeve around rod, interposed between plugs and adapted to be compressed thereby to frictionally secure sleeve to rod, and packing cups upon one of the plugs adapted to be compressed thereby against sleeve to pack barrel.

How to Find a Pocket.

Written by a Prospector.

First.—Remember that the gold in the surrounding surface is the only guide to a pocket.

Second.—Never dig a hole on a quartz ledge with the expectation of finding a pocket unless it will prospect at the start.

Third.—When tracing for a pocket, if the gold is smooth, leave it at once, for it's ten to one you will never find it.

Fourth.—If your trace runs to a deep bed of clay, don't lose much time in looking for the pocket.

Fifth.—Beware of serpentine traces. Most all will prospect and not pocket.

Sixth.—Remember fifteen or twenty colors of gold as fine as flour to the pan, and an occasional coarse color as big as a pinhead, is a better trace to a pocket than a single piece of gold worth $1, even if it is rough.

Seventh.—The best place to look for pockets is in a coarse-gold district. The pockets are larger and as easily found.

Eighth.—Recollect that nine out of ten pocket ledges do not crop out near the pocket.

TRACING.—Commence by panning the top of the ground. It will prospect better there than deeper, unless you are near the pocket or on flat ground. Then go deeper, even to the bedrock. If on descending ground, face up hill, panning from right to left as far out as you can get gold, and where you get the best prospect; move up the hill from that point, panning from right to left as before, and move up on the best prospect. Keep this up until you get above the prospects; then go back where you got the last best prospect, dig a small hole half way to the bedrock and take a pan. Then take one on the bedrock, and if the last prospects best, rest assured you are near the pocket. From there trench up, and if you don't find the ledge and prospects give out, trench across, and you will be certain to find the ledge; if you do not find the pocket, trench both ways along the ledge, panning every inch, and you will be certain to find it, unless it has been distributed over the ground you have traced by the rocks decaying and rain washes. Where a pocket throws out a trace, you will find it at the top of the bedrock, if there is any left.

When you have taken out one pocket, note the formation around it; follow that and you will be likely to find another or a dozen. It is not advisable to sink straight down very deep, unless it will prospect or the formation runs that way, which can be determined by black rock, caused by fine stringers of iron and quartz running towards the ledge; where they strike the ledge, pockets are liable to occur.

Pocket chimneys—like those on the mother lode or any gold-bearing region—do not run straight down, but angle on the ledge. Pocket shoots are often not more than 1 foot wide, and even less. By the time your shaft is down 8 or 10 feet, you will have cut through your shoot and left it on the end of your shaft. The same system described to find pockets holds good in locating chimneys on milling lodes, if they contain free gold or even gold-bearing sulphurets.

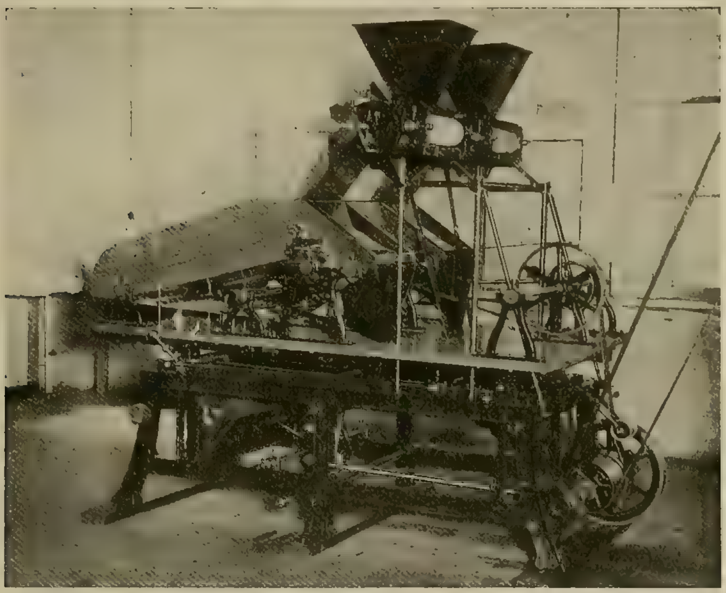
New Concentrating System.

Mine and mill managers, dealing with ores which require concentration, are often harassed in their efforts to secure concentrates of the greatest possible purity and carrying the highest attainable ore values at least possible cost of extraction, if, when the profitable point of extraction and purity has been reached, values still remain in the tailings which if in the mine treasury would insure a handsome profit. In the majority of mining operations the margin between profit and loss is a narrow one, and this passing away of values is a source of worry.

More particularly does the above apply to those who destructively handle gold ores which, in addition to their free gold, carry auriferous metallic sulphides of zinc, antimony, lead, iron, arsenic, copper, etc., sometimes singly, often containing a combination of two or more, all of which slime readily under the impact of a stamp; and especially the more friable ones, as of zinc and antimony.

In no branch of the mining industry has a greater degree of intelligent thought and inventive genius been brought to bear than in that involving the concentration of ores, and the mine owner heartily welcomes any suggestion or device which will enable him to ever so slightly and profitably increase his percentage of values saved.

The Crown dry ore sizer and concentrator, illustrations of which appear on this page, have been especially designed to secure a larger percentage of values. In these machines are embodied the practical results of long continued and expensive tests on the part of the inventor, F. W. Wood, based upon the proper application of the following principles:


Concentrator.

First.—That bodies of unequal sizes, but equal falling weights, will fall together.

Second.—That bodies of equal sizes, but unequal falling weights, will not fall together.

Third.—That the influence of specific gravity upon a falling body increases or decreases proportionally to the density of the medium traversed by the body.

Fourth.—That all mineral particles, however finely divided, will, in falling, if of equal size and left free to act, arrange themselves in accordance with their specific gravities.

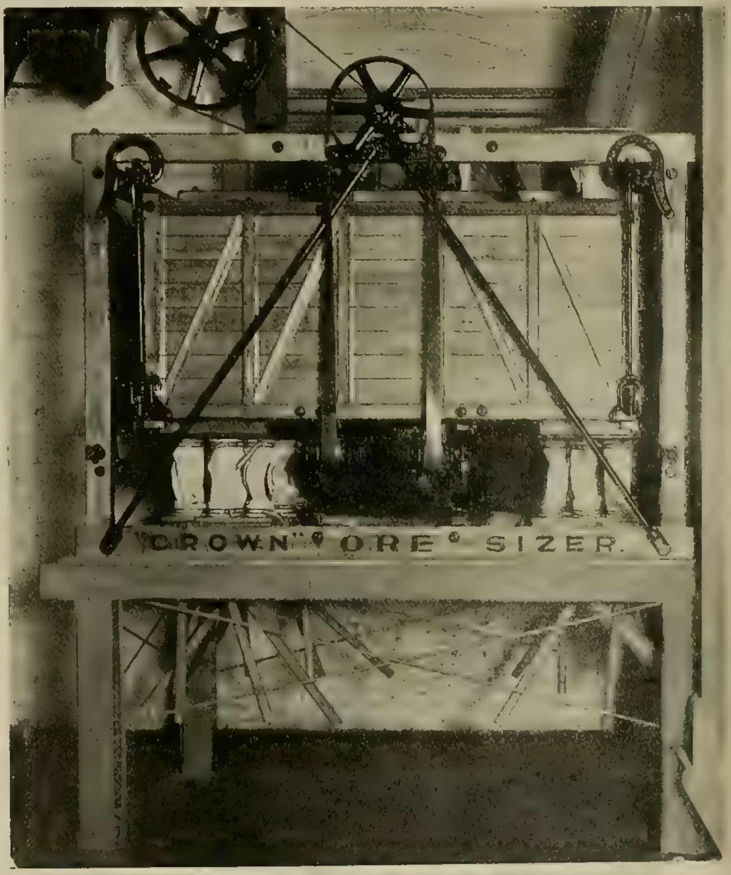
In the Crown dry ore milling process the ore is first passed through the rock breaker, thence through a series of rolls gauged to give pulp of the desired fineness and without grinding or crushing the sulphides to a sliming powder. The pulped ore is conveyed by a carrier belt to the "sizer," which consists of a dust-tight box containing screens of from 40 to 180 mesh (the mesh sizes can be varied to suit particular ores). By a simple mechanism and small expenditure of power the sizer is given a rapid oscillatory motion, and each screen discharges its special sized grains into a separate bin. An automatic attachment takes assay samples from the separate discharges at regular intervals. In the sizer the ore particles have been rearranged and classified from:

First.—Bodies having unequal sizes, but equal falling weights, into—

Second.—Bodies having equal sizes, but unequal falling weights.

From the sizer bins the assorted particles are taken to the concentrators by carrier belts, the sized grains being concentrated separately; but all of the concentrates are delivered into one receptacle, and all of the waste is discharged into one dump, unless for any reason it is desired to keep the sizes segregated.

The concentrator consists of a woven corrugated belt, traveling through a closed box having an air chamber under the superior portion of the belt. The concentrator box is fastened to a shaking table to which is given a compound motion to keep the ore particles actively vibrating on the belt, and is designed to insure perfect concentration. The concentrator belt travels equal distances in equal times, an accompanying device being intended to eliminate all slippage. The travel of the belt can be quickly varied and the table elevated or depressed, as may be best suited to obtain the most profitable results from the different sized ore grains being concentrated. At the head or elevated end of the concentrator is placed a blower which discharges itself horizontally into the air chamber under the corrugated belt. This air pressure may be regulated from an ounce to the smallest fraction thereof to each square inch of belt surface, as may be found to be most suitable to the gravity and size of the ore grains. The air pressure can relieve itself only through the interstices of the woven belt, running at an angle of about 15°, the horizontal air column strikes it at an acute angle, and, passing through the belt, deflects the slower moving, light and worthless grains from the perpendicular, causing them to travel toward the lower or waste discharge. The heavier and valuable particles, being unaffected by the air current, are carried by the belt to the upper or concentrate discharge. As the influence of specific gravity acts more freely in the rarified medium—air—than in the denser medium—water—satisfactory concentration is designed to be effected, the finest particles being recovered.



Sizer.

The manufacturers are of the belief that the sulphides saved will be from 95% to 98½% of the total quantity contained in the ore, even though such sulphides should have the greatest tendency to slime. They also claim that in purity or freedom from worthless matter the concentrates will reach 90% to 95%. Any system of rolling or crushing will leave some grains of matrix with adherent particles of sulphides or free gold, which pass over into the concentrates, and, to this extent, debase the product.

Numerous assays indicate that, with some exceptions, the valuable contents of ores worked will be found in a well-defined series of classified particles. In some ores these values will be in the coarser series; in other ores they will be found in the finer series, and in still other ores in the intermediate series. As assay tests are taken at the sizer, only those sizes carrying value are put through the concentrator. The worthless sizes are consigned to the waste dump, there being, then, a large amount of material upon which no further expense is incurred.

The manufacturers say "that among the sizes showing values it will be found that one or more of these carry the bulk of the sulphides, while the other sizes will carry the largest percentage of free gold in ores. Those sizes carrying free gold can be treated either before or after concentration—preferably after—and a larger value recovered than if treated while associated with the sulphides; and the loss of free gold floated away by the slimes, or the loss of mercury and amalgam by being scoured, sickened or floured and carried off in the tailings, is reduced almost to zero."

They claim that the Crown sizer and concentrator can be profitably attached to most mills now in operation. In the complete process the general practice is reversed, in that the ore is worked for the free gold—if the tailings show any—after, instead of before, concentration.

"The ores are handled automatically from breaker to waste dumps. A limited personal supervision only is necessary to attend to the details of stopping, starting and regulating machinery and concentrator, air currents, feeds, elevation and action. The feeds are designed to be so adjusted that precision and uniformity are assured. When the machines are in action all floating dust particles are absorbed by a dust collector, much to the comfort of the millman and the increased longevity and cleanliness of the machinery. Compared with their tonnage capacity, the machines require but a small area under cover and but a moderate expenditure of power. All swinging points are ball bearing and other bearings are dust proof."

If all that is claimed by the manufacturers be true, the sizer and concentrator should prove of value to those operating milling plants in arid regions, where the water supply is scarce, impure or expensive.

The manufacturers say: "In putting beach and river sands through the machines the separation of gold and black sand grains from the siliceous particles was so perfect as to leave nothing to be desired but a higher value in the crude sands."

They also claim that "from dry placer gravel sands all but a very small fraction of the gold is redeemed." It has ordinarily been found impossible to economically extract the finer gold particles from dry placer sands.

Further claim is made that "where pulps charged with cupriferous pyrites or metallic copper particles have been treated by this process the tailings have proved barren when assayed."

The machines are manufactured and operated by the Crown Gold Milling Co. at their factory, 23 Stevenson street, San Francisco, where they can be seen in operation and may be subjected to any desired test. The office of the company is at 230 Post street, San Francisco, Cal.

THIS time it is smelting that is to be "revolutionized." A company in New York is reported to be operating on a small scale a new process for the manufacture of oxygen, by which with the assistance of liquid air and an apparatus which can be placed on the stack of a smelter, oxygen can be made at a low cost. Then it is sprayed over the coke in a furnace, and one ton of coke, it is claimed, can be made to do the work of three tons, so hugely is the work of combustion aided by the added oxygen.

Not Published in New York.

"As to the recent advance, so welcome to our Province's silver-lead production, the New York MINING AND SCIENTIFIC PRESS speaks as follows:" * * —Vancouver, B. C., News-Advertiser.

Silver Smelting in Mexico

NUMBER III.

All water jackets have a projection 4 inches above their tops in the center. This projection is open on top and has a circular hole in front in which the waste water pipe is inserted. The feed-water pipe is inserted through the open top and reaches about half way down in the projection. Some metallurgical authors insist that the coldest water should be introduced at the bottom of the jackets. I am of a different opinion. The feed water is kept near, but below, the boiling point.

The height of the water jackets is 41 inches in the case of the large size (42″x120″) furnaces, and 54 inches in that of the smaller-sized (42″x102″). Such high jackets are unwieldy to handle; the former are, therefore, preferable.

The width of the side jackets of the large furnaces is 20 inches, that of the smaller is 17 inches; hence, the length of the furnace section can be easily obtained by multiplying the width of the side jackets by their number.

The front and back jackets are 27 and 34 inches wide at the bottom, respectively, and 37 inches wide at the top. The front jackets are made 10 inches shorter at the bottom than the back jackets, in order to be able to place a slag tap (slag notch or tap jacket) on the dam under them. The slag tap is a small water jacket of cast iron, or, better, of bronze, 26 inches long by 14 inches high, with 3½ inches of water space, and a conical hole cored out in the center, which has a diameter of 2½ inches toward the interior of the surface and 5 inches outside. Through this hole the slag is tapped. The jackets of the larger furnaces have a bosh of 6 inches (or an angle of 74½° from the horizontal) all around, thus making the section of the furnaces above the water jackets 54x132 inches. Likewise have the jackets of the smaller furnaces a bosh of 9 inches all around (or an angle of 73½° from the horizontal), affording an area of 60x120 inches above the jackets. A flatter bosh is to be avoided.

The front and back jackets are not set between the side jackets, but lean or butt against them on the outside, and are wide enough to cover the narrow ends of the side jackets. They are held together by means of 1-inch bolts passing through wedge-shaped washers (wedge blocks), which are inserted in lugs cast on the jackets. This arrangement allows contraction and expansion of bolts without breaking off the lugs. Where blast of a high pressure is used, extra binders must be laid around the jackets.

By giving the smaller furnaces the same number of tuyeres as the large ones, namely, twelve, it was thought that they could be made to smelt the same number of charges as the larger ones. Ordinarily, this was not the case.

Cast iron water jackets are preferably used by lead smelters on account of their cheapness and the ease with which they can be handled. They are especially of advantage when the water is bad, for, if one breaks, there is not much lost, and it is an easy matter to replace it. This is different with wrought iron and steel jackets. As the sections cannot be fitted so snugly as cast iron ones, it is customary to make the whole side of a furnace one water jacket, to avoid too many joints. With bad water, they do not last much longer than cast iron, and it is then quite troublesome, and involves a great loss of time to replace leakly ones.

Good cast iron jackets can, however, not be made by any founder; it requires a great deal of experience and care, a fact which the Colorado founders, who now turn out the best work, have found out long ago. The water jackets made by the local foundry at Monterey were worthless, both on account of the quality of the iron and the uneven thickness of the castings.

It is a strange fact that I never saw a cast iron water jacket in a copper smelter; they use wrought iron or rolled steel plate altogether. At the Heinze smelter, Butte, Montana, cast iron jackets are used.

Cast steel jackets, if such are made, cannot be trusted, as the castings frequently contain air holes, which give rise to leakage.

The shaft of the furnace with the chimney surmounting it is built of red brick, with an interior lining of refractory brick, and rests on four hollow cast iron columns, weighing about 800 pounds each. There are three methods in use to support the shaft:—

First, a cast iron mantle frame is bolted on the caps of the columns, and brick arches are thrown across from column to column on which the upper masonry rests, the space between mantle frame and arch being also filled out with brickwork.

Secondly, a framework of three parallel I-beams bolted together is fastened to the tops of the columns, and cast iron deck plates of the width of the masonry are bolted to the I-beams; on these deck plates arches are sprung the same as before, and on these the upper masonry rests.

Thirdly, cast iron shoes, having the shape of skewbacks, are fastened to the tops of the columns and held together by two stout cords or tension rods with screwed ends, and from these shoes the arches are built up. This latter plan has been put in practice at the Germania Lead Works, Utah, by the Denver Engineering Works, and seems to be a good one if the arches do not get distorted by variations in temperature.

The two first plans I have tried myself, and I do not know now which is the worse of the two. Both have their bad sides. The I-beams are much affected by the radiated heat of the furnaces, and after along use get out shape with corresponding injury to the masonry. Therefore I discarded them. On the other hand, the cast iron mantle frames are subject to corrosion by the smelting material, and are liable to be cracked by the heat, in which case their function becomes unsafe.

The furnaces at smelter No. 3 were, however, all provided with mantle frames after rebuilding.

The furnace walls are in most cases too thin; they consist of 18 inches of red brick externally, and 9 inches of firebrick lining internally. This lining rests on the few courses of firebrick intervening between jackets and mantle frame. To afford more solidity to the brickwork, the firebricks should be tied at every third or fourth course with the red brick. The shaft is bound by heavy tension rods, running through cast iron angle pieces, at every foot up to the charge floor, above that at greater distances.

The shaft is carried up straight to about 6 or 7 feet above the charge floor, leaving spacious doors in the long sides, and then contracts gradually to the size of the chimney. The doors are not directly opposite one another, but diagonally, in order to prevent the feeders from throwing the charge all in one place. The doorsill is about 9 inches above the charge floor, to compel the feeder to shovel in the charge and not scrape or push it in.

The effective height of the smelting column, that is, the distance between the centers of the tuyeres and the charge doorsill, is between 13 feet 10½ inches and 14 feet 1 inch. The original furnaces had a higher smelting column, but the filling up with slag in front of the furnace building to a higher level than the furnace floor caused the rainwater to flood it in the wet season, and necessitated the raising of the hearths above the high-water mark. This was done without raising the charge floor, hence the loss in height.

The down-comer or down-take is carried from an opening in the back wall of the chimney into the flue underneath the back part of the charge floor, and behind the furnaces, in the same manner as at smelter No. 2. The flue runs parallel to the back end of the furnaces some distance beyond the furnace building proper, then turns a rectangle, and connects with a brick chimney 130 feet high. The discharge openings of the flue through which the dust is raked out are in the side opposite the one running through the furnace shed, and are facing the ore bed shed. The main blast pipe is carried overhead from the engine room through the passage into the furnace shed along the rear of the furnaces to the farthest one, where it makes connection with the reserve blower. The blast main is tapped for joining on the distributing or bustle pipe opposite the center line of each furnace. In the connection between the main pipe and the bustle pipe a gate valve (blast gate) is inserted, for turning on, lowering, or shutting off the blast. This arrangement repeats itself in every American smelter. Corresponding to the tuyeres, there are stubs attached to the bottom of the bustle pipe, which are connected with the tuyere pipes or nozzles by means of a stout canvas hose (16-ounce duck), made air-tight by being soaked in raw linseed oil and dried. Galvanized tuyere pipes have been abolished on account of their frail construction; the patented forms of tuyere pipes are too complicated for the simple-minded people of the country; and cast iron ones are too heavy and clumsy. So a tuyere pipe of cast steel has been adopted, which is similar in construction to the Davies tuyere pipe made by Fraser & Chalmers. It has a 2-inch slag escape at the bottom, threaded inside, and ordinarily closed by screwing in a wooden plug, and a detachable cap with a peep-hole at the back. The mouth fits over a sleeve against the shoulder of a steel thimble or bushing that is inserted into the tuyere opening and made airtight by packing with asbestos paper or even clay mortar. This thimble, which, in reality, might be called a tuyere, is 3½ inches diameter at its mouth.

Brass would be the proper material for these devices if it were not coveted so much by petty thieves. The water is distributed to the furnaces in a similar manner as the blast. The main pipe is conducted overhead from the water tank along the front of the furnaces, and at each furnace is tapped for joining on the feed pipe, which is of reduced section. It is not sufficient to provide water for the jackets only, but there must be extra nipples with rubber hose attached to the feed pipe in case of accident. Water should of necessity be plentiful about a furnace.

Adjoining to and connected with the furnace shed is the bullion shed, is which six broad gauge cars may be placed to load bullion on. Annexed to one side of this bullion shed is another shed containing the bullion remelting plant, for short called the "refinery," in which all the furnace bullion is melted over again, and the impurities are skimmed off. The plant consists of two cast iron kettles or pots, 6 feet 4 inches in diameter, and 36 inches deep, with a common iron smokestack between them.

(TO BE CONTINUED.)

New Metallurgical Process.

The current number of the Engineering Magazine has extended notice of Dr. Goldschmit's new method of welding rails, in which he makes use of the great heat developed by aluminum when it combines with oxygen furnished by a metallic oxide. In the process of welding which he uses at present, the ends of the rails are brought together in a crucible, in which is then placed a quantity of finely divided aluminum and iron ore. The rails, previously planed at the ends, are pressed together tightly and the mixture ignited; the heat produced is sufficient to make a good weld, the more so as the high temperature causes an expansion of the rails and brings them firmly together.

When aluminum and oxygen enter into chemical combination, there is evolved a higher temperature than can be generated in any other artificial way except by electric methods. For a long time this fact was not generally recognized, partly because aluminum was more or less of a chemical curiosity and its production was confined to the laboratory; but of recent years, since it has become an important technical product, its properties have been more widely investigated and new facts concerning it discovered.

The work of Dr. Hans Goldschmidt in this field has laid the foundation for an important new industry, to which the name of "Aluminothermie" has been given. This term covers, in general, those processes in which high temperatures are produced by the combination of oxygen and aluminum, and various developments of Dr. Goldschmidt's inventions are described by him in a recent issue of Gluckauf.

The chemical reactions involved, says the Engineering Magazine, are very simple. Oxygen is not taken from the air, but is used as combined with the metals in the form of metallic oxides. As an example, take iron oxide, of common occurrence in nature as some of the iron ores. If metallic aluminum, finely divided, be mixed with a powdered iron ore and a reaction made to take place, the resulting products will be aluminum oxide and metallic iron, and at the same time a very high temperature will be evolved.

The problem has been to start the reaction. Most of these mixtures of metallic oxides and aluminum will burn only at high temperatures. They could be stirred with a glowing rod without any combustion taking place. The application of external heat would not answer, because the heat which would cause the mixture to burn would damage the crucible containing it.

A solution of the difficulty was reached when it was found that there is a class of oxides, which, when mixed with aluminum, are easily ignited at a low temperature, and after ignition evolve very high temperatures. It is only necessary, then, to sprinkle an easily inflammable mixture, such as barium superoxide and aluminum, on the refractory one, and then light the former, which can be done most easily with a large match. The kindling mixture will burn and generate a high temperature, and so set the main mixture on fire. More of the latter can be added from time to time, as desired, and will react with the evolution of as high temperatures as the combustion of the first portion generated.

There is thus afforded an extremely convenient means of obtaining great heating effects at any place, without the use of machinery or any complicated apparatus. The temperatures resulting from the reactions described can only be estimated, as there are no means of determining them exactly, but they are considerably over 2000° C.

The practical applications of this process already embrace wide limits. A direct result of the chemical reactions is the separation of the metals from their oxides in a pure state. The combinations take place in a regular way, according to chemical laws, but the mixtures are always made with an excess of oxide, so that all the aluminum will be oxidized and no metallic aluminum left to form alloys with the other metals.

The process is applied with special advantage to metals which it has not before been possible to isolate completely, but which now can be separated in an entirely pure state, free from even carbon. Among such metals, one of the most important in a metallurgical way is chromium. Almost all the chromium which has heretofore been used in steel metallurgy contains a considerable percentage of carbon, and is to be regarded as chromium carbide. All the chrome steels are, therefore, strictly speaking, chromium carbide steels, and have their properties materially influenced by the combined carbon. But it is now possible with the pure chromium to form steel alloys whose properties are decidedly different from the old chrome steels, and which can also be made to contain larger percentages of chromium.

In the same way pure manganese is produced, which finds a wide application in the making of manganese bronzes, free from iron, and, also, in special manganese steels. This pure manganese possesses the desirable property of not disintegrating on exposure to the air, as does the ordinary carboniferous manganese, and it also particularly distinguishes itself by its easy formation of alloys with molten copper, tin, zinc and other metals. Copper alloys containing 20, 30, 50 and even higher percentages of manganese are formed with extreme ease by the pure manganese.

Among other metals of growing importance in metallurgy which are prepared by this process may be mentioned titanium and boron.

A most important bye-product is the melted aluminum oxide, which is formed simultaneously with the separation of the pure metals. This product is really an artificial corundum and has been called "corubin." It is distinguished by its great hardness, and for grinding and polishing purposes far surpasses natural corundum and emery.

But perhaps the most important practical application which is made of this process is in welding. For this purpose there is used a mixture called "thermit," consisting essentially of iron oxide and aluminum, which is kindled by one of the easily burning mixtures previously described, and burns with the evolution of great heat in a specially prepared crucible made of corubin, magnesia, or some other very refractory material. The surfaces of the parts which are to be welded are carefully cleaned and polished, and pressed together by a framework with screws. A mold is placed around the joint and into it is poured the fluid mass from the crucible. The heat and pressure do the rest. In the crucible, before pouring, there are two strata. The lower consists of fluid iron and the upper one of the lighter melted aluminum oxide. When the pouring begins, the alumina which first flows into the mold quickly cools and forms a thin layer on its inner walls as well as on the pieces which are being welded. The rest of the alumina and all the iron remain fluid for a short time in the mold. In consequence of the solid coating of alumina, the molten iron does not touch the surfaces of the mold and the welded piece, and when the whole mass has cooled down, it can be removed by a couple of light hammer blows. The welded piece has not been deformed by the attachment of any fused iron, and the mold is not injured and can be used repeatedly.

By many experiments it has been carefully determined just how much of the heating mixture is necessary for a weld of a given size, and what the capacity of the mold must be. In this way it is possible to know beforehand the amount of heat required for a weld. This is an advantage which no other welding process possesses, as these are all based on empirical methods and require an experienced eye and hand to be carried out successfully. The new process can be applied by ordinary workmen, after a very little practice. Another advantage of the new method is that the heat is concentrated just at the place where it is needed.

This process is particularly applicable to rails of electric railways and to pipes for steam, gas and water, as these can all be welded in any position and at the places where they are in use.

The molten iron can also be used to repair defective or broken parts, by casting it right onto the original piece and working it into proper shape after cooling.

Only a few of the leading applications of this process have here been given, but there are enough to show that it bids fair to mark a distinct advance in metallurgical fields.

Notes on the Occurrence of Platinum in North America.

By DR. DAVID T. DAY, Chief of the Division of Mineral Resources, U. S. Geological Survey.

In the summer of 1898 demand suddenly arose for commercial quantities of the element osmium. At least half a ton was wanted for initiating a new incandescent light. This led the writer to examine as many localities as possible where platinum had been reported, to determine whether osmiridium was contained in the crude platinum. With the co-operation of the firm most interested, the Welsbach Light Co., and in company with its president, Colonel William Barrows, I visited most of the localities where platinum has proved plentiful. I also wrote to every available placer mine in the West for samples of the heaviest sands, in order to test them for platinum.

The references to the occurrence of platinum in this country as given in scientific journals include two interesting observations in the East. One is of a nugget described by Peter Collier of Washington, D. C. (Am. Jour. Sci., 1881, Vol. 21, p. 123), said to have been found on land adjacent to the village of Plattsburgh, New York. It weighed 104.4 grammes and contained sufficient chromite to reduce the specific gravity from 17.35 for the heaviest portion to 10.446 for the average of the nugget. The nugget gave "unmistakable evidence of osmium."

Messrs. William E. Hidden and J. H. Pratt have (Am. Jour. Sci., 1898, Vol. 6, pp. 381 and 467) found sperrylite—platinum arsenide—in placers in several points in the Cowee valley of North Carolina. The conditions tend to the belief that the source of this rock is a ledge of impure rhodolite and biotite containing much of disseminated iron sulphides—conditions much like those at Sudbury, Canada. In spite of unsubstantiated reports of platinum occurring in place in certain specific locations in the Catskills in New York, and in granite near Philadelphia, and again near Port Deposit, Maryland, the only localities where platinum is known to occur in North America, otherwise than as a mineral curiosity, are California, Oregon and British Columbia.

As early as 1852 Prof. W. P. Blake called attention to the existence of platinum at Port Orford, on the Oregon coast (Am. Jour. Sci., Second Series, Vol. 18, p. 156, and Vol. 22, p. 8), and noted that the platinum equaled from 10% to 30% of gold. This article seems to be the original source of the statement that the proportion of platinum to gold increased northward. B. Silliman (Am. Jour. Sci., Third Series, Vol. 6, p. 132), in his mineralogic notes on California, etc., extended our knowledge to the occurrence of platinum in the older deep placers worked by the hydraulic process in Butte county. He also notes the occurrence of iridosmine with the platinum.

The various notes concerning the finding of platinum on the Pacific coast have been well summarized in the publication of the California State Mineralogist and show that platinum has been found at many places on the Pacific beach from as far south as Santa Barbara county northward to the mouth of the Columbia. Indefinite reports have been made of its occurrence farther north on the Washington beach, but the amount is certainly not great. The principal beaches where platinum has been reported are: Beginning at the south, Santa Barbara, Lompoc, the beaches of San Luis Obispo county, Santa Cruz, and occasionally between Santa Cruz and the Golden Gate. In accordance with Blake's statement the richest beaches are farther north, in Humboldt and Del Norte counties. The beach mines of Gold Bluff, north of Arcata, Big Lagoon, Stone Lagoon, Little River, Crescent City, and at Gold Beach and Port Orford, in Coos county, Oregon, have all yielded platinum in more than experimental quantities. Still farther north platinum is found at Yaquina Beach, Oregon, but the sands are poor. Port Orford has proven, perhaps, the richest beach. Sharpless and Winchell have made an unusually careful examination of the sands at Brandon, on the Oregon beach. They almost invariably found platinum, but the proportion was not so encouraging as with less careful workers. All of this beach platinum is discouragingly fine and difficult to save.

Most of the platinum product has come from inland mines, where the platinum is comparatively coarse. It has become well known in the placers of the American river, and in Plumas, Shasta, Trinity and Siskiyou counties, California. The Bee Gum district, in Shasta county, the Hay Fork district, in Trinity county, and along the Trinity from Chapman's mine, north of Junction City, north beyond North Fork, are most promising.

While platinum metals are so frequently found in many of the gold placers in the region including Trinity, Shasta and Siskiyou counties, this is by no means universally true. There seems, for example, to be no platinum in the Weaverville placers on the Trinity. The platinum-bearing placers confirm the generally accepted idea that the platinum originates in the serpentine rock in which this county abounds, for the platinum gravels are sure to be closely associated with some prominent serpentine ridge. Nevertheless, no platinum has yet been found in place in that region.

A hurried trip through this region enabled the writer to learn—by the analytical aid of Dr. Waldron Sharpleigh—that in the Bee Gum district of Shasta county, at Hay Fork and at Chapman's mine, on the Trinity, osmiridium makes up, perhaps, the greater part of the mixture of platinum metals. At Chapman's mine Colonel Barrows obtained thirty ounces of small nuggets, averaging $\frac{1}{8}$ inch in diameter, which seemed altogether too hard for platinum, and yet, in very much larger grains than is usual for osmiridium, which has the habit of occurring in very small scales. Dr. Sharpleigh has shown that these nuggets yield a small amount of platinum on treatment with aqua regia, and then fall apart in the ordinary scales of osmiridium. Dr. Sharpleigh has found that the Pacific beach platinum often contains more than 90% of osmiridium. This is a sufficient reason why so little effort has been made to mine platinum, for until recently this osmiridium has been of practically no value.

At the time of this visit platinum was also noticed in the placers near Grant's Pass, Oregon, and by examining great numbers of black sands traces of platinum were found in the Snake river from Barkersville to Lewston, and in a sand reported from Miles City, Montana.*

In examining the well-known platinum localities on Granite creek near its junction with the Tulameen Fork, in British Columbia, it was estimated that the placers contained about one-fifth as much platinum as gold. I could get no test for osmium, but Dr. Hoffman of the Canadian Geological Survey has found samples of platinum yielding as high as 25%, and on the average about 10%, of osmiridium.

In further search for the platinum metals the writer collected heavy sands from the placer mines in California, Oregon, Washington, Idaho, Montana and Alaska. These samples averaged four pounds in weight. The sand was first separated by ordinary assay sieve into nine sizes, coarser than 20-mesh, through 20, 40, 60, 80, 100, 120, 160 and then 200-mesh. Each size was then in good condition for easy separation of the very magnetic portion by a rude form of separator. By limiting the magnetic separation to the very magnetic particles very little gold or platinum was found on panning the magnetic portions. By panning each size and then counting the flakes of gold and platinum, or weighing where the amount was considerable, a fair idea of the proportion of platinum to gold was obtained. As the sieving was carried to such uniform sizes, it was possible by counting weighed amounts to estimate the unit weights of flakes of the different sizes, and thus to approximate roughly the total weight of gold and platinum obtained.

A number of concentrates collected by Mr. A. H. Brooks of the Geological Survey from the Tanana river district in Alaska, and also the beach sands from Cape Nome, by Messrs. Brooks and Schrader, showed no platinum.

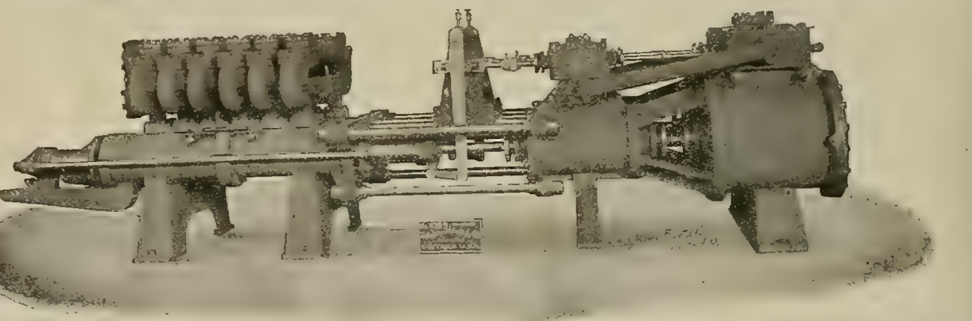
The total result shows that if all the sands examined were considered together there would be about half as much of platinum metals as of gold.

May's Gold Extraction Process.

From the explanation of the process given by the officials of the company, it appears that the ore, after being crushed, is exposed to the action of a solution of caustic alkalis or alkaline carbonates (used either separately or mixed) contained in specially designed vats, the solution being heated by waste steam, and is kept in a state of agitation, which is effected either by the rotation or the internal mechanical arrangement of the vats. The period required for treatment is said to be from one to three hours, according to the rebellious nature of the ore. By this means the extraction of the total gold contents from refractory ores is facilitated, and a large proportion of the precious metal, which would otherwise be irrecoverable, is saved. The ores, slimes, etc., after being subjected to the action of the chemicals, are then ready for amalgamation and are run off in the amalgamator into the settler. The amalgam is collected at intervals and passed through the clean-up pan, and is then ready for retorting and separation of the metal in the ordinary manner, the residues passing into a pit. It is claimed that the entire process is continuous, the time required being but from eight to ten hours from the first operation to the extraction of the gold and silver. It was stated that the average cost is only 2s. 6d. per ton of ore treated.—London Mining Journal.

Compound Duplex Pressure Pump for Mines.

The illustration herewith is for a compound duplex pressure pump to develop a maximum pressure of 700 pounds per square inch. The liquid end is of the end-packed trombone style, the cylinders being made of special metal. Mounted thereupon are separate chambers for the location of the valves; chambers are also constructed of special metal and designed with a view of facilitating quick access for the inspection of the valves. The valves are of the hydraulic pattern, made of steel and guided from below. An extension piece is provided for supporting the water plunger, and an approved adjustment device provided therefor. The water end is mounted on heavy supporting columns. An engine of the transposed cylinder type is furnished, giving free access to all steam pistons without dismantling the pump. The outside valve adjustment is a feature of this design. Further particulars regarding this style of pump may be obtained by addressing the manufacturers, The Stilwell-Bierce & Smith-Vaile Co., 276 Lehman St., Dayton, Ohio, U. S. A.



---

*Dr. F. W. Traphagen confirms this find of platinum at Miles City, Mont. The concentrated sand examined by him contained 10% of platinum.

MINING SUMMARY.

ALASKA.

(Special Correspondence).—This is and promises to be an unusually dry season. No rains yet, though it is cloudy. This is keeping back the creek mining, many of the creeks and gulches being dry ones. But little is doing on Dexter creek for this reason, water being hauled in barrels for the little rocking that is done there. The territory comprised in Anvil, Dexter, Snow Gulch and the creeks which in that immediate vicinity proved rich last year, are practically the only ones that are being worked with much activity or with paying results, though much prospecting of other streams is going on. Hundreds of men have packed horses and prospected 100 miles inland from here, all returning with the same story—nothing of value found. But one party of six, just arrived, claim to have found ground that pays well on a gulch 100 miles from here, $140 being taken in two pans. The beach is being very actively worked by both machines and rocker men. There are 120 machines or pumping plants between Snake and Renny rivers. This is ground that also proved rich last year—is the only beach ground of much value this year, and will be thoroughly worked out by the close of the season. At Topkok a small strip of beach proved rich and a few thousand dollars taken out, and the gulch leading down to it, comprising some three or four locations, is said to be very rich. It is noticeable the "sour dough" men, or old timers, are themselves doing but little work on the beach, many of them appearing half sick and lifeless, but still "staying by the country."

In town, building is still going on actively. The rush and boom are over; prices are becoming more reasonable. Pipes are being laid for a water supply for the town. Mr. Chas. D. Lane's railroad is making good progress toward Anvil Creek.

The postoffice, under the management of Inspector Jno. P. Clum, is and has for some time been doing excellent service, employing a large number of clerks and working night shifts when large mails arrive and having a free delivery system for the town. The building is still very inadequate, the Department having no funds for this purpose.

Nome, July 18.

The July report from the Alaska-Treadwell mine showed 36,681 tons of ore crushed in twenty-seven days by 300 stamps, yielding $45,037; 668 tons sulphurets saved, value $22,063; gross returns $72,288; ore averaged $1.83 per ton. The expenses for the month were $26,605.

H. E. Hoggatt, Supt. Julian M. Co., Berner's Bay, says he will sink 500 feet, drift on the ore and raise to the present levels. A ten-drill compressor has been ordered.

ARIZONA.

COCHISE COUNTY.

R. R. Harper has bonded to English parties a group of wolframite claims in the Dragoon mountains, 13 miles from Benson. A concentrating plant will be provided.

COCONINO COUNTY.

Near Williams the Niack M. Co. is in charge of all the mining properties at that point of the Grand canyon. There have been fourteen cars shipped to El Paso during the past month under the supervision of Mr. Helme. There are thirty men employed.

GILA COUNTY.

Supt. Cook of the United Globe Mines has returned from New York. A new double compartment shaft is to be sunk.

MARICOPA COUNTY.

A dredger is being put in the river at Box canyon above Wickenburg, by B. C. Redlon. There are 30 miles of river there thought worth working.

G. W. Middleton, at the Groom property, Black Rock district, has a bond and is doing development work. He is down 350 feet.

Devine Bros., Sunset, Harqua Hala mountains, have bought the Prangy mill and will run on ore from their copper and gold property. They intend to put in a concentrator to save the copper, which will be shipped to a smelter.

PIMA COUNTY.

The Hardshell mine, 12 miles from Crittenden, is a lead-silver property. The company has a mill; water is piped from Harshaw, 1 mile distant; the incline shaft is down 300 feet. The ore is brought up from the shaft in cars operated by a steam hoist. From this point the ore is hauled to the mill, where it is broken and put through the crusher. About forty tons of ore are run through daily and eight tons of concentrates produced, shipped to El Paso. J. C. Smith is Gen. Supt.

YAVAPAI COUNTY.

The tanks and machinery for large cyanide plant at the Copper Chief mine, formerly the Equator, near Jerome, are in place.

G. W. Hull has bought the interest of Ralph Dillon in the Jerome Copper Co., and will put men to work to drive the 1000-foot tunnel another 1000 feet into the mountain.

The Verde Queen M. Co., at Jerome, has the main shaft down 240 feet, and has started to drift north from the 140 and 240-foot levels. Dr. King is superintendent of the smelter.

YUMA COUNTY.

Devine, Mulford, Winsor & Smith have sold 2000 acres of dredge land to the Crosby-Ehrich Co. of Colorado Springs, who are building a dredge, capacity 2000 yards, at a cost of about $40,000 on the banks of the Colorado in Yuma. It will be towed up the river by steam to Pot Holes, where, by Oct. 20, it will be in operation. The company has men at work prospecting with a drilling machine, with the view of building other dredges. A number of other companies have acquired dredge and hydraulic lands along the Colorado, extending 30 miles up stream.

E. A. Clark is foreman of the Crown Point mine, where twenty men keep the 10-stamp mill running.

CALIFORNIA.

AMADOR COUNTY.

A. J. Crain, Supt. of Lane & Hayward ditch, Cosumnes river to Plymouth, shut off the water on the 10th to set men cleaning out and repairing the ditches so as to make the main carry from 2000 to 2500 inches of water.

Dispatch: At the Peerless mine Supt. Osborne has the shaft down 365 feet.——J. Simcich is opening the Amica Stella mine, 9 miles west of Jackson, on the Mokelumne river, running a tunnel into the mountain from the level of the river, and expects to strike the lead at a distance of 500 feet from the mouth of the tunnel, and at a depth of 500 feet below the croppings of the ledge.——Tangerman & Ehlers are running a tunnel on the James mine, Clinton. It is in 320 feet.——The Oneida mine is expected to start up the first of September.——At the Kirkwood mine the upraise has a length of 60 feet. Preparations are being made for sinking.

BUTTE COUNTY.

The ditch and flume that will bring water from Cherokee to the Banner mine are completed, except a tunnel 200 feet long that is being run through solid rock.

CALAVERAS COUNTY.

Chronicle: Driving the main tunnel on the French Hill quartz mine is progressing under the management of T. E. McSorley. The main tunnel is in 639 feet, exposing a vein averaging 6 feet wide. The walls stand at an angle of 65°. The filling with the quartz is of black slate, with gouge on either wall, all of which carries a high percentage of sulphurets.——The pumps at the Vorlander mine at Middle Bar have been taken out and work suspended on account of the shortage of water for power.——Work on the dam at Horseshoe Bend, above Robinson's Ferry, to divert the waters of the Stanislaus into the flume of the Melones Con. M. Co., is resumed.

EL DORADO COUNTY.

Stingle & Loughry have bought the Gold Queen quartz mine, Kelsey district.

The Kimble mine near Placerville employs thirty-one men.

The Columbus Development Co. has levied an assessment, No. 1, 3½ cents per share, delinquent Sept. 17. The company has been developing the Columbus quartz mine, Cold Springs Flat, three miles west of Placerville.

At the Ribbon Rock mine three 8-hour shifts are driving tunnels north and south from the 200-foot level.

The Crystal mine, Shingle Springs, has been sold to Woodruff and Mau, who will put in a 5-pan Huntington mill.

HUMBOLDT COUNTY.

Reports are that, near Petrolia, oil is struck at a depth of about 1300 feet. The oil from Mattole is reported to have a paraffine base. All the land in the Mattole and Petrolia district, comprising 40,000 acres, has been scripped or located. Four companies are now boring and more are expected.

INYO COUNTY.

W. W. Bowsell is Supt. Lane mine at Darwin.

Work on the antimony mines bought by Montgomery & Dineen will begin September 1st.

The Tribune says Salt Lake men are sampling the group of mines at Darwin belonging to the estate of the late P. Reddy, with a view to purchase.

KERN COUNTY.

The Revenue Oil Co. at Kern river reports well No. 5 in section 4, 29-28, down over 800 feet, with 500 feet of oil sand.

To Aug. 1 nearly 350 oil companies have filed articles of incorporation in the county.

Bakersfield Californian: The fullers earth mill, on the Santa Fe reservation, is turning out five tons per day. The raw material is mined north of Poso creek, 14 miles from here.

LOS ANGELES COUNTY.

New Century Oil Co. is reported to have found the white oil streak at Newhall at 360 feet and at a depth of 400 feet, the bailer bringing up oil.

MARIPOSA COUNTY.

The Pumpkin mine at Coulterville, J. J. Dolan Supt., is to be worked.

The Nameless M. Co. at White's gulch has begun a dam across the Merced river. A tramway has been built from the mine to the Merced river, one-half mile in length. Thirty men are employed.

The Mariposa grant people are figuring with Capt. A. H. Ward on his electric power plant and property.

MONO COUNTY.

The Arnot Co. will operate a 10-stamp mill at Green Creek. Eighteen men are taking out ore.

In the Standard Con. mine, Bodie, the latest report shows 393.7 tons of ore were crushed during the week; average assay and vanner tailings, $11.11; concentrates produced, 1.23 tons; assay value, $101.78; plate amalgam produced, 1279 troy ounces; assay value per ounce, $3.12.

Pratt & Simonis will put a stamp mill on the Green Creek mine.

At the Castle Peak mine chlorination works and a new assay office are being built.

W. E. Lindsey has sold in San Francisco his Antelope marble quarry for $25,000.

NEVADA COUNTY.

Nearly all the men at the Providence mine are laid off. Supt. McKinlay is in San Francisco conferring with the company as to future work.

The elevator and derrick erected by the company that intends to work the Yuba river at Missouri Bar, French Corral, is finished, and the company is now ready to wash gravel.

R. Phillips will develop the Tres Robles mine taken by the Seal Rock G. M. S. of New Jersey. A contract has been let for an incline shaft 200 feet.

At Grass Valley suit is brought by the Pennsylvania Con. G. M. Co. against the Grass Valley Exploration Co. The complaint alleges that the defendant and its grantors have sunk an incline shaft upon land east of the Pennsylvania mine, the shaft being part of the W. Y. O. D. mine. The plaintiffs claim that within the past two years the defendants have by means of shafts, levels and stopes, and particularly in the 800 and 900 stopes, illegally intersected veins and ledges which have their tops or apexes within the lines of the Pennsylvania M. Co. It is claimed that the defendants have unlawfully taken out and converted to their own use 30,000 tons of rock valued at $600,000. The Pennsylvania M. Co. asks that $600,000 and the costs of the suit be awarded them as judgment for the damages sustained; that the W. Y. O. D. mine workers be enjoined from entering ground alleged to be the property of the Pennsylvania Co., and that by final judgment of the court the defendants be enjoined from trespassing.

The Grass Valley Exploration Co., defendant, has filed a cross suit on virtually the same grounds.

The Reward G. M. Co. has levied an assessment of 2 cents per share, delinquent Sept. 3.

E. E. Stark will install electric power at the Reward mine.

PLACER COUNTY.

Colfax Sentinel: The Tadpole Con. G. M. Co., 80,000 shares, $20,000, W. H. Cass, secretary, will work a gravel channel 4 miles east of Westville.

Coffin & Gray will work the Big Spring mine, Texas ridge, main north fork American river.

At the Turkey Hill mine the B. & S. D. M. Co., Wm. Muir, Supt., will put in a $50,000 electric plant.

L. D. Butts, 9 miles north of Cisco, will erect a mill on his properties. The mill site has been cleared and a ditch for water supply finished. The ditch is 1800 feet in length, 1000 feet of which is flume.

At the Lloyd quartz mine, 8 miles south of Blue canyon, the new main tunnel is 160 feet.

The tunnel at the Azalea mine, Blue canyon, is in 2640 feet. The company calls for one cent per share a month on the stock, which provides $400 each month.

Twenty-six men are employed at the Lost Emigrant mine near Cisco.

PLUMAS COUNTY.

Twenty-three men are employed by A. B. Chambers at the Bloomer Hill mill.

The Twelve-Mile Bar, formerly the Hyde mine, employs twelve men, G. W. Gaberel, manager.

The Rich Bar mine is being worked under the superintendency of J. W. Gray.

The Kellogg mine, on Kellogg ravine, is employing thirty-two men; F. Von Leicht, Supt.

RIVERSIDE COUNTY.

At the Gold King mine Supt. Johnson is running a crosscut tunnel to tap the main lead at a depth of 200 feet. The ledge is 4 feet wide between granite walls, with a streak of porphyry on the hanging side. The vein matter is talc, in which are bunches of hematite iron, and in this iron is found the gold.

SACRAMENTO COUNTY.

Near Folsom Drew & Cohn are putting men at work on their river bed mine at Salmon Falls. The section of the river to be worked has been dammed, and a centrifugal pump set up.

SAN BERNARDINO COUNTY.

The Puente Oil Co. owns wells in the Puente oil field and the refinery at Chino, the only refinery in southern California in which illuminating oil is made. The company turned out during July 5000 gallons per day of illuminating oil, gasoline and engine distillate. The oil is of so volatile a nature as to be too explosive to make the best of fuel, and the refinery makes it possible to take out the volatile portion in the form of distillates and leave the residuum for fuel use. The Standard Oil Co. takes all the refined oil produced at a stipulated price and distributes it, it being claimed that it is first mixed with Eastern oil. The oil refined by the Puente Oil Co. is taken from its own wells in the Puente field, and it is piped by gravity to the refinery.

At Gold mountain water is developed through an artesian bore at Bear lake, 2 miles from the mine. A flow of 14 inches is considered enough for forty stamps. The well was put down 150 feet in the bed of the ancient lake and at that point the water gushed. The mill will be started up next week.

SHASTA COUNTY.

(Special Correspondence).—About two years ago the Brown Bear people commenced a lower level to tap their ore chutes at a depth of about 360 feet below the present workings. They have been at this work with power drills and have advanced over 4000 feet at this writing. They expect to reach the first ore chute some time next month. That they have confidence in the result of the work is shown by their having already commenced the erection of a new 10-stamp steam mill, placed below the mouth of the new crosscut. This will also necessitate building new boarding-houses, offices, stores, etc., near the new mill—in fact, will move the entire town of Deadwood some 2 miles below its present location.

At the Niagara, a sale of the property is pending, and on that account little work is being done by the company, although a considerable amount is being carried on by lessees who are scattered over the whole property, engaged partly in exploratory work and also in working through and stoping on the old pillars and deposits left in the original work.

At the Washington the work is all being done by lessees, who are meeting with good results.

The same can be said of the Milkmaid property.

The Rossi property, opposite the Niagara, is being developed by the owner with a small force; good bodies of fair-grade ore are being opened up and blocked out.

The Gladstone property, which had been in litigation for some time, has now been straightened out and was recently sold to Roberts, McIntosh & Jillson of the Harrison Gulch and Siskiyou Co. properties, who intend commencing active exploration work. D. J. Sullivan will be the superintendent.

The American property is working a small force under the management of W. Irwin of New York, a part owner. They are fixing up the mill, preparatory to starting up.

French Gulch, Aug. 7.

On his recent visit to the Bully Hill group, accompanied by Manager Cohen, Captain De Lamar directed that the site of the projected smelter be removed to the banks of the Pitt river, that its capacity be enlarged, and that a railway be built for the transportation of the ores a distance of 4 miles between the Bully Hill mines and the plant.

Ex-Senator Warner Miller of New York has another bond on the Uncle Sam mine, Backbone district.

Courier: M. T. Hill is sinking a shaft on the Electric Light mine at Lower Springs, southeast of Shasta.

SIERRA COUNTY.

At the Sierra mine, near Downieville, J. W. Finney of Chicago has finished laying a 900-foot pipe line to furnish power to run a jet pump. It supplies the water under a pressure of 420 feet.

SISKIYOU COUNTY.

Yreka Journal: From the Dewey quartz mine, in Gazelle district, shipments of ore are being made. Four-horse teams haul from 12,000 to 14,000 pounds of ore to a load. Prospectors are opening up claims all over the dividing range of mountains on west side of Shasta valley, and on the opposite side of same range east of Scott valley.

The Chinese owners of the Last Chance, Montezuma and Fortune mining claims, at Callahan's, have sold their property to J. R. McFadden of Pittsburg, Pa., for $16,200. This ground is to be worked by the dredger process.

Mining has been suspended at many mining camps on account of a scarcity of water.

TRINITY COUNTY.

The Yellow Rose of Texas, owned by Carr and Miller, recently cleaned up twenty-seven ounces of gold in three days' run.

A 5-stamp mill has been put on the Lawrence mine, Coffee Creek.

The Nash deep gravel mine is putting in fluming. Where the company is drifting the pay dirt averages $80 between each set of timbers.

TUOLUMNE COUNTY.

The grade of the branch line of the Sierra railway is completed to Tuttletown, 5 miles north of Jamestown. From Tuttletown to the top of Carson hill, across the Stanislaus canyon, an elevated cableway 4 miles in length is projected, average height of 50 feet, the motive power to be supplied by an auxiliary cable attached to the cars and propelled by steam power at one end of the line.

At the Uncle Sam, near Carters, the crosscut from the 300 level toward the footwall vein 40 feet effects a contact with the quartz at 75 feet.

R. M. Ballard is succeeded as Supt. Dead Horse by E. T. Kane. The former takes a similar position at Auburn, Placer county.

Supt. Holmes has resumed work at the Mohican M. & M. Co.'s property. The Lillian tunnel, already in the vein 100 feet, will be driven 700 feet farther.

In a test run at the Laura mill, of rock from the Blue Star and White Star Consolidated, the ore from the main tunnel in on the vein 180 feet yielded $10.50 per ton; it carried 2% of sulphurets, worth $84 per ton. A small mill is to be placed on the property.

The Independent says the Rawhide and App mines are undergoing another examination by G. W. Hudleston of New York, who is said to represent an English company.

The Confidence mine ceased development work last week. Seventeen miners are retimbering the shaft. The ore on hand will be milled.

At Big Oak Flat the strike at the Four Oaks is attracting attention. Some of the rock is rich; the main ledge is rich in sulphurets.

The Little Wonder M. Co. has paid off its men and shut down its mine. They say that they will start up again.

At Groveland the Rhode Island shaft is over 200 feet deep and sinking continues.

The Kanaka Co. have put in a new air compressor and concentrator.

The Independent hears that the Little Wonder mine has been paid for by the Scottish California Mining Syndicate. The mine was bonded from F. Marconi one year ago.

The Slapjack Co. has let a contract to sink 150 feet and drift 400 feet.

Supt. McCallum of the Kanaka is credited with intention to put up a 10-stamp mill at the Duluke mine.

At Stent, on Sept. 3d, J. Opie, president Tuolumne union, states that there will be a double-handed contest, first money $125, $50 second; for single-handed drilling the prize money will be $40 and $15.

The Imogene mine at Stent has shut down. The property is owned by the Alder Creek M. Co.

At the Riverside cross-cutting on the vein in the face of the 1900-foot tunnel goes on.

The Little Giant is bonded to J. McCormick for one year, with option of purchase for $15,000.

On the Old Continental, Supt. Graham has men driving a 500-foot tunnel.

In the Bonanza mine a drift is being run to the east from the bottom of the incline for the vein.

At the Sonnet mine, owned by Davis & Lane, miners are cross-cutting for the Crab vein.

Sonora Democrat: At the Providence mine the shaft is down 900 feet. Ten stamps are at work.

VENTURA COUNTY.

The average yield of products from 100 barrels of Ventura county mixed crude oil of 24° B. is stated to be as follows:

	Bbls.
Gasoline, 70° B	3
Benzine, 63° B	4
Kerosene, 45° B	15
Heavy kerosene, 38° to 40° B	8
Gas distillate, 28° B	21
Light lubricating (spindle) oil, 26° B	10
Neutral oil, 23° B	12
Heavy neutral oil, 21° B	6
Reduced stock, lubricating oil, 14° B	5
Asphalt, crude	11
Loss	5

COLORADO.

BOULDER COUNTY.

(Special Correspondence).—In driving a crosscut tunnel on the Cold Spring group, on Gold hill, the main vein was recently cut at a point 800 feet below the surface. The same vein at higher levels has been a rich producer. The ore is a sulphide, in the main, though carrying considerable free gold. It is stated $1000 per week is the net proceeds of operating this property at present.

Boulder, Aug. 5.

Eight miles from Boulder the Cold Spring tunnel, Gold Hill, is reported in fine streaks which averages $1 per pound.

At Eldora new strikes have been made and new machinery is being installed.

The Revenge at Eldora is shipping high grade ore and is producing at the rate of $5000 per month. W. B. Connell is the manager.

Near Eldora the Bird's Nest mine, on Spencer mountain, is reported sold to N. Macdonald of New York for $10,000. The Bird's Nest is cut by the Mogul tunnel at a depth of 650 feet, and shows ore.

The Bailey chlorination mill at Eldora has started up. The claims of the Andrews estate of New York have all been settled.

The American Star near Sunshine is nearly through with its legal troubles and is expected soon to resume.

The old Fourth of July mine at the foot of Arapahoe peak, idle since '75, has resumed.

CHAFFEE COUNTY.

The superintendent of the Clinton mine, Monarch district, says that a body of silver galena ore has been found in tunnel No. 2, on which two assays have been made showing $60. He also reports the opening up in a drift from the tunnel of a 12-inch vein of ore which assays one-half ounce in gold, 400 ounces silver and 20% lead.

CLEAR CREEK COUNTY.

(Special Correspondence). — The Gold Fissure G. M. Co., in sinking their shaft have encountered ore at 40 feet, which is undoubtedly the extension of the Tenth Legion lode, whose property end lines with the Gold Fissure. The shaft of the latter is being well timbered, and a plant of hoisting and air compressor machinery is being installed. The calculation is to sink to 800 feet depth. G. A. Bristol and C. B. Steele are managers.

Empire, Aug. 4.

F. R. Carpenter is engineering the establishment of a 240 heavy-weight stamp mill at the Alice mine in the Yankee hill belt of veins and plans to treat 1000 tons of ore daily. The 240 stamps will be of 1000-pound weight each and have a low drop. The ore averages about $5 per ton in gold, a portion of which can be saved by plate amalgamation. The tailings from the stamp batteries will make a desirable flux, which will be treated by pyritic smelter, the values being run into a matte.

Near Georgetown, work will soon begin on the Mendota shaft. The workings on the Mendota vein, which include the Mendota, East Mendota and Fulton, aggregate 3 miles, which, at an average cost of $10 a foot, represent an outlay of $158,400.

At the Sun and Moon, near Idaho Springs, Manager Sims has an ore body running $250 per ton. The Newhouse tunnel on Aug. 1st was about 400 feet away.

In the Stanley, Manager Bell is preparing plans for the new mill; concentrator capacity, 100 tons per day.

CUSTER COUNTY.

At Silver Cliff the Aburdix mine shaft is down 250 feet. Operations are going on at the 200-foot level and drifting is in progress. The Bassick will resume active operations; air drills are being put in. The Geyser at Silver Cliff, which closed down recently, is expected to reopen.

DOLORES COUNTY.

(Special Correspondence).—The three main groups of mines at Rico—the Enterprise, Rico-Aspen and Blackhawk—produce an excellent grade of ore, running 100 ounces silver, two and one-half to five ounces gold and 15% lead. It is most interesting to observe the increasing importance of the gold product of these time-honored silver mines. With the exception of the three groups named, nearly all the properties of Rico district are still in the hands of the original locators, who have hung tenaciously to their holdings through years of depression and discouragement. It is pleasant to observe a more hopeful condition here, which presages an opportunity for many of the old timers as well as for capital seeking to invest. Conditions at Rico are favorable. The mines are not over 10,000 feet altitude, the rock bearing the ore is soft and easily broken, making labor more effective than in many places.

W. J. Scoutt and associates have a lease and bond on considerable property here and have run a tunnel 2300 feet, a connection with which will be made with Jumbo No. 2. Then the ground traversed by the tunnel will be prospected by crosscuts. Electric drills are being put in here.

Rico, Aug. 4.

FREMONT COUNTY.

The Rocky Mountain Smelting Co. is erecting a new plant at Florence and has a lease and bond on property at Kokomo, controlled by the Uthoff tunnel, for sulphides and iron ore.

The Independent Oil Co. is drilling for oil in Newlin creek, 6 miles south of Florence. It has 3000 acres of oil land, and will drill a second well should it not be struck in the present bore. Drilling operations in the Florence oil fields are active; strikes have been numerous in the last sixty days.

GILPIN COUNTY.

(Special Correspondence).—A strike of rich ore was made last week at the 500 level on the Ridgewood, showing smelting ore which ran as high as $260 per ton, some of the richer specimens running $1000 per ton. The ore also contains considerable free gold. The Ridgewood is well equipped and belongs to a Boston company, whose interests are in the hands of M. P. Dalton and C. K. Colvin.

Blackhawk, Aug. 6.

Near Central City Manager F. Young is operating the Gunnell G. M. & M. Co., employing seventy-five men, and making daily shipments of milling ores to their mills on North Clear creek of fifty tons.

HINSDALE COUNTY.

(Special Correspondence).—The Tobasco mine, near the top of the divide, has been developed substantially the past few months and is now in position to ship ore. Manager Ray states that much of the ore averages $200 per ton.

Lake City, Aug. 6.

F. B. Hill has resigned the management of the Hinsdale M. & M. Co., to be succeeded by V. A. Robinson, who expects to soon have thirty men at work and be smelting ore September 1st.

Supt. Meek at the Bachelor has forty men at work.

HUERFANO COUNTY.

The Scantic mine has removed its machinery from Walsenburg and started the tunnel to be driven through Mount Blanca.

On the McMillan property Manager D. M. Murray will install additional machinery for increased production and work.

LAKE COUNTY.

(Special Correspondence).—The Leadville Gas & Electric Co. has been formed to consolidate the interests of the Boetcher electric light plant and the gas plant here to make extensive additions to both. Especially will the electrical facilities be enlarged with the view of supplying power, as well as light, to the mines throughout the district. The generators will be run by steam power, with a grade of coal which can be delivered at light cost. It is stated that many of the mine operators have given assurances of support, which will doubtless result in increased demands for electrical equipment in the district. The construction work at these plants and the operation thereof will be under the management of G. Wilkes & Co. of Denver.

Leadville, Aug. 1.

(Special Correspondence).—The Home M. Co. passed its July dividend, because of the expense which will be incurred in sinking the Penrose shaft to considerably greater depth to get under the present contact.

The New Monarch mine, on the north side of Breese hill, is shipping about forty tons of ore per day; it runs high in gold. A recent shipment was settled for on the basis of sixty ounces gold per ton. which is one of the many evidences of the importance of the gold product in Leadville's mosquito range mines.

Leadville, Aug. 7.

A contract has been let to Leadville men to drive the English tunnel 600 feet at the foot of Fletcher mountain, to cut the gold shoot on the Golden Chord property. M. Staine of Leadville is manager.

The Ballard mine of Leadville supplies bismuth. Johnson, Matthey & Co. of England and the Saxon government control the prices and allot the amount each country is to ship. The following prices are paid on delivery at works, deductions for treatment having been made: 10% ore, $150 per ton; 15%, $250; 20%, $350; 30%, $550; 40%, $750, 50%, $1000, on the basis of bismuth $1.25 a pound.

Eight thousand tons of zinc were shipped from Leadville to foreign ports during 1899. During the present year the production will be more than twice that, a large portion of which goes to the Vieille Montagn Works in Belgium.

At Twin Lakes is a large free milling gold region, a cluster of mining districts on the top slopes of the Saguache range where Lake, Chaffee, Pitkin and Gunnison counties corner, where granite peaks capped with trachyte rise to an altitude of 13,000 feet. The Little Joe is north of the Gordon on Mt. Elbert and under development by a Pennsylvania company. J. W. Dixon, president and manager, contemplates a 50-stamp mill. Its values are chiefly in gold; pockets occur of lead ores running 60% in lead.

Lorimer is a new camp established at the old site of Everett, at the junction of the north and south forks of Lake creek.

The Forest Queen has 1000 feet of development, including three tunnels on the vein, 200, 355 and 300 feet long. In the lower level is a spur vein with galena running 65% lead and sixty-two ounces silver. The main vein carries zinc blendes.

OURAY COUNTY.

In Denver it is said that the deal for the purchase of the Camp Bird mine near Ouray, from T. F. Walsh, its owner, by the Venture Co. of London, is closed and that the mine will be transferred to the English company this month. T. A. Rickard's report on the mine, after giving an account of the condition and extent of the property included in the transaction, is alleged to state that upwards of $4,500,000 in gold has already been taken from the veins, principally in development work. The development of the extensive property, the report says, the main vein having been traced for 1¾ miles on the surface, displays $17,500,000 worth of ore in sight, and it is further stated that only about 7% of the vast property has been thoroughly prospected, while only 5% of it has been developed. In view of the immense quantity of ore exposed, Mr. Rickard, in his report, regarded $15,000,000 as a low price for the property. The Venture Co., it is locally reported, will float the Camp Bird with a capitalization of $25,000,000, the company to be known as "The Walsh-Camp Bird M. Co., Limited," and Mr. Walsh to be given about 40% of the stock in that concern and $10,000,000 cash for the property, which will be sold on a basis of $15,000,000. Mr. Walsh will be the managing director. He was a poor man in Leadville in early days, now his income from mining investments is about $80,000 per month. At present he is in Paris.

PITKIN COUNTY.

Returns from a sixty-ton shipment of silver ore from the Argentum-Juanita mine at Aspen netted the company nearly $25,000; average value 690 ounces per ton. This ore came from the seventh level. The mine is being worked through the Mollie Gibson shaft. It is the intention of the company to cut stations until the thirteenth level of the Mollie Gibson has been reached, at which point levels will be run to cut the vein, thus opening a stoping area of 250 feet.

ROUTT COUNTY.

H. A. Lee, State Commissioner of Mines, and assistant, J. C. Langley, are at Steamboat Springs, investigating the mineral resources of the county, their findings to be incorporated in the next annual report of the mining bureau.

SAN MIGUEL COUNTY.

(Special Correspondence).—The Alta, in Turkey Creek basin, belonging to A. J. Clark and associates, is shipping about twenty cars per month, being about ten cars each of crude ore and concentrate. The ores are sulphides, the principal values being silver and lead. In the course of the development carried on during the past two years ores of the value of $45,000 have been shipped, which has paid for all work and equipment. The mine is opened through four tunnels, one above another, about 200 feet apart, one tunnel being in 1600 feet, another 750 feet, another 500 feet. Most of this tunnel work is on the vein, which averages probably 2½ feet width of ore, which runs generally about $50 per ton. In a 220-foot upraise, connecting two of the tunnels, the same width of vein and values of ore are said to have been demonstrated.

Turkey Creek Basin, Aug. 3.

(Special Correspondence). — T. Walter Beam and A. J. Clark are extending the Mikado tunnel, in Savage basin, toward the Tom Boy vein. The tunnel has progressed 1750 feet, and may cut the Tom

Boy lode at a point 200 to 500 farther on and at about 1200 feet depth.

The Japan mine and mill are steadily operating with a force of sixty men, and is shipping out one car a day of concentrates, the result of reducing about five tons of ore to one ton of concentrate. The values run about one-half gold and the other half silver and lead. The mill is equipped with crushers, rolls, jigs, concentrating tables and canvas tables. The jig tailings are reground by a Huntington mill. The underground workings in the Japan are extensive, the great ore zone, which is claimed to be the same as that of the Virginius, is opened 2000 feet longitudinally and has about 5000 feet on the vein at various levels.

Both mills, the new and the old, of the Smuggler-Union Co. are operating and handling about 450 tons a day. Additional equipment will be put in to increase the combined capacity of the two mills to 550 or 600 tons per day. A wire rope tramway line, 3500 feet long, is being put up from the entrance to Pennsylvania tunnel to the old mill; this is supplementary to the main line, which runs from the main Smuggler tunnel to the new mill.

Telluride, Aug. 3.

The Palmyra mine, owned and operated by the Four Metals Co., is to commence shipping, having developed several hundred feet of stoping ground above the tunnel level.

At Telluride the Butterfly–Terrible people project new work, and are driving a new level, 150 feet above present workings. This will open a new era of fine ore. Twenty stamps of the milling plant are dropping; thirty men are employed.

The Silver Bell, an adjoining property, a silver-lead proposition, is to be acquired. The Silver Bell can be worked to advantage through Butterfly ground.

SUMMIT COUNTY.

Near Breckenridge, W. L. Wilson, Supt. Jessie property, expected to start the 40-stamp mill on the 10th.

The Golden Edge mill is running on ore from the Pony Express.

TELLER COUNTY.

(Special Correspondence). — A thirty-two-ton shipment from Letendre & Ritter's lease on Zenobia brought $150 per ton.

July shipments from the Lillie were 600 tons from the old workings. Development has been proceeding in new ground for several weeks.

The Vindicator management and its lessees shipped 3000 tons during July. The new plant of machinery will soon be ready for action.

Lessees on the Wacuweta, on Bull Cliff, are sinking in ore and expect to drift at the 300-foot level. The same shoot of ore has been opened on adjoining properties, shipments from which are said to run $40 per ton gold.

Work has been resumed on the Red Umbrella. The shaft is being sunk from 140 to 200 feet depth, with the idea of drifting at the latter level.

The Moose is more active than for two years prior to this date. A crosscut is being driven at 1000-foot station, with the calculation of reaching the ore shoot. This is a well equipped mine on Raven, which dropped out of the list of shippers two years ago.

The Detroit mill at Independence, Cripple Creek district, has been closed down. It is owned by Detroit parties. The process, for which the mine was equipped, is one of fine pulverization, leaching, amalgamation and concentration of tailings.

Victor, Aug. 6.

(Special Correspondence). — Olson & Johnson, lessees on the Ramona, on Bull hill, found a 2-foot vein at 85 feet depth as they were drifting on the second level. The ore is claimed to run seven to eight ounces gold to the ton. This property belongs to Reed & Hamlin and is situated 750 feet from the Wild Horse shaft.

The Creston Leasing Co. have obtained a twenty months' lease on a part of the Alamo grounds. A royalty of 20% is agreed on. New machinery is to be installed on the property.

The Wrockloff lease on the Burns mine, of the Acacia Co., shipped eighty tons of five-ounce ore, and the Brady lease, on the same group, shipped 100 tons which ran $45 per ton. Larger shipments are anticipated in the future.

Two cars of ore recently shipped from the Pointer are claimed to have run three ounces gold to the ton. The shipment came from the third level on the vein, which is 5 feet wide. The intention is to sink the shaft to 500 feet depth.

W. F. Goodling has taken an eighteen months' lease on the Nickel Plate claim on Copper mountain. He also has a bond with option to purchase at $50,000.

Geo. Schonhurst has leased the Kittie Hollis claim, with stipulations as to a certain amount of work to be done each month.

J. M. Abbott has taken a lease on the blocks 2 and 5 of the Eclipse, agreeing to work fifty shifts per month.

Ore running as high as fourteen ounces to the ton was found at 180 feet depth in new workings on the Kentucky Belle, just above Eclipse gulch, near the Moose. The newly found shoot is supposed to run into Moose grounds.

The Grafton Co. is operating the Hoosier on Tenderfoot hill. At the 300-foot level the rich ore shoot, from which shipments were formerly made, has been reopened. A carload shipment last week brought $260 per ton. The work is said to be in ore at the 300 and 400 levels.

After having been closed down several months as a result of disagreement among the stockholders, the Blue Bird, on Bull hill, has resumed work.

The July shipments from the Last Dollar amounted to 800 tons, most of which went to the smelters.

A new plant of machinery is to be put in at the El Paso Gold King in Poverty gulch. This property is under the same management as that of the Strong.

Milo Hoskins will superintend the work at the Anaconda, where a new hoist will be put in over the 220-foot winze from the main tunnel. A main shaft will be sunk from the surface. Much of the Anaconda grounds are under lease.

Work is soon to resume at the Whipp & Glenn shaft of the Pinnacle property.

A thirty-ton shipment of ore from the Nugget's Elizabeth Cooper shaft ran $70 per ton.

Three shafts are being sunk on the Santa Rita vein.

The Cripple Creek Sampling Co. is enlarging its operating facilities, making its capacity 450 tons greater per day.

The Jennie Semple, on Raven hill, is to be equipped with new steam power and air compressor plant.

The result of the consolidation compromise between the Independence Town & Mining Co. and the Wilson Creek Co. appears to be that a new company has been organized to take over the interests of both the contestants, the stock in the latter being divided between the shareholders of the two old companies. However, some discord appears to be growing out of the settlement, as some of the minority shareholders are dissatisfied and threaten to take the whole matter into the courts.

Cripple Creek, Aug. 7.

IDAHO.

BLAINE COUNTY.

Near Hailey, Scranton, Pa., men have bonded the Maryland Con. and have men excavating for a 10-stamp mill.

At Hailey the Gold Belt Power Co., W. T. Riley manager, proposes to put in a power plant on Deer creek.

BOISE COUNTY.

Near Idaho City the New England Co.'s new dredger above Warm Springs is reported working 2500 cubic yards per day. The ground is rich and good clean-ups are daily made.

The War Eagle Co. has bought the Buffalo mill, and will move it to their mines at Grimes Pass.

ELMORE COUNTY.

Miners near Atlanta are reported guarding mine Supt. Garrett and refuse to allow him to leave for his home in Spokane unless he pays them off.

At Atlanta the main Atlanta lode is from 40 to 60 feet in width.

At Rocky Bar the Sawtooth G. M. Co., E. C. Brockman, manager, intends to erect a new plant.

A Chicago company under the management of M. Wilbur is operating the Red Warrier group and employs twenty-five men.

L. Vinton has twenty-five men on his placer property 6 miles below Atlanta.

IDAHO COUNTY.

Warren reports a strike in the Little Giant mine, owned by the Idaho L. G. M. Co., along the adit level, east of the main working shaft—a 6-inch streak rich in free gold. General Manager Hill says it will be shipped crude to a smelter.

At Grangeville G. Mitchell declares: "I have located three claims in Robbins mining district. I recently received returns from samples sent to the Smithsonian Institute, Washington, D. C. The returns show 34½% nickel, 4½% copper and $4.15 in gold.

The Sampson group, 3½ miles from Pollock, is being prospected.

LEMHI COUNTY.

The Blackbird Copper-Gold Co., Salt Lake City, bought the Uncle Sam group in Blackbird mining district, 30 miles north of Salmon City. P. A. H. Franklin is president, M. G. Gilbert secretary and general manager.

SHOSHONE COUNTY.

At Wallace last week was taken the final step in the consolidation of the Frisco and Black Bear mines by the filing of a deed for the Black Bear from Larson & Greenough to the Frisco Con. M. Co., transferring the Black Bear mine, mill, water right, etc., for $600,000.

Near Wallace, the Headlight M. Co. will let a contract for running a 600-foot crosscut tunnel to tap its vein 400 feet below the surface.

The Hecla mine at Burke, Canyon creek, Cœur d'Alenes, is putting in a plant, including two 400 H. P. boilers, a compressor plant with a capacity of twenty drills and a hoist that can operate the mine to the 2500-foot level, to be in operation September 1. About 1000 tons of concentrates a month are being shipped.

Mining locations filed for record during July numbered 161—129 quartz, 7 placer, 23 water rights and 2 millsites—a total of 791 quartz locations for the seven months of 1900. The increase has been in the Cœur d'Alenes.

H. E. West, Gen. Mgr. P. N. M. Co. will recommend to the directors of the Snowshoe mine the development of the mine on a much larger scale than heretofore and the construction of a larger and more modern mill. The No. 1 tunnel is now in over 1800 feet, about 1200 feet of which is in ore. From this tunnel a winze has been sunk 220 feet. The 100-foot level from this winze is opened up about 800 feet and is in good ore. Mr. West's plan is to sink 500 feet and drift both ways.

WASHINGTON COUNTY.

(Special Correspondence).—The Pacific, Idaho & Northern railroad runs regular trains from Weiser to Cambridge, 40 miles distant. The latter town is near Salubria. From Cambridge to the copper mines of the Seven Devils is about 70 miles, which has to be traveled by stage or private conveyance. Development in the copper region has not been as rapid as was anticipated, though results of work done have been pretty satisfactory in most cases. A recent shipment from the Blue Jacket mine of ten carloads of ore ran 42% copper and brought $31,000. There has been a good deal of talk about establishing a copper smelter near Cuprum, but as yet no substantial move has been made to build one.

Cuprum, Aug. 4.

The Weiser Record says people are jubilant over the rekindling of the fires in the furnaces of the smelter at Mineral, 25 miles down the river—fires that have not burned for many years. Recent activity is occasioned by the buying of mines and smelters by wealthy operators and the employment of men to work in mines and reduction works.

MICHIGAN.

CHIPPEWA COUNTY.

The Calumet & Hecla M. Co. has bought a tract of timber land 225 miles east of the mine, for $650,000. The mines of Lake Superior use nearly 100,000,000 feet timber annually.

MONTANA.

DEER LODGE COUNTY.

In the Vipond mining district the Queen of the Hills group is under bond to W. A. Clark syndicate; the shaft is 100 feet deep. In the bottom is ore that assays $6 gold, ten ounces silver, 5% lead and $5 copper.

It is locally reported that the cost of the new smelter at Anaconda will be apportioned between the Anaconda, Parrot and Washoe companies and will be operated co-operatively. The daily capacity of the smelter will be 5000 tons.

C. E. Rueger has sold to Compagnie de Mines et Minerals Society Anoniyme, Bruxelles, Belgium, nine patented mining claims in the northern part of the district for $17,200.

The Montana & Idaho Copper Co., G. B. Conway, P. Mullins, B. E. Calkins, E. H. Renish and W. K. Foote, has incorporated; capital stock, $24,000.

FERGUS COUNTY.

E. W. King, Supt. Great Northern plant at Gilt Edge, has bought the Horse Shoe, Mule Shoe, Discovery and Pasaic for $75,000.

MADISON COUNTY.

At the Watseka mine, 10 miles east of Melrose, the high grade ore is shipped to Helena. The last consignment showed an average net profit of $56 per ton. The shipment consisted of nine carloads. A. W. McCune has determined to erect a new mill at the property.

At Red Bluff the Red Chief mine will put up a 30-ton concentrator. C. L. Sherman is manager.

MISSOULA COUNTY.

From Saltese the Monitor M. Co. has shipped a 25-ton car of ore—the first full carload of copper ore ever shipped from there.

SILVER BOW COUNTY.

At Butte, on the 8th, the entire surface plant of the Parrot M. Co. was destroyed by fire; loss, $100,000; insurance, $30,000; the 164 men employed in the mine all escaped safely through the workings of the several adjoining mines with which the Parrot is connected. The fire is supposed to have started in the carpenter shop from a spark from a passing engine. The six buildings comprising the plant were burned to the ground with their contents. The Parrot mine is one of the assets of the Amalgamated Copper Co. The fire was witnessed by John D. Rockefeller, H. H. Rogers and other Eastern capitalists interested in the company, who had arrived in the city the day before. General Manager Gallwey says the company will be hoisting ore again in five weeks.

At Butte the Amalgamated Co. closed down the Gagnon last Saturday, throwing out of employment nearly 300 men. The reason given is that the shaft needed retimbering. M. Hewitt, Supt. for a number of years, is superseded by W. Word of the Pennsylvania mine.

TETON COUNTY.

The Cracker group copper mines on the ceded strip of the Blackfeet reservation, at Altyn, is building a new concentrator. The town of Altyn is at the mouth of the canyon which leads up to the Cracker mines. Another canyon leads up to Bull's Head and Josephine group, which is being developed by the A. M. Esler Copper M. Co.

NEVADA.

ESMERALDA COUNTY.

(Special Correspondence).—B. E. Shear of Denver, Colo., and associates have taken an option on the Pontoon property, 20 miles east of Bodie, Cal., which they will develop to ascertain its value.

Belleville, Aug. 6.

EUREKA COUNTY.

Sentinel: This week what remained of the smelting plant of the Eureka Con. M. Co. has shared the fate of the Richmond, the old iron contained therein having been sold to the Joshua Hendy Machine Works of San Francisco, and by the use of giant powder it is being broken into fragments. It is estimated that there is about sixty tons of old metal remaining in and about the building; and when this is removed, all that will be left of that mammoth plant is the air compressor and two blowers on the lower floor and the light machinery recently used by the Eureka Sampling Works on the floor above. The buildings, Supt. McTerney says, will not be molested. At this time, when the last vestiges of the two big plants are being obliterated, some idea of the wealth which the mines of the two companies have produced here may be interesting. Of course the actual values of the ore taken out can not be even guessed at, but the following figures taken from the county assessor's books, and covering the period from April 1, 1873, to April 1, 1900, will give some idea of the enormous production of the two properties:

Eureka Consolidated.

Gross value of output	$17,480,923 63
Net value	5,296,277 35
Taxes paid	120,333 86

Richmond.

Gross value of output	$15,713,975 08
Net value	4,914,169 61
Taxes paid	119,044 27

Thus it will be seen that the gross output of these two mines alone has amounted to $33,194,898.71; net product, $10,210,446.96, according to the books of the county assessor, and during that period—from April 1, 1873, to April 1, 1900—they paid in taxes into the county treasury $239,378.13. The mines, of course, are still being operated, though the output has been greatly diminished.

LINCOLN COUNTY.

Supt. F. P. Swindler, at the De La Mar mine, will treat the 400,000 tons tailings, average value $2.40, by releaching.

The handling of tailings along with crude ores will begin when the automatic contrivance which is being devised by the Highland Boy, Utah, smelter is completed. With this the tailings will be delivered through a chute connected with the roof of the plant at an estimated cost of 15 cents per ton.

WHITE PINE COUNTY.

The Chainman mill is closed for repairs to the rolls. When operations are resumed it will probably be by the new company.

Work has begun on the Robust mill at Ely, to have a capacity of 100 tons daily.

NEW MEXICO.

The American Placer Co. is laying a pipe 5 miles long to work in Ancho gulch, Jicarilla mountains. S. L. Bean, Supt., J. T. Johnson, engineer.

J. P. McNulty, Supt. Tiffany turquoise mines, owned by the American Turquoise Co., 18 miles south of Santa Fe, is producing some fine gems. No gems have been taken from a depth greater than 120 feet. It is said that 140 feet is the limit for the production of real turquoise because the chemical composition necessary to produce it does not take place at a great depth there as in Persia, where turquoise in times past is reported found 800 feet below the surface. The Tiffany mines produce best at a depth of 40 to 60 feet. Regular shipments of gems go forward weekly to the New York office of the company. Before shipment the stones in the rough are composed and assorted into five classes, the rich blue gem being classed as No. 1 and the lighter stones grading down to the off-colored light green which together with its matrix of iron stained lime rock is usually cut in large size and worked up by jewelers into sleeve buttons and other ornaments.

BERNALILLO COUNTY.

The Bland mill is to resume operations under the management of V. V. Clark.

The Cochiti G. M. Co. is putting out about 5000 tons per month, yielding a gross output of about $33,000.

DONA ANA COUNTY.

Gen. Mgr. Geo. C. Hopkins of the New Mexico Lead Co. in the San Andreas mountains, 40 miles from Las Cruces, has a vein assaying 40% uncovered to the width of 16 feet. It is hauled in wagons 15 miles to the railway station on the White Oaks road, north of Tularosa: the freight charge for that distance is $10 a ton; on the railway, 90 miles to El Paso, the freight is $1.50 a ton. Two cars are shipped daily.

OREGON.

BAKER COUNTY.

At the Columbia M. Co.'s property Manager Baillie will have the new mill building completed next month and the ten new stamps in operation, increasing from a 10 to a 20 stamp mill.

Huntington reports $17,000 paid Vaughn Bros. by the Northwest Copper Co.—amount due on the Iron Dyke mine under the terms of the bond. There is but one more payment to be made before this property is transferred to the Nortnwest Copper Co.

GRANT COUNTY.

Failure to meet the $10,000 due August 1st under the terms of their bond and lease caused the parties holding an option on the Magnolia mine, Granite district, to permit the property to revert to the owners. Coyle, Conde & Jones will start the mill and work the mine themselves.

JOSEPHINE COUNTY.

The last of the season's clean-ups in the Sterling hydraulic mine of Ankeny & Cook gave $14,000 in gold bricks and $10,000 in coarse gold nuggets, some of the nuggets weighing nearly five ounces. The entire season's clean-up will amount to $100,000.

The Oak Flat placer mines, 700 acres of undeveloped placer ground, with a 5-mile ditch and water rights, are sold to Poole Bros. & Tomlinson of Denver, Colo., for $8000 and one-third of the capital stock of the company. The purchasers have organized the Oak Flat M. & M. Co., capitalized at $200,000, and will prepare for next season's run. The ground is on the Illinois river and Briggs creek, and consists of an old river channel having a deposit of gold-bearing gravel, which shows fine and coarse gold.

SOUTH DAKOTA.

CUSTER COUNTY.

Near Custer City, from the Tin Crown mine, several pieces of mica measured 12x22 inches. The Monarch Mica Co. of Chicago has undertaken large operations there. They claim to have a process by which small pieces of mica can be cemented together under high pressure and look as well as large ones, and the waste can be ground up for use in the electrical industries for insulators. The Standard Oil Co. also consumes a large quantity in making axle grease and other lubricators. The present supply of mica comes from North Carolina, Canada and India.

An Omaha company has a contract to ship 1000 tons of hematite iron ore from the Iron mountain, 8 miles north of Custer, to the smelters of Omaha, Denver and Kansas City. The ore in places runs 70% iron.

LAWRENCE COUNTY.

Manager Wales of the Detroit & Deadwood M. & M. Co. is about ready to start the new cyanide plant, 2 miles west of Portland.

At Lead the number of men employed by the mine, mills, railroad, water works, etc., is 2200. The payroll will average $200,000 a month. Much of the success of the Homestake mine is due to the management of T. J. Grier, an old telegraph operator, who worked for the Western Union Co. at Salt Lake and other Western points, and at Deadwood in 1878 as operator for the Homestake Co. The Homestake Co. is building an aqueduct 14 miles long from the headwaters of the Spearfish river to improve the water supply of Lead City and Deadwood. Six miles of the ditch will be 30-inch iron pipe. For the remainder of the distance the water will be carried through a wooden flume.

PENNINGTON COUNTY.

Spodumene mineral, which contains lithia, is found in considerable quantities near the Etta tin mine, at Hill City, and is shipped to Germany, where it is manufactured by the chemists. It comes in large white crystals like stalactite.

UTAH.

SALT LAKE COUNTY.

The Ben Butler at Bingham reports 3 feet of lead and silver ore in the east drift of the tunnel level.

Two more contracts for material to be used in the enlargement of the Highland Boy smelter were let last week—one for 350,000 pounds of iron and steel for the roaster building, the other for 300,000 pounds for the main building.

SUMMIT COUNTY.

Eastern men have bought the property of the Constellation M. Co. of Park City for $115,000, to be paid in two years.

The new Silver King aerial ropeway at Park City will be 7200 feet long; the cables will be supported by forty iron towers. Seventy-five buckets will be strung on the cables to have a guaranteed capacity of thirty tons an hour, delivering the ore in the ore bin at the rate of one bucket every fifty-seven seconds. The buckets will hold 6½ cubic feet—1200 pounds.

TOOELE COUNTY.

On the 1st the properties of the Con. Mercur Gold Mines Co., consisting of the Mercur and Golden Gate groups at Mercur, passed to the control of a single management. Shares in the consolidated company are issued in exchange for those of the old.

It is understood, says the Tribune, that the Mercur mill at Manning, from whose tanks the builders have derived over $3,000,000 in gold, will be made to handle the vast mass of tailings that have accumulated about it, while all crude ores will in a short time be put through the Golden Gate plant.

WASHINGTON.

FERRY COUNTY.

At Keller work has started on the Umatilla, bonded to a St. Louis firm for $75,000.

At Loomis, Mgr. Allcock of the Golden Zone is increasing the capacity of the mill to 100 tons daily.

SNOHOMISH COUNTY.

After a year's suspension, owing to a disagreement among the owners, the Sunset mine at Index has resumed operations.

WHITMAN COUNTY.

Near Palouse in the Blue Bird, Hoodoo district, M. W. Truax, manager of the mine, has begun development. It is a copper property.

FOREIGN.

BRITISH COLUMBIA.

The largest concentrator in British Columbia is probably the one at the St. Eugene Con., Moyie; capacity, 400 tons per day.

Victoria reports that the employes of the company operating at Blackland placers on Wreck bay, on the west coast of Vancouver island, say they have taken out $80 worth of gold in two hours' work.

Near Sandon in the Slocan, the Ivanhoe's new 150-ton mill will be ready for operation by September 15, is stated by J. Hickey, manager of the mine.

At Rossland, at the Le Roi, the compressor of 40-drill power is in operatien. The head works of the aerial tramway are in course of construction above the ore bunkers at the railroad on Black Bear flat. The combination shaft is timbered down to the 800-foot level, where sinking has been resumed. The mine is shipping 800 tons per day.

Of the present condition of the Miocene Gravel M. Co.'s property, Harper Camp, Cariboo, Manager R. H. Campbell says: "The total outlay to date has been $150,000. We expect to determine the value of the property within the next two or three months. Indications are all that we could wish; but the channel being so much larger and deeper than first anticipated, it has taken a great deal more time and money than we at first expected. However, we do not look upon this as a bad feature, and we expect to find the bottom pay stratum correspondingly larger. If the entire deposit could be worked by the hydraulic process, it would be the largest proposition of that kind in existence; but, unfortunately, one—and only one—of the principal requisites necessary for hydraulicking is absent, viz., the dump or outlet for the disposition of the washed material. The enormous deposit containing sufficient gold, its susceptibility for hydraulicking and the abundance of water at hand make the conditions extraordinarily favorable for hydraulicking if an outlet could be had. As it is, it must be a drift mine, if anything."

Ymir reports a fierce forest fire, which burned the Dundee concentrator. This concentrator was erected in August, 1898, at a cost of $16,000; it had a capacity of fifty tons per day and was connected with the mine by an aerial tramway 5000 feet long.

MEXICO.

Chihuahua Enterprise: After three years of seemingly fruitless effort, the sinking of a shaft 1300 feet and 1300 feet of drift work, which represents an expenditure of $100,000 silver, the Santa Eulalia M. Co. has at last struck it rich in its mine at Santa Eulalia. The first shipment of ore (100 tons) is made which will run 50 ounces of silver to the ton and 55% lead. Thirty tons of ore will be taken out daily, and the K. C. S. & R. Co. has contracted to take the entire product of the mine. The Hearst estate is the chief stockholder in the Santa Eulalia M. Co.

SOUTH AFRICA.

Cable advices from South Africa regarding the condition of the Johannesburg mines indicate a resumption of gold production before long; that the mines have suffered little apparent damage, especially those recently worked. Damages sustained by the other mines have been principally confined to the extraction of ore. Most of the properties will be ready for resumption when native laborers can be induced to return to Johannesburg. The mines are not flooded with water.

Managing a mine in the midst of war's alarms, with battles going on, is not an ideal form of mining life. How it affects one mine manager is illustrated by the following from Wm. Naas, manager of the Lancaster Gold, one of the Rand mines, who, under date of June 15, writes from the property: "The machinery is in good order, and also the buildings and cyanide works, where I had all leaching tanks refilled with water. In the case of the Botha's Reef mine, the hoisting of water was carried on during seventy eight-hour shifts. From May 1 to May 4 I had only one winding engine driver; from the 5th to the 21st I had two, and since the 22nd I had again only one man; 18,914 skips, equal to 6,619,800 gallons of water, were hoisted, and the water stood on May 31 at 5 feet below the third level. As regards the West Battery Reef mine, the Gould electric pump in the No. 1 shaft works now only ten hours per night. The water is kept at 3 feet below the fourth level station. The water in the company's dam stands at the 18 feet 9 inches mark, which is the same as last month. On May 28 I had thirty trucks of coal at the station which had arrived during the previous day and night, and only five hours were allowed me for off-loading. As a battle was raging to the south of us, in the direction of Doornkop, and heavy cannonading was going on from 9 A. M. to 12 M., my transport rider refused to work any longer as he had to bring his oxen in safety. On the 29th a tremendous cannonading commenced at 10:30 A. M. and lasted, without a minute's interruption, till 5:30 P. M., when the small-arms fire also ceased, and I could see from the headgear the Boer forces retreat and the British forces take up a position to the south, and about opposite the French Rand. Many of my boys got scared and ran away, but they came back during the next day or two. I could also engage other transport riders at a slightly increased price. I had all the coal brought from the station to the Botha's Nos. 1 and 2 shafts. On May 30, Boer scouts had a heliograph on the Lancaster West incline shaft headgear. During the day the British troops entered Roodepoort, and the railway stopped running in the direction of Johannesburg, but has continued to run up to this day (June 15) in the direction of Potchefstroom. Everything is very quiet here."

A. Brakhan, who remained in Johannesburg throughout the war, writes under date June 27 stating that in the Botha's mine there is now about 13,000,000 gallons of water, and that it will take about six weeks to unwater the mine, reckoned from the time when pumping work to the fullest extent can be started. He also reckons that the West Battery Reef mine can be unwatered under six weeks.

THE KLONDIKE.

The Tanana country is the scene of the latest stampede from Dawson.

G. E. Howard says the principal operations are confined to Homestake and Faith creeks, upon each of which he saw men shovel in from $60 to $100 per day. The diggings are located 60 miles above the confluence of the Tanana and McManus rivers. "There is little or no grub in the country, and it is difficult to get in during the summer season, and in consequence little work is possible at the present time. The mosquitoes are something frightful, and several instances are reported of men being driven insane as the result of attacks from the pests. On some of the claims work had to be abandoned on account of the mosquitoes."

He met a man who was entirely without grub, excepting an owl which he had killed, and with no clothing save a badly torn suit of underwear and a worn pair of gum boots. His face was literally eaten by mosquitoes and the man apparently was out of his mind, being unable to tell his name or from what part of the country he hailed. He was given some salt pork, which he devoured raw.

The Dawson News says: "While the output in the aggregate was larger than last year's by nearly 75%, the actual cost of production was so much greater that very few mine owners find a balance on the credit side of their ledgers, and a very large majority of laymen find themselves utterly ruined, with hundreds of workmen whose daily wages remain unpaid as the result of their winter's toil. The cause of it lies in the bad laws, excessive taxation and the defective lay system that has so long prevailed, affording protection to no one and permitting of the rankest kind of wildcat speculations with prospective mines at the expense largely of the poor working man. The remedy for the latter lies in a thorough protection to the working man, and this can only be given through a mechanics' alien law that will make not only the dumps, but the mine itself, responsible for the wages. The percentages on which laymen took claims all of last winter were entirely too small to warrant any possible profit except on claims that turned out exceptionally rich.

"Steam thawers have not proven the bonanza they were expected to be, and more men have been swamped by them this last winter by reason of the heavy cost of running them than can now be figured up.

"Existing conditions are such that in order to make mining profitable in this district a number of important changes will have to be made. First, the royalty must be abolished or materially reduced; titles to claims must be given; miners' licenses must be abolished or brought down to a nominal, indiscriminate head tax for every one entering the country—miner or no miner—and then the country will have to be thrown open to relocation before anything like a population can be expected."

Personal.

A. M. Wells, M. E., has returned to Denver from San Francisco.

F. N. Gibbs has gone to Rossland, B. C., to examine mining property.

L. D. Copeland has returned from the Mammoth mine to Phœnix, Ariz.

Wm. A. Farrish has returned to Denver, Colo., from Baker county, Or.

Milo Haskins has been reinstated as Supt. of the Anaconda, Colo., mine.

Marcus Daly is expected to return from Europe to Butte, Montana, on the 15th inst.

J. J. McDonald, representing the Gold & Silver Extraction Co. of America, is in San Francisco.

Lewis H. Eddy of the California State Mining Bureau is gathering information in Sierra county, Cal.

Alfred B. Sanford, assayer, has returned to Denver, Colo., from the Seven Devils copper region, Idaho.

W. L. Hallett, formerly of the Victor sampler, is now ore purchaser for the Eagle sampler, Battle Mountain, Colo.

J. Bawden has gone from Sutter Creek, Cal., to Victor, San Bernardino county, Cal., to take charge of the G. M. M. Co.'s quartz mill.

Duncan McVichie has gone from Salt Lake City to Bland, N. M., to supervise mining operations at the Cochiti and Navajo properties.

H. J. Allen manages the affairs of the United Verde Co., Jerome, Ariz., in the absence of Supt. J. L. Giroux, who is on a sixty-day vacation in the East.

H. Hirsching, recently engaged in extensive metallurgical operations at Goodspring, Nevada, proposes opening a chemical laboratory in San Francisco.

T. C. Archer, mining engineer, has returned from the Prince of Wales island, Alaska. He reports many good copper prospects, that require capital to develop.

R. A. F. Penrose of the Commonwealth mine, Pearce, Arizona, is in San Francisco. He expects to have the new 100-stamp mill in operation next January.

F. M. Johnson, Supt. Albemarle mill, Bland, N. M., is in San Francisco working on plans for the new 350-ton mill. He will return to Bland about Sept. 1st, and thence proceed to Boston to complete the plans and specifications, likely until the first of

November. Soon thereafter construction work on the new mill will begin.

WALDEMAR LINDGREN, of the U. S. Geological Survey, has returned to San Francisco from Molokai, Hawaii, and goes on a geological reconnoisance to eastern Oregon.

RICHARD U. GOODE of the U. S. Geological Survey is in Los Angeles, Cal., where he will make headquarters for work in southern California, beginning at Randsburg.

F. N. BRADLEY has returned from Alaska and gone to Idaho. In speaking of a successor to Supt. Robeson of the Alaska-Mexican mine, Mr. Bradley says that as yet no one has been chosen.

F. L. BROWN, till recently manager Pacific Coast branch of the American Steel & Wire Association, goes to Chicago to take charge of the business of the Shelby Steel Tubing Co., at an annual salary of $10,000.

J. V. CILLEY, general manager North Argentine railway of Buenos Ayres, S. A., is in Colorado investigating the operation of wire rope tramways. He is interested in a mine in the Andes mountains, on the western border of the Argentine Republic, about 14,000 feet above sea level, and purposes to connect the mine with the mill at the foot of the mountains, 21 miles away. This would be the longest tramway system in the world, and it is estimated that the cost of construction would be $300,000.

Obituary.

GEORGE W. PENNINGTON, senior member of the firm of George W. Pennington & Sons, steel manufacturers of San Francisco, died on the evening of the 8th inst. He was a native of Yorkshire, England, and in the 72nd year of his age. He came to the United States in 1863, locating in Pittsburg until 1883, when he came to San Francisco and established the firm of which he remained the head until 1895. He was well and widely known and highly esteemed by friends and business associates.

Commercial Paragraphs.

THE contract for material to be employed in the tramway for the Silver King, Park City, Utah, was awarded W. C. Bogue of Salt Lake City for $17,000.

THE Denver Engineering Works Co. are supplying a carload of electric motors to equip 15 and 20 H. P. electric hoists for the Colorado Electric Power Co. at Cripple Creek, Colo.

GILBERT WILKES & CO., electrical engineers of Denver, Colo., are supplying equipment for electric power plant for the San Juan G. M. Co. at Telluride, Colo., to be used in part for the operation of New Era electric drills.

THE battleship Wyoming will be launched at the Union Iron Works, San Francisco, on September 8. An invitation has been forwarded to Governor Richards of Wyoming requesting him to be present with four State officials.

THE Lunkenheimer Co., Cincinnati, Ohio, is building a large shop in Fairmount in that city for the manufacture of automobiles and iron valves. This is in addition to the present plant, which will be continued at the old location until the completion of the new works.

THE Risdon Iron Works, San Francisco, has an order for a 35,000-gallon steel tank to be used for the storage of fuel oil for railroads at Bakersfield, Cal. This tank will have a steel riveted roof. The Risdon Iron Works has the contract for repairs on the steamer Tellus, to cost $20,000.

List of U. S. Patents for Pacific Coast Inventors.

REPORTED BY DEWEY, STRONG & CO.,
PIONEER PATENT SOLICITORS
FOR PACIFIC COAST.

FOR THE WEEK ENDING JULY 31, 1900.

654,824.—PUMPS—J. M. D. Bland, Baker City, Or.
654,872.—HYDRAULIC MOTOR—E. F. Cassel, Seattle, Wash.
654,712.—DOMESTIC BOILER—A. Cerruti, S. F.
654,950.—BICYCLE SUPPORT — H. H. Coote, Phœnix, Ariz.
654,617.—TAMPING ROLLER—J. W. Fitzgerald, Kern, Cal.
654,652.—HAME FASTENER — Lake & Sims, Loyalton, Cal.
654,802.—STUMP PULLER—T. H. McCain, Monroe, Wash.
654,838.—GOLD SOLVENT — D. Mosher, S. F.
654,839.—GRAPE CRUSHER AND STEMMER—J. S. Philpott, Windsor, Cal.
654,675.—COFFEE POT—Elvina Root, Coquille, Or.
655,021.—SPRING—E. A. Seaburg, Seattle, Wash.

Latest Market Reports.

SAN FRANCISCO, Aug. 9, 1900.

SILVER—Per oz., Troy: London, 28d (standard ounce, 925 fine); New York, bar silver, 60⅝c (1000 fine); San Francisco, 60⅝c; Mexican dollars, 49c.

COPPER.—New York: Lake, 1 to 3 casks, 16.50 cash; carload lots, 16.25; Electrolytic, 1 to 3 casks, 16.62½; carload lots, 16.25; Casting, 1 to 3 casks, 16.37½; carload lots, 16.25. San Francisco: 17. Mill copper plates, 20c; bars, 22@23c.

Total foreign shipments of copper for the first six months of this year amounted to 199,366,720 pounds. Following is a table of export of copper from this country during the past twelve months compared with those of the previous twelve months:

	Tons.		Tons.
July, 1899....	7,160	July, 1898 ...	15,354
Aug., 1899 ...	10,920	Aug., 1898 ...	11,424
Sept., 1899...	7,553	Sept., 1898...	11,280
Oct., 1899....	11,360	Oct., 1898....	10,810
Nov., 1899 ...	10,800	Nov., 1898 ..	14,741
Dec., 1899 ...	15,550	Dec., 1898....	13,222
Jan., 1900....	14,035	Jan., 1899....	9,204
Feb., 1900....	12,749	Feb., 1899....	8,391
Mar., 1900 ..	20,149	Mar., 1899 ...	14,414
Apr., 1900....	12,762	Apr., 1899 ...	7,423
May, 1900....	13,997	May, 1899. ..	7,026
June, 1900 ...	15,312	June, 1899 ...	10,002
Total	152,346	Total	133,291

Estimating the value of these 241,255,040 pounds of copper exported during the past twelve months at an average of 17 cents, gives an aggregate valuation of $58,013,356.80.

LEAD.—New York, $4.25; Salt Lake City, $4.00; St. Louis, $4.20; San Francisco $5.00, carload lots; 5½c 1000 to 4000 lbs.; pipe 6¾, sheet 7½, bar 6c. London, £18 = 3.91c per ℔.

The new prices of the American Smelting & Refining Co., 50-ton lots, are as follows:

Delivered.	Desilverized.	Corroding.
St. Louis	$4 20	$4 30
Chicago	4 20	4 30
Cincinnati	4 25	4 35
Pittsburg........	4 30	4 40
Philadelphia.....	4 30	4 40
New York........	4 25	4 35
Boston	4 32½	4 42½

On carload lots 5c. per 100 ℔s. higher.

During the first half of this year there were imported into the United States 98,726,096 pounds lead in ores and bullion, and 1,586,670 pounds metallic lead. During the same period there were exported 96,144,811 pounds foreign lead. Of the 100,312,766 pounds, there came from Mexico 85,867,420 pounds, from Canada 12,618,446.

SPELTER. — New York, $4.25; St. Louis, $4.15; San Francisco, ton lots, 5½c; 100-lb lots, 5¾c.

ANTIMONY.—New York, Cookson's, 10½c; Hallett's, 9½c; San Francisco, 1000-lb lots, 12c; 300 to 500 lbs., 13@14c; 100-lb lots, 15@18c.

IRON. — Pittsburg, Bessemer pig, $16.50; gray forge, $14.50; San Francisco, bar, per lb., 2¾c. in small quantities.

Decreased consumption rather than overproduction is the source of the trouble.

STEEL.—Bessemer billets, Pittsburg, $18.00; bars, 1.10; tank plate, 1.15; San Francisco, bar, 7c to 12c per lb.

C. P. Huntington says: "I get English rails cheaper than $29. These English rails were designed for use in Mexico, and they passed through New Orleans in bond. They cost me $27.13 a ton."

QUICKSILVER. — New York, $51.00; large lots: London, £9 5s; San Francisco, local, $48.50@50.00 ℔ flask of 76½ ℔s.; Export, $47.

The Ætna's June output was 200 flasks. U. S. quicksilver exports for the first six months of 1900 were 510,472 pounds; for the corresponding period of 1899, 664,397.

MAGNESIUM.—New York, $3.00 ℔ ℔.; San Francisco, $4.00.

ZINC.—San Francisco, 5½c; slab, 6c; bar, 7¾c.

SOLDER. — Half-and-half, 100-℔. lots, 21½c; San Francisco, Plumbers', 100-℔. lots, 18¼c.

BABBITT METAL.— San Francisco, No. 1, 10c.

TIN.—New York, pig, $32.00; San Francisco, ton lots, 34c; 1000 ℔s., 34½c; 500 ℔s., 35c; less, 36c; bar tin, ℔ ℔, 40c.

ASSAY LITHARGE.—San Francisco, 10c ℔ ℔.

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 30c to 35c.

PLATINUM.— San Francisco, crude, $17 ℔ oz.; New York, $18.25; manufactured, $19.50@22.00.

BISMUTH.—New York, ℔ ℔., $1.60 50-℔ lots; San Francisco, $2.50 to $2.75 ℔ lots.

NICKEL.—New York, 50@60c ℔ ℔.

TUNGSTEN.—New York, ℔ ℔., 95c; San Francisco, $1.15.

FERRO-TUNGSTEN. — New York, 37%, 35c; San Francisco, 65c (60%).

FERRO-MANGANESE. — Pittsburg, 80%, domestic, $85, large lots.

CHEMICALS.—Cyanide of potassium, 98%-99%, jobbing, 32½@34½c ℔ ℔.; carloads, 31@32c; in 10-℔. tins, 40c; sulphuric acid, 66% B, 2c ℔ ℔.; soda ash, $1.60 ℔ 100 ℔s. 58%; hyposulphite of soda, 2¾@3c ℔ ℔.; blue vitriol, 5½@6c ℔ ℔.; borax, concentrated, 7@8c ℔ ℔.; chlorate of potash, 12@13c; roll sulphur, 6c; alum, $1.90@2.00; flour sulphur, French, 2¼@2½c; California refined, 1¾@2c; nitric acid, in carboys, 8c ℔ ℔.; caustic soda, in drums, 3@4c ℔ ℔.; Cal. s. soda, bbls., $1.00; sks, 95c ℔ 100 ℔s.; chloride of lime, spot, $2.35@2.50; nitrate of potash, in kegs, 8c; caustic potash, 10c in 40-℔. tins.

OILS.—Linseed, pure, boiled, bbl., 79c; cs., 84c; raw, bbl., 77c; cs., 82c. Deodorized Stove Gasoline, bulk, 16c; do., cs., 22c; 86° Gasoline, bulk, 21c; do., cs., 27c; 63° Naphtha or Benzine, deodorized, in bulk, per gal., 15½c; do., in cs., 21½c; Lard Oil, Extra Winter Strained, bbl., 60c; cs., 65c; No. 1 bbl., 49½c; cs., 54½c; Neatsfoot Oil, coopers' bbls., 60c; extra bbls., 55c; cs., 60c; No. 1 bbl., 52½c; cs., 57½c.

POWDER.—F. o. b. San Francisco: No. 1. 70% nitro-glycerine, per ℔., in carload lots, 15¼c; less than one ton, 17¼c. No. 1*, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1** 50%, carload lots, 11¾c; less than one ton, 13¾c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9½c; less than one ton, 11½c. No. 2** 30% carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9, in lots not less than 1000.

FUSE.—Triple tape, $3.60 per 1000 feet; double tape, $2.95; single tape, $2.35; Hemp, $2.00; Cement No. 2, $2.95; Cement No. 1, $2.35, in lots of 3000 feet and up.

PHOSPHORUS. — F. o. b. New York or Philadelphia, 45@50c ℔ ℔.

CANDLES.—Granite 6s, 16 oz., 40s., 12¼c ℔ set; 14 oz., 40s., 11¼c.

COAL. — San Francisco, coast, yard prices: Wellington, $9; Seattle, $7.00; Coos Bay, $5.50; Southfield, $9.00. Cargo lots, Eastern and foreign: Wallsend, $8.00; Brymbo, $7.50; Pennsylvania, hd., $14.00; Scotch, $8; Cumberland, $12; Cannel, $9.50; Welsh Anthracite, $12.00; Rock Springs, $8.50; Colorado Anthracite, $14.50. Coke, $16 per ton in bulk; $18 in sacks.

San Francisco Stock Board Sales.

SAN FRANCISCO, Aug. 9, 1900.

9:30 A. M. SESSION.

50 C. C. & V. .$1 50	100 Savage......14c
300 Crown P't...16c	100 Sierra Nev...39c
500 G. & C......16c	100 Silver Hill...59c
300 Justice......07c	100 Union.. .....23c
100 Overman.. .09c	

2:30 P. M. SESSION.

100 Ophir 69c	300 Belcher.....18c
400 Mexican 15c	200 Union Con...21c
100 C. C. & V.$1 50	700 Challenge...23c
100 Savage......13c	100 St. Louis....14c
100 Y Jacket....30c	50 Standard..$4 60
500 Imperial 02c	100 H. & N.....24c

Recently Declared Mining Dividends.

San Pablo, Diento district, Mexico, $4 per share, $9600..........	Aug. 10
Daly-West M. Co., Utah, 25 cents per share, $37,500...............	Aug 15

WANTED.

A Rich Placer proposition, adapted to working by Railroad Steam Shovel, or Dry Land Excavator. Description, with price and terms, to receive attention must be accompanied by reliable reports and references.

Address: EDWARD N. BREITUNG,
MARQUETTE, MICH.

Quicksilver
——FOR SALE BY——
The Eureka Company,
OF SAN FRANCISCO.
ROOM 1, - - 320 SANSOME STREET,
SAN FRANCISCO.

SAVE THE DROPS

WANT SIX MORE.

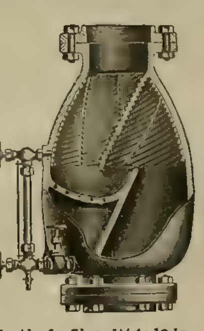
GENTLEMEN:—We have tested the Filter, running through some of the very rank oil that comes from our spindle borings, etc., and find it all right. Please forward six (6) more at once.
Very respectfully,
The Lodge & Shipley Machine Tool Co., Cincinnati, Ohio.

THE CROSS OIL FILTER

is in the largest power plants and shops in the World because it stands just such tests as the above. Experiment at our expense. Your Supply Man will send you one on approval. If not satisfactory, we pay the freight. Catalogue.

THE BURT MFG. CO.,
Akron, Ohio, U. S. A.

Quicksilver
For Sale in Lots to Suit.
REDINGTON & COMPANY, Wholesale Druggists, 23-25-27 Second Street, San Francisco.



Separators for
Every Service.

Our new catalogue shows a very complete line of separators designed to cover special requirements for large steam storage, extreme high pressure, extra water capacity, etc.

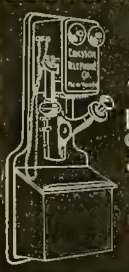
Austin Separators

are guaranteed, and are without a rival for eliminating condensation from Live Steam and removing oil, grease and other impurities from exhaust.

We ship them on 30 days' trial to responsible parties and pay freight both ways if not satisfactory.

Vertical. Sizes 1½ to 12 in.

AUSTIN SEPARATOR CO.,
27 W. Woodbridge St.,
Detroit, Mich., U. S. A.



ERICSSON SWEDISH TELEPHONES

Seem to possess almost human intelligence. They respond to every requirement in a smooth, positive fashion that shows what a perfect telephone can do. Besides this they have unequalled strength and durability. Their reputation as "STANDARD OF THE WORLD" is built on merit. Is the best too good for you?

ERICSSON TELEPHONE CO. 296 BROADWAY NEW YORK.

SITUATIONS WANTED.

BY A BLACKSMITH. Thoroughly understands and has had many years' experience in all branches of mining work. Also is a good machinist and has had several years' experience in handling steam. Address J. C. Blacksmith, care this office.

CHEMIST.—TECHNICAL GRADUATE IN CHEMistry with some experience in commercial work, and especially assaying. Have good grounding in surveying and draughting. Box A. this office.

WANTED.—A SITUATION BY A COMPETENT Assayer, Surveyor, Draughtsman and Bookkeeper, with good references. Address L. R., this office.

WANTED.—POSITION AS ASSAYER OR millman in cyanide plant. Several years' experience, and understands the handling of machinery. Can also serve as bookkeeper. Best of references. Address M. S. A., care of this office.

Experienced Accountant and Assayer, with knowledge of cyaniding and complete assay outfit, wishes employment with mining company, or would like to hear of favorable field for custom assay office. Highest references. Address L. S. U., this office.

WANTED—SITUATION AS MANAGER OF producing or developing property. Twelve years' experience in gold mining and milling, copper mining and smelting. Address C. H., care of Mining and Scientific Press.

CYANIDING.

Have had charge of five mills and worked in every part of process from shoveling to laboratory work. Test ores and outline process for treating them. For three years treated SLIMES successfully. Wish a position after July 10. Have studied to excel. References as to character and ability.

Address I. B., care Mining and Scientific Press.

WANTED.

WANTED.—A THOROUGHLY DEVELOPED, siliceous gold property with a possible output of fifty tons per day. In close proximity to railway. Values must not go below $5 per ton in gold. Address X.Y.Z., Mining and Scientific Press.

WANTED.—A CHEMIST AND ASSAYER FULLY conversant with the latest and most economical methods of cyaniding; also an Assistant Assayer and Chemist. State salary expected and forward testimonials. Address "Extraction," care of Mining and Scientific Press.

WANTED.

An Ore Tramway—Bucket or Jig Back—Cable and Terminals.

Must be in perfect order for use in central Arizona. Length 1700 feet. Grade 24%. Daily capacity 80 to 100 tons. Address "TRAMWAY," 406 Rookery Building, Chicago.

REFRACTORY ORES WANTED.

1000 TONS or more which will assay $75.00 Gold per ton and over, delivered free of charge at San Francisco, Cal. Correspondence solicited.

C. J. TALLON,
308 MARKET STREET, SAN FRANCISCO, CAL.

WE BUY very rich Ores, Dental Scraps, Tellurium Ores, Mill Wastes, Jewelers' Sweeps, Gold Retorts, Old Iron Retorts, Base Amalgam, Quicksilver, Amalgamated Plates, Gold and Silver, Old Slags.

A. M. DONALDSON & CO.,
ASSAYERS AND WASTE PRODUCT SMELTERS,
1661 Larimer St., Denver, Colo.
Write for Donaldson's Assayers' Slag Hammer.

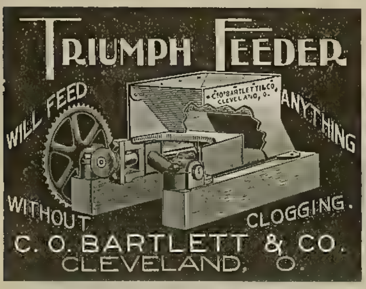
EUREKA CONSOLIDATED DRIFT MINING COMpany.—Location of principal place of business, San Francisco, California; location of works, Forest Hill, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 9th day of August, 1900, an assessment (No. 26) of one (1) cent per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 214 Pine street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 8th day of September, 1900, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on SATURDAY, the 29th day of September, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

GEO. W. DIXON, Secretary.
Office—214 Pine street, San Francisco, California.


TRIUMPH FEEDER
WILL FEED ANYTHING WITHOUT CLOGGING.
C. O. BARTLETT & CO. CLEVELAND, O.
C. O. BARTLETT & CO. CLEVELAND, O.

PRICE, $50.00.

FRED C. MILES,

CISCO, PLACER CO., CAL.
COPPER AND GOLD PROSPECTS.
A GOING GOLD PROPERTY

INVENTORS, Take Notice!

L. PETERSON, MODEL MAKER,
544A MISSION STREET, bet. First and Second Sts., SAN FRANCISCO. Experimental machinery and all kinds of models. Tin and brasswork. All communications *strictly confidential.*

FOR SALE.

FOR SALE —Ten mines, forming a group (gold and silver), with mill site and water power, Acuitapilco Mining District. Ore assaying from 30 ozs. to 100 ozs. to the ton; gold, ½ oz. Address to LIC. ELIAS GALINDO, P. O. Box 26, Tepic, Mexico.

FOR SALE --- Developed Zinc-Lead-Silver Property. Texas.

Two trunk lines. 700 acres. 8100 feet on vein. Splendid concentrating proposition. 1500 feet development. Mine average: Zinc, 17.66%; lead, 9.57%; silver, 7.35 ozs.; gold, .04 ozs. Price, $30,000. Principals only. **H. E. RUNKLE, El Paso, Texas.**

FOR SALE.

WROUGHT IRON PIPE.

150,000 Feet Second-Hand, Refitted Pipe. New Thread and Couplings.

THE S. H. SUPPLY CO.
WRITE FOR CATALOGUE OF MINING MACHINERY AND SUPPLIES.
22nd and Larimer Sts., DENVER, COLO.

SECOND-HAND MACHINERY For Sale.

Boilers, Engines, Heaters, Pumps, Tanks, Steam Pipe, all sizes, Shafting, Pulleys, Boxes, Hangers, Gears, Belting, etc. Iron and Wood Working Machinery, all kinds, all makes. We make a specialty of Saw Mill Supplies. Our prices are low and all goods are guaranteed as represented. Let us know your wants and we will please you.

Harris Machinery Co.,
1042 Washington Ave., S. E., Minneapolis, Minn.

Hydraulic Pipe FOR SALE CHEAP.

1500 feet of 10⅝-inch Casing weighing 27 lbs. to the foot, with Flanges, or Screws and Sockets; in lots to suit. Immediate delivery. Correspondence solicited.

C. J. TALLON,
308 Market Street,........San Francisco, Cal

ASSAY OFFICE FOR SALE.

An old established and completely equipped Assay Office and Chemical Laboratory, doing a good business in Denver, Colo.; power plant with crushing and grinding apparatus in connection. Good business reasons for selling. Bargain if sold at once. Address Q 641, Mining and Scientific Press.

FOR SALE.

BIG COPPER MINE

In Shasta county. A south extension of Iron mountain. Croppings 700 feet wide; 600 to 800 feet of backs. Four miles from Sacramento river and railroad. Address C. D., this office.

5 Gold Quartz Claims

In Compact Body, Together With

10-STAMP Quartz Mill and Mill Site FOR SALE.

Situated on Dog Creek, Shasta Co., California, six miles from Delta Station, on the Shasta Division of the Southern Pacific Railroad, thirty-eight miles from Redding. Mines in good condition for inspection. Will be sold outright, or bonded for a sale after thorough inspection and experting. Property acquired by foreclosure of mortgage. Owner can not handle it.

C. C. BUSH, Trustee,
Address: REDDING, CAL.

THE CALIFORNIA DEBRIS COMMISSION, having received applications to mine by the hydraulic process from F. E. Thomas, in the Gold Run Placer Claim, near Quincy, Plumas Co., to deposit tailings on a flat; from Walter C. Robinson, in the Deadwood Hill Mine, near Meadow Valley, Plumas Co., to deposit tailings in Deadwood Creek; from W. B. Meek, in the Indian Hill Mine, near Camptonville, Yuba Co., to deposit tailings in Indian Creek; from the La Porte Consolidated Gold Mining Co., in the Dutch Mine, near La Porte, Plumas Co., to deposit tailings in Rabbit Creek; from J. T. Birmingham, in the Strawberry Mine, at Strawberry Valley, Yuba Co., to deposit tailings in a worked-out pit; and from C. M. Jurgenson, in the Garden City Mine, near Gibsonville, Sierra Co., to deposit tailings in a ravine, gives notice that a meeting will be held at Room 59, Flood Building, San Francisco, Cal., on August 13, 1900, at 1:30 P. M.

BENJAMIN T. LLOYD, STOCKS, BONDS AND MINES.

Have immediate customers for well-developed Gold and Copper Properties.
P. O. Box 608, **SALT LAKE CITY, UTAH.**

MICHIGAN COLLEGE OF MINES.

An Engineering School with unique location, giving it unusual facilities. Distinctive methods of instruction. Special courses. For catalogue giving occupation of graduates, address
F. W. McNAIR, President, Houghton, Mich.

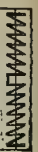
SPIRAL SAND PUMPS.

For Pumping Sand, Slimes, Tailings and Crushed Ores.

The Cheapest and Most Durable Pump on the Market. Manufactured by J. H. Frenier & Son.

Represented by M. S. HAUSER,
12 Front Street,............San Francisco, Cal.

Notice the Shape of GLOBE BOX---THE BEST BABBITT.



Send for trial order, Ladle free.

The Globe wire lace makes the smoothest joint, runs the stillest and lasts the longest of any lacing. Sent on approval. Write us for booklet with instructions, etc. J. M. HAYDEN & Co., 58 Pearl St., Grand Rapids, Mich.

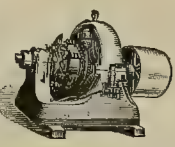
WEST COAST OF MEXICO.

WÖHLER, BARTNING Suc's, Mazatlan (Sinaloa), Mex.

Bankers, Importers, Exporters and Commission Merchants.

Representatives and Agents of the principal Mining Companies in the State of Sinaloa and the dependencies of the Pacific coast in the States of Durango, Chihuahua, Sonora, Lower California and Jalisco.

ORE BUYERS AND EXPORTERS. - MINING SUPPLIES.



FLINT & LOMAX,

DENVER, COLO.

Electrical AND MECHANICAL Engineers.

—DEALERS IN—

BOILERS, ENGINES, DYNAMOS, MOTORS, ICE MACHINERY, SHAFTING, HANGERS, BELTING, PULLEYS, and

ELECTRICAL SUPPLIES OF EVERY KIND.

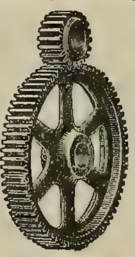
OPERATING MACHINE, PATTERN, BLACKSMITH AND PLATING SHOPS. MAKERS OF SPECIAL APPARATUS TO ORDER.

DEWEY, STRONG & CO.,

PATENT SOLICITORS,

330 MARKET STREET, - SAN FRANCISCO, CAL.

Inventors on the Pacific Coast will find it greatly to their advantage to consult this old experienced first-class agency. We have able and trustworthy associates and agents in Washington and the capital cities of the principal nations of the world. In connection with our scientific and Patent Law Library, and record of original cases in our office, we have other advantages far beyond those which can be offered home inventors by other agencies. The information accumulated through long and careful practice before the Office, and the frequent examination of patents already granted, for the purpose of determining the patentability of inventions brought before us, enables us to give advice which will save inventors the expense of applying for patents upon inventions which are not new. Circulars and advice sent free on receipt of postage. Address **DEWEY, STRONG & CO., Patent Agents, 330 Market St., San Francisco, Cal.**



P. T. TAYLOR & CO.,

525 MISSION ST., SAN FRANCISCO, CAL.

GEAR WHEELS, GEAR CUTTING,

ALL DESCRIPTIONS UP TO 50 INCHES.

GEARS FOR AUTOMOBILES A SPECIALTY.

FULL INFORMATION BY MAIL.

PIPE BARGAINS.

Suitable for Water Mains, Mining, Irrigation, Air, Oil, etc, etc. New Spiral Welded Asphalted Steel Pipe with any style coupling desired.

460 ft. 6-in.	3,480 ft. 10-in.	1,828 ft. 14-in.	1,077 ft. 18-in.
50,000 " 8 "	2,428 " 12 "	520 " 16 "	1,623 " 24 "

All Sizes Wrought Pipe, Well Casing and Straight Riveted Pipe in Stock. Equipment of All Kinds for Mine, Railroad and Contractors' Outfits. Write for Prices and Particulars.

BOWES & CO., 23 Lake St., Chicago, Ill.

Are You Confronted With a Difficult Ore-Separating Problem?

THE WETHERILL MAGNETIC SEPARATING PROCESS

may prove the solution. Apply to Wetherill Separating Company, 52 Broadway, N. Y.

FOWLER'S AIR SPACE and Asbestos Sectional Covering.

As a Non-Conductor, Unequaled.
Special Rates for Steam Boilers and Drums.
G. C. Fowler, 656-58 Howard St., S. F.

PUT YOUR ADVERTISEMENT

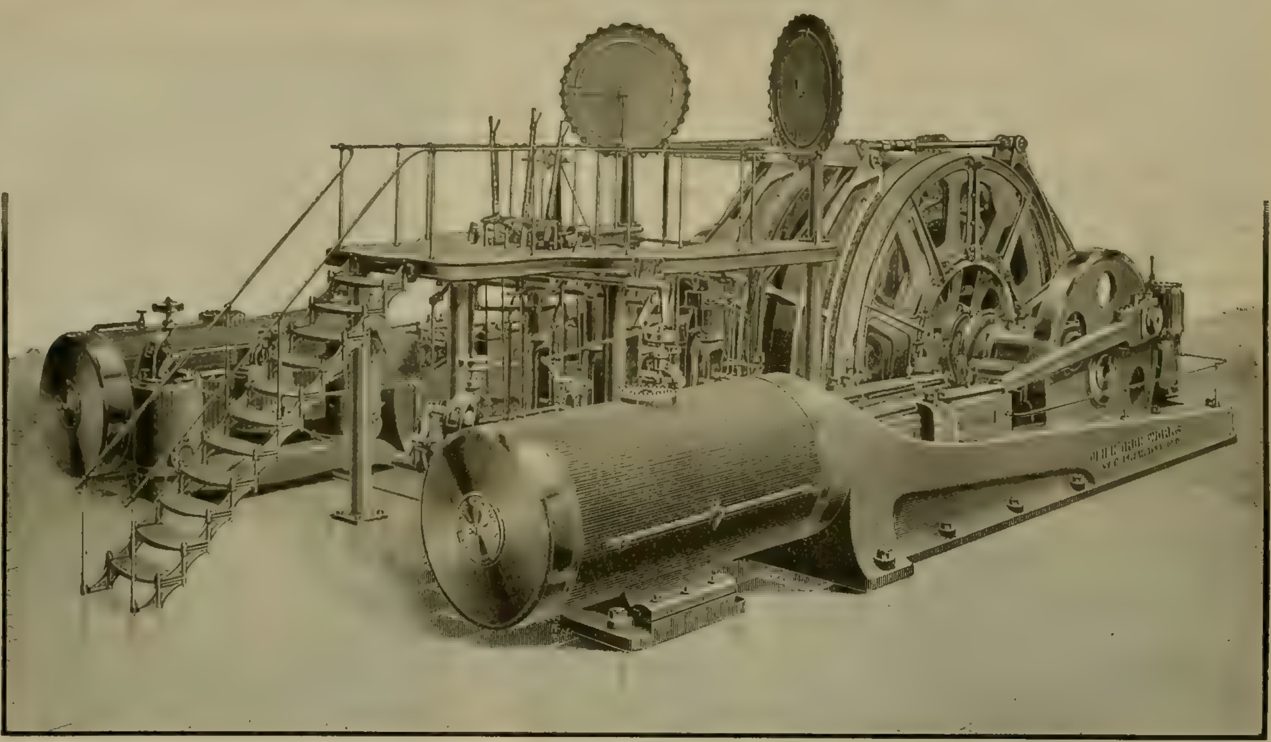
In the Paper Read by the Men Who Buy What You Have to Sell.

UNION IRON WORKS,
222 Market Street, San Francisco, Cal.

30 in. x 72 in.
Direct Acting
Hoisting
Engine

BUILT FOR THE
Anaconda
Copper Mining
Company
OF MONTANA.

Embodying all that experience and practical working have demonstrated as valuable in this class of machinery.



The brakes, clutches and reversing gear are arranged to be operated by compressed air or steam, by means of auxiliary cylinders which are under full control of the engineer, stationed upon the elevated platform shown, insuring the most rapid work with absolute safety. Shaft hollow forged steel of ample strength and stiffness to withstand any strains; reciprocating parts of steel and are as light as consistent with the duty required; cylinders of the "overhung" type, weight being taken by a guide saddle, which admits of free longitudinal movement, due to expansion, causing no strain on bed plate or foundations; cylinders steam-jacketed, fitted with valves provided with Corliss releasing gear and hand cut-off, enabling the engines to be run economically with reference to the work to be performed; bed plates modification of the Porter Allen type, heavy and substantial, with large foundation base and anchor bolts. A duplicate of this engine has also been furnished the Homestake Mining Company of Dakota.

STEAM LOCOMOBILE FREIGHTING TRAIN.

CAPACITY OF WAGONS
16 TONS EACH,
or total freight carrying capacity
of train 50 tons.

CAPACITY
OF
ENGINE,
50 H. P.

THESE WAGONS ARE ESPECIALLY DESIGNED FOR STEAM FREIGHTING.

CAPACITY OF TRAIN, 50 TONS.

"The Daniel Best" 50-Horse Power Traction Engine.

The most powerful and only Successful and Practicable Road Engine in the world. Eighty of them in use on this Coast. They are being Successfully and Profitably Employed in Hauling Logs, Lumber, Ore, Salt, Borax and other kinds of freight.

The work is being done **FIFTY PER CENT** Cheaper than it is possible to do with Animal Power. They can be operated over any ordinary road where it is practicable to use mules or horses, doing the same work. They can ascend grades as much as 10% to 20%, hauling their loads of 35 to 40 tons, depending upon the condition of the roads; loads may be increased to even greater amount on a firm and moderately level road.

Send for descriptive Circulars and Price List of Engines and Wagons. We solicit correspondence. No trouble to answer questions.

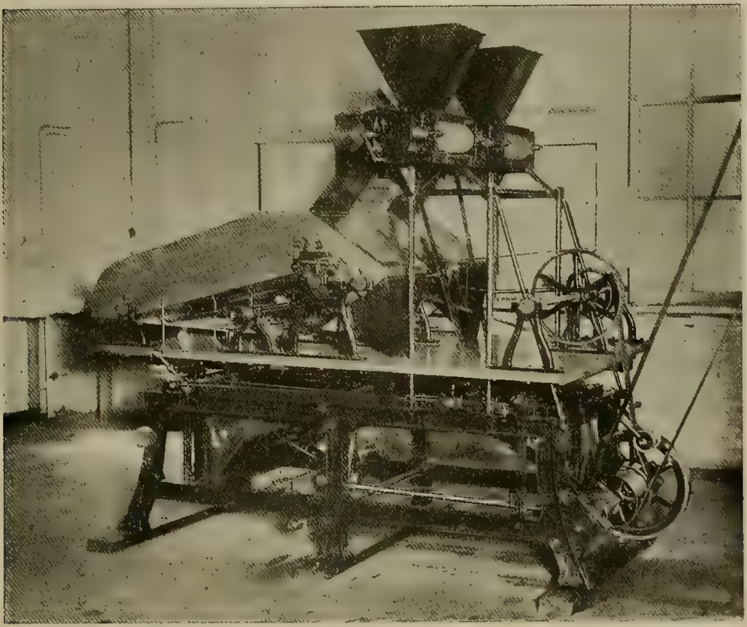
Estimates made for complete Steam Freighting Outfits. Address

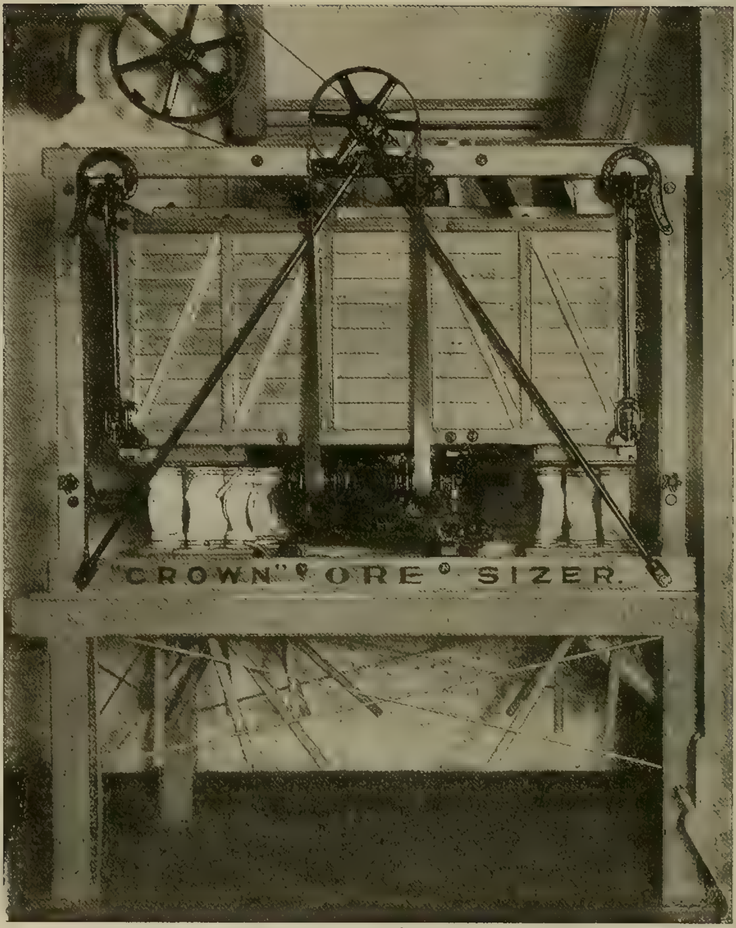
THE BEST MANUFACTURING CO.,
San Leandro, Cal., U. S. A.

CROWN GOLD MILLING CO.

Manufacturers of the "CROWN" CONCENTRATOR and CROWN ORE SIZER. A dry process of sizing and concentrating ore, sand or gravel. Designed to accord fully with the laws of specific gravity, and especially adapted to refractory ore or localities where there is no water.

The chief claims for the Crown Concentrator are that it occupies less floor space and has nearly four times the capacity of any wet concentrator; that it will concentrate ores containing base and refractory metals that ordinarily slime and carry off values; that it effects a saving of values far above the ordinary methods of concentration.





Works, 23 Stevenson St. Office, 230 Post St. SAN FRANCISCO, CAL.

THE MINE AND SMELTER SUPPLY CO.,

DENVER, - - COLORADO.

Mining and Milling Machinery and Supplies.

We beg to call your attention to

THE FINLAYSON PATENT WIRE ROPE TRAMWAY—

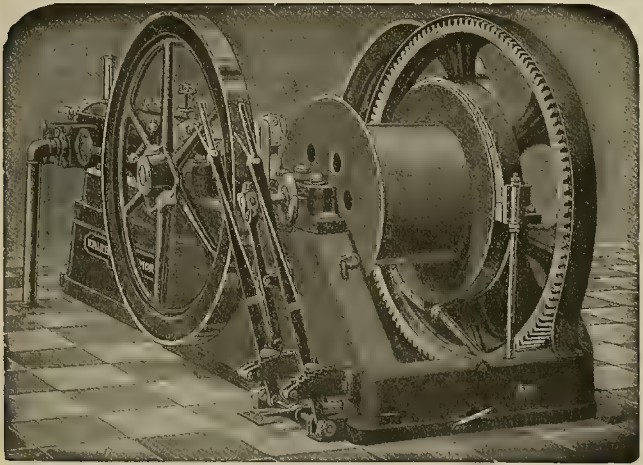
the latest and best system of double-rope automatic aerial tramway in the market.
If interested in the most economical system of transporting ores from mine to mill and to shipping stations, send for our special tramway catalogue.

We carry a complete stock of Machinery and Supplies for immediate delivery.

Send for our special catalogues on Mining Machinery, Milling Machinery, Wilfley Concentrators, Tramways, Power Transmission Machinery, Machine Tools, Etc.

THE MINE AND SMELTER SUPPLY CO.,....................Denver, Colorado
THE MINE AND SMELTER SUPPLY CO.,..............Salt Lake City, Utah
THE MEXICO MINE AND SMELTER SUPPLY CO.,
No. 16 San Francisco St., City of Mexico.

BOILERS, ENGINES, STEAM HOISTERS, ELECTRIC HOISTERS, ROLLS, CRUSHERS, WILFLEY TABLES, CARS, CAGES, ORE BUCKETS, RAIL, PIPE, FITTINGS, BELTING, ETC., ETC.



FAIRBANKS-MORSE GASOLINE-DISTILLATE GEARED HOISTER.

An efficient and reliable combination of a Fairbanks-Morse Gasoline-Distillate Engine on the same base with a Friction Hoist. Modern and up to date. We publish a special catalogue describing our Hoister which we gladly mail prospective purchasers.

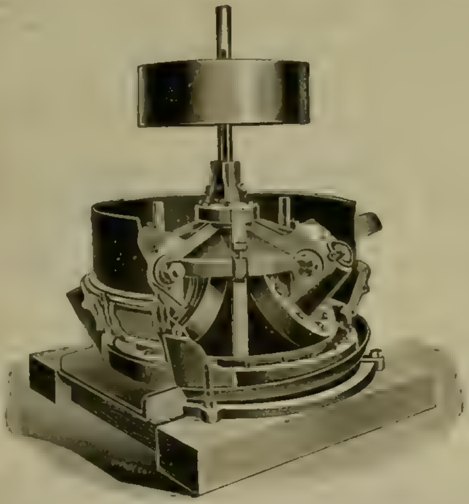
FAIRBANKS-MORSE GASOLINE-DISTILLATE ENGINES.

ALL SIZES UP TO AND INCLUDING 54 HORSE POWER.
For Pumping, Milling, Lighting, Air Compressors, Etc.

FOR CATALOGUES AND FULL INFORMATION, ADDRESS

FAIRBANKS, MORSE & CO.,

310 MARKET ST., SAN FRANCISCO, CAL.
201 N. LOS ANGELES ST., LOS ANGELES, CAL.
FIRST AND STARK STS. PORTLAND, OGN.
1600 SEVENTEENTH ST., DENVER, COL.
FRANKLIN AND MONROE STS., CHICAGO, ILL.



THE GRIFFIN
THREE ROLLER
ORE MILL.

The Griffin Three Roller Ore Mill is a simply constructed Mill, suitable for working all kinds of ores that require uniformly fine crushing by the wet process. This Mill is a modification of the well-known Chilian Mill, but the rollers run upon a crushing ring or die, which is inclined inwardly at an angle of about 30 degrees, the rollers themselves also being inclined to the central shaft of the Mill, thus utilizing the centrifugal force, as well as the weight of the rollers themselves as a crushing agent. The Griffin Three Roller Ore Mill is therefore a Mill of great strength, and has few wearing parts. We construct these Mills with extreme care, using only the best of raw materials, which are most carefully worked by men who are specialists as mill builders. We sell the Griffin Ore Mill on its determined merits, and will gladly supply full information regarding it to any one.

SEND FOR FREE ILLUSTRATED AND DESCRIPTIVE CATALOGUE TO

Bradley Pulverizer Co., Boston, Mass.

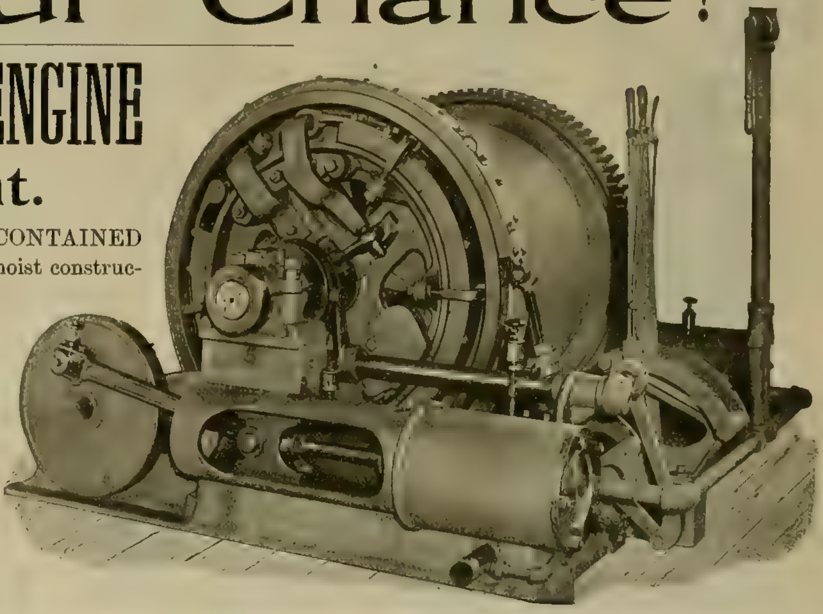
Here is Your Chance!

A MAGNIFICENT HOISTING ENGINE

For Immediate Shipment.

We are prepared to ship from stock this HEAVY DUTY, SELF-CONTAINED ENGINE, in which are combined the most desirable features of modern hoist construction. Read the following specifications:

DOUBLE CYLINDERS, 13″ BORE, 15″ STROKE.
SINGLE DRUM 72″ DIA., 48″ FACE,
CUT GEAR—RAWHIDE PINION,
SHIPPING WEIGHT, 28,000 POUNDS.



THE HENDRIE & BOLTHOFF
M'F'G & SUPPLY CO.,

No. 36. DENVER, COLORADO.

Westinghouse

WESTINGHOUSE ELECTRIC
THE NAME WESTINGHOUSE IS A GUARANTEE

Electric Apparatus

Westinghouse Electric
& Manufacturing Co.,
Pittsburg, Pa.

All Principal Cities
in U. S. and Canada.

Mills Building,
San Francisco.

65d

AARON'S ASSAYING, PART I.

FOURTH EDITION.

Revised, Rewritten, New, Improved.

This practical treatise on assaying has long been the favorite among practical men. The new edition, just out, is up to date. Price $1, postpaid anywhere.

Book Dept., Mining and Scientific Press,
330 MARKET ST., SAN FRANCISCO, CAL.

THE BUCYRUS COMPANY,

DESIGNERS AND BUILDERS OF
DREDGES, STEAM SHOVELS, EXCAVATING MACHINERY,
WRECKING CARS, LOCOMOTIVE CRANES, PILE DRIVERS,
CENTRIFUGAL PUMPS, WITH SIMPLE, COMPOUND OR TRIPLE
EXPANSION ENGINES,
MACHINERY FOR PLACER MINING.
SOUTH MILWAUKEE, WISCONSIN.

MINE BELL SIGNALS.

Adopted, Used and in Force in Accordance with Law.

We print in legal size, 12x36 inches, the Mine Bell Signals and Rules provided for in the Voorhies Act passed by the California Legislature. The law is entitled "An Act to Establish a Uniform System of Bell Signals to Be Used in All Mines Operated in the State of California, for the Protection of Miners." We furnish these Signals and Rules, printed on cloth so as to withstand dampness. 50 Cents a Copy.

MINING AND SCIENTIFIC PRESS, 330 Market St., San Francisco, Cal.

RISDON IRON WORKS,

SAN FRANCISCO, CALIFORNIA.

Cable: "Risdon's." Code: A. B. C. & Leiber's.

MANUFACTURERS OF

Gold Dredging Machinery

And COMPLETE EQUIPMENT for Placer Mines
OUR SPECIALTY.

We build **GOLD DREDGES COMPLETE IN RUNNING ORDER** to handle 2500 cubic yards per day at a cost of 3 cents per cubic yard.

We excavate 50 feet below water, 20 feet above water and handle boulders up to one ton weight.

Send for Dredging Catalogue No. 17.

—WE ALSO BUILD—

All kinds of Mining, Milling, Concentrating, Pumping, Air Compressing, Hydraulic, Water Wheel and Hoisting Machinery.

EVANS HYDRAULIC GRAVEL ELEVATORS.

We publish sixteen catalogues. Write for one in the line you are interested in.

THE RISDON HAMMERED SHOES AND DIES.

Manufactured from the best quality of projectile steel—which is stronger and tougher than any heretofore used—the best shoe and die ever made. Will crush more ore per pound of steel than any other. Will not chip or cup and will outcrush any other made. Wear smooth and true with hardly any perceptible decrease in their size, and those who use them say, "We never had shoes and dies wear so long." Send for circulars and dimension blanks to

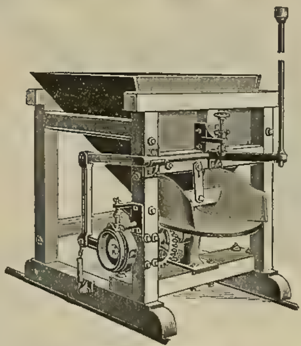
RISDON IRON WORKS, San Francisco, Cal.

THE EDWARD P. ALLIS COMPANY,

RELIANCE WORKS,
MILWAUKEE, - WIS.

BLAST FURNACES.

AMALGAM CARS,
SILVER RETORT FURNACES,
REFINING FURNACES,
DESILVERIZING PLANTS,
SLAG POTS AND TRUCKS.



ORE FEEDER.

BLAST FURNACES
— FOR —
SILVER, LEAD AND COPPER ORES.

REYNOLDS CORLISS ENGINES.

WRITE FOR PRICES.

GENERAL ELECTRIC COMPANY,

SAN FRANCISCO, CAL.,
Claus Spreckels Building.

DENVER, COL.,
Kittredge Building.

PORTLAND, OR.,
Worcester Building.

SALT LAKE CITY, UTAH,
Templeton Building.

— MANUFACTURES THE —

Standard
Electric
Mining
Apparatus
OF THE WORLD.

Mines Operated by Our Apparatus are Operated Economically, Safely and Satisfactorily.

ADAMANTINE SHOES AND DIES.

◆◆◆◆◆CHROME CAST STEEL.◆◆◆◆◆

CANDA Improved Self-Locking CAMS.

TAPPETS, BOSSES, ROLL SHELLS AND CRUSHER PLATES.

These castings are extensively used in all the mining States and Territories of North and South America. Guaranteed to prove better and cheaper than any others. Orders solicited subject to the above conditions. When ordering, send sketch with exact dimensions. Send for Illustrated Circular.

Manufactured by **CHROME STEEL WORKS,** Brooklyn, N. Y.

H. D. & H. W. MORRIS,
AGENTS,
Room 194 Crocker Building, San Francisco, Cal.

Canda Cam.

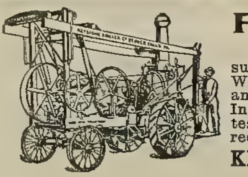
GENERAL PHOTO-ENGRAVING CO.

[SUCCESSORS TO DEWEY ENGRAVING CO.]

FINE ZINCOGRAPHS, HALF-TONES, AND DESIGNING.
ENGRAVINGS OF MACHINERY OUR SPECIALTY.

SEND FOR SAMPLES AND PRICES.
TELEPHONE BLACK 1466.

NO. 536 CLAY STREET,
SAN FRANCISCO, CAL


KEYSTONE DRILLER CO BEAVER FALLS PA.

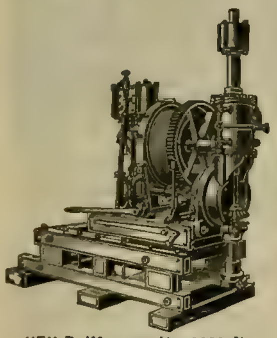
Prospecting Machinery.

Multitudes in use for testing for minerals. Sizes and equipments to suit any and all conditions. Unexcelled for Placer Testing, Oil Wells, Water Wells, testing for Lead and Zinc, Iron and Coal; goes through anything; brings up everything. Large sizes drill as much as 1500 feet. In use all over the world. Every purchaser pleased. Used on boats for testing river and lake beds. Water no hindrance. No skilled labor required.

KEYSTONE DRILLER CO., Beaver Falls, Pa., U. S. A.

"GIANT" DRILLS AND COMPRESSORS
ARE THE BEST.
"GIANT" BABY DRILLS CHEAPEN MINING.
WRITE US FOR PARTICULARS.
THE COMPRESSED AIR MACHINERY CO., 11-13 First St., San Francisco, Cal.

SULLIVAN



"N" Drill, capacity 2000 ft.
Cable Address, Diamond, Chicago.
Codes: A. B. C., 4th Edition. Postal Directory. Western Union. Liebers.

Diamond Core Drills
FOR PROSPECTING. Catalogue 29.
The most extensive line of sizes and styles ever offered.
CONTRACTORS FOR PROSPECTING WITH DIAMOND DRILL.
ROCK DRILLS
FOR MINING. Catalogue 30.
Superior valve and ratchet motions. The highest possible grade.
Send for Our New Catalogues.
Sullivan Machinery Co.,
New York. Pittsburg. Claremont, N. H.
Main Office, CHICAGO......................54 to 60 N. CLINTON ST.
Western Office, DENVER..................332 SEVENTEENTH ST.
Pacific Agency, SAN FRANCISCO, HENSHAW, BULKLEY & CO.

Established 1837.
I. C. Yawger,
Successor to VICTOR BISHOP & CO.
IMPORTER OF CARBONS FOR DIAMOND DRILLS.
21 Maiden Lane, - NEW YORK.

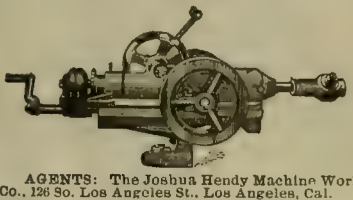
DIAMOND DRILLS
FOR PROSPECTING.
AMERICAN DIAMOND ROCK DRILL CO.
120 LIBERTY ST N.Y.

THEODOR LEXOW, 14 JOHN STREET, N.Y.
......Importer of......
CARBONS
(BLACK DIAMONDS)
For DIAMOND DRILLS and all Mechanical Purposes.
HENRY DEMMERT.

RAND ROCK DRILLS and Drill Mountings.

HIGHEST DEGREE OF PERFECTION ATTAINED. ∴ INDISPENSABLE IN MINING, TUNNELING & EXCAVATING.
AIR —AND— Gas COMPRESSORS.
STANDARD TYPES! SPECIAL PATTERNS! ALL SIZES!
RAND DRILL CO., 100 BROADWAY, New York, U. S. A.
San Francisco Office: 223 First St.
1328 Monadnock Blk., CHICAGO, ILL.

THE JACKSON HAND POWER ROCK DRILL.



Works in Any Rock, in Any Position.
Write for Circulars and References.
THE JACKSON DRILL & M'F'G CO.,
1756 Larimer Street, DENVER, COLO.
Sole Licensees for all Foreign Countries and Eastern United States: THORNTON N. MOTLEY COMPANY (INC.), 43 John St., New York.
AGENTS: The Joshua Hendy Machine Works, 38 Fremont St., San Francisco, Cal.; Chas. B. Boothe & Co., 126 So. Los Angeles St., Los Angeles, Cal.

FIRTH'S DRILL STEEL,
16 cents per pound.
The best drill steel on the market. Has no equal for hard rock drilling. Miners cannot afford to use an inferior steel when FIRTH'S can be bought at the above price.
Abner Doble Company, Gen. Agts.,
Fremont and Howard Sts., SAN FRANCISCO, CAL.

CANTON STEEL COMPANY,
—— Manufacturers of ——

CANTON DRILL STEEL.

UNEQUALED FOR TOUGHNESS AND ROCK-CUTTING QUALITIES. WRITE FOR 1900 STEEL LIST, CONTAINING ENDORSEMENTS AND USEFUL INFORMATION.
Works: CANTON, OHIO. Branch Warehouse: DENVER, COLO.

ANY BOOK
ON ANY SUBJECT
Connected with Mining, Metallurgical, Mechanical or Industrial Interests,
WILL BE SENT ANYWHERE, POSTPAID,
AT PUBLISHER'S PRICES.
SEND FOR CATALOGUE OF LINE DESIRED.
ADDRESS BOOK DEPT. MINING AND SCIENTIFIC PRESS,
NO. 330 MARKET STREET, SAN FRANCISCO, CAL.

BULLOCK DIAMOND DRILLS
If you are interested in prospecting send for our new Diamond Drill Catalogue (No. 33).
BULLOCK MINING MACHINERY
PORTABLE HOISTS—Send for our new Catalogue (No. 40). CHAMPION MINE VENTILATORS—Send for our new Catalogue (No. 35).
HOISTING AND HAULAGE PLANTS, ORE CARS, SKIPS, CAGES, ETC., ETC.
PARKE & LACY CO., Agent,
21 & 23 Fremont St., San Francisco, Cal.
M. C. BULLOCK MFG. CO.,
1172 West Lake St., Chicago, Ill., U. S. A.

JEFFREY SPECIALTIES.

FOR MINE, MILL, FACTORY AND POWER PLANT.

We manufacture: Chains (Standard and Special), Sprocket Wheels, Elevator Buckets, Bolts, Boots, Coal and Coke Crushers, Dump Cars, Skip Cars, Columbian Separator (for Treating Cement, Cement Clinkers, Broken Ores, Marble, etc.), Coal Washing Machinery, Cable Conveyors, Spiral Conveyors, Labor Saving Appliances in General.

For Catalogue, Address

THE JEFFREY MFG. CO., Columbus, Ohio.
Western Branch, Equitable Bdg., Denver, Colo.

QUARTZ SCREENS

A specialty. Round, slot or burred slot holes. Genuine Russia Iron, Homogeneous Steel, Cast Steel or American planished Iron, Zinc, Copper or Brass Screens for all purposes. CALIFORNIA PERFORATING SCREEN Co., 145 and 147 Beale St., S. F.

Mining Screens

A SPECIALTY.

Diagonal Slot,
Straight "
Burred "
Round Holes.

In American planished or Russian iron or steel for all purposes. GEO. WIMMER, 312 Iowa Street, San Francisco. Telephone Mint 1332.

—EASTERN PRICES BEATEN.—

SAN FRANCISCO Pioneer Screen Works,

JOHN W. QUICK, Prop.

Improved Facilities! Finest Work! Lowest Prices!

Perforated Sheet Metals, Steel, Russia Iron, American Planish, Zinc, Copper and Brass Screens for All Uses.

MINING SCREENS A SPECIALTY.

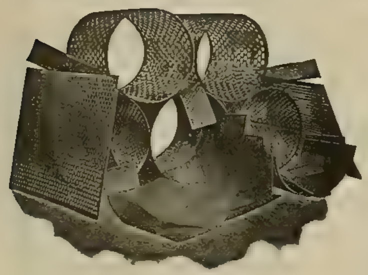
221 and 223 First Street, San Francisco, Cal.

For Best Satisfaction and Lowest Prices

— IN —

PERFORATED METALS

— AND —



MINING SCREENS

PLACE YOUR ORDERS WITH

Fraser & Chalmers,

CHICAGO, ILL., U. S. A.

SEND FOR SAMPLES, MENTIONING THIS PAPER.

COLORADO'S GOLD

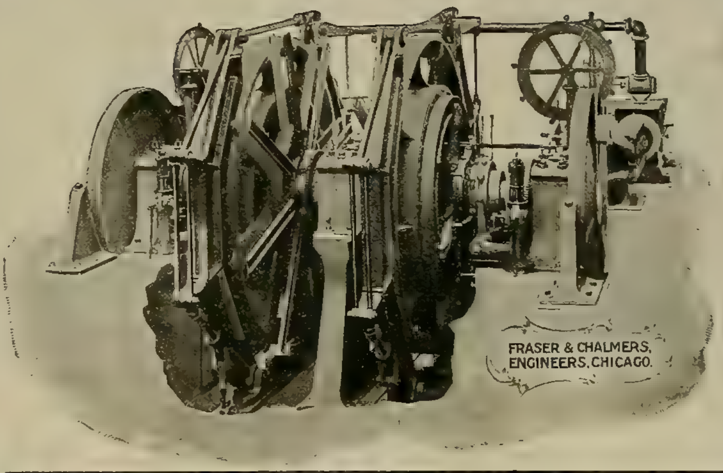
Output for 1899 is unequaled by any State in the Union. Cripple Creek, Leadville, and all the important mining towns are reached by

THE COLORADO & SOUTHERN RY...

For copies of our publications on the Swandyke and Pine Creek Gold Districts, or our pamphlet "Hints to Prospectors," address

T. E. FISHER, GEN. PASS. AGT., DENVER, COLO.

HOISTING ENGINES IN GREAT VARIETY ARE DESCRIBED IN FRASER & CHALMERS



NEW EDITION
CATALOGUE NO. 2.

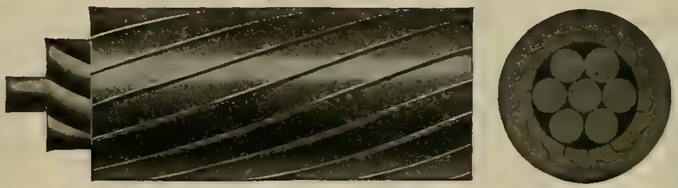
When you are thinking about putting in a new hoist
Get their catalogue,
Get their quotations,
Give them a fair opportunity to supply you with a fine machine.

Fraser & Chalmers,
Chicago, Ill.

See those wires—how they interlock? Note the smooth surface also.
No displacement of wires in any event. Gives much greater service than other cables, and adds correspondingly to the life of the rolling stock.

—THE PATENT—

Locked-Coil Track Cable



Is Used only on the Patent

BLEICHERT WIRE ROPE TRAMWAY,

and Others Manufactured by

THE TRENTON IRON COMPANY, Trenton, N. J.

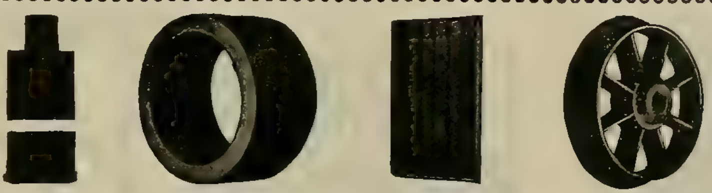
ENGINEERS AND CONTRACTORS,

And Sole Licensees in North America for the Bleichert System. Also, Wire Rope Equipments for Surface and Underground Haulage, Transmission of Power, Etc. Illustrated Book Upon Application.

For Particulars, Address, **NEWTON M. BELL, Agent, 308 Market Street, San Francisco.**

☞ A full stock of the Trenton Iron Co.'s Wire Ropes, made from "SPECIAL" Crucible and Plough Steel, carried in San Francisco.

HARD ☘



TOUGH

TAYLOR IRON AND STEEL COMPANY,

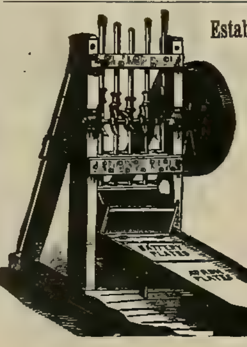
HIGH BRIDGE, NEW JERSEY, U. S. A.

Sole Licensees in America under the HADFIELD System and Patents for **MANGANESE STEEL,**

Best Metal Known for Roll Shells, Stamp Shoes and Dies, Crusher Plates and Side Liners, Toggles and Toggle Bearings, Gyratory Cones and Concaves, or Liners, Mine Car Wheels, Coal Crushing Rolls, Etc.

PACIFIC COAST PARTIES INTERESTED PLEASE ADDRESS PARKE & LACY CO., SAN FRANCISCO, CAL.

WRITE FOR INFORMATION AND PRICES.



Established 1865. **NOTICE TO GOLD MINERS.** Incorporated 1890.

Silver-Plated Copper Amalgamated Plates

FOR SAVING GOLD

IN QUARTZ, GRAVEL OR BEACH MINING. MADE OF BEST SOFT LAKE SUPERIOR COPPER.

AT REDUCED PRICES.

Our Plates are guaranteed, and by actual experience are proved, the best in weight of Silver and durability. Old Mining plates replated, bought, or gold separated. THOUSANDS OF ORDERS FILLED.

SAN FRANCISCO NOVELTY AND PLATING WORKS,

☞ SEND FOR CIRCULARS. Telephone Main 976. **68, 70, 72, 74 and 76 FIRST STREET, COR. MISSION, SAN FRANCISCO, CAL.**

The "Stop for Repairs" to Mining Machinery,

Especially if it is a conveying plant, is a considerable item of expense. Many of these expensive pauses are made to repair or adjust faulty belting. To economize in this respect, use the

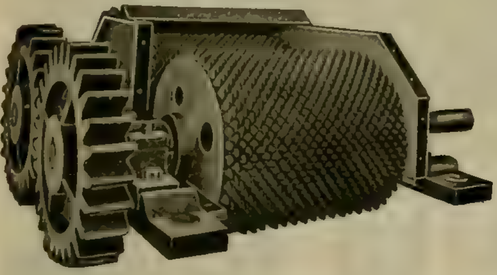
LEVIATHAN CONVEYOR BELT.

It is not only adapted to the heaviest service, but will run under any conditions in underground, drippings, extreme heat or cold.

IT WILL OUTLIVE ANY OTHER BELTING.

MAIN BELTING COMPANY,
1225-41 Carpenter Street, Philadelphia.
55-57 Market St., Chicago. 120 Pearl St., Boston.
SEND FOR PRICE LISTS AND SAMPLE.

LINK-BELT ELEVATORS —AND— CONVEYORS.



BREAKER ROLLS,
PICKING TABLES,
MALLEABLE IRON BUCKETS,
SHAFTING, PULLEYS,
GEARING, CLUTCHES, Etc.
Catalogue Upon Application.

LINK-BELT MACHINERY CO.,
Engineers, Founders, Machinists,
CHICAGO, U. S. A.
DENVER, 1328 17th St.,
A. E. LINDROOTH, Manager.

ROBINS BELT CONVEYORS

HANDLE
ORE, GRAVEL, TAILINGS, DREDGINGS.

Cut shows belt conveyor carrying 1200 tons per hour of rock and gravel from dredger on Danube river.

ROBINS CONVEYING BELT CO.,
Park Row Building, NEW YORK.

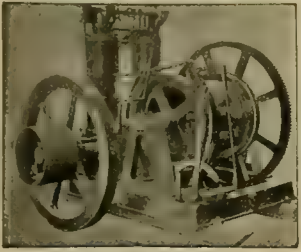
STEEL RAILS, TRACK FIXTURES,

PRODUCT PENNSYLVANIA STEEL COMPANY.

BAR, SHEET AND BOILER STEEL,

STRUCTURAL MATERIAL,
Cold Rolled Shafting.

GEORGE W. GIBBS COMPANY,
33-39 Fremont Street, 38-40 Beale Street,
CORRESPONDENCE SOLICITED. SAN FRANCISCO, CAL.



Mining Hoist.

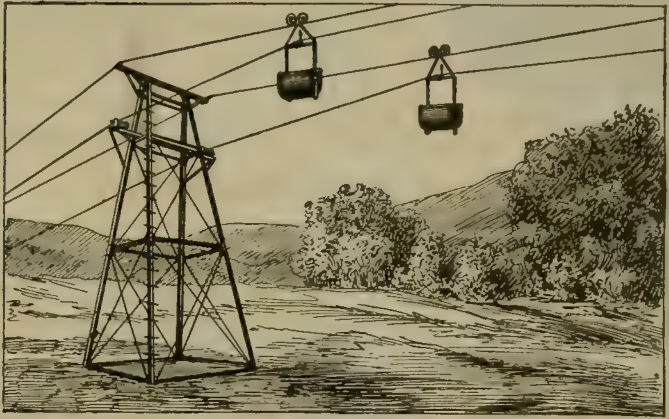
THE GOLDEN GATE GAS ENGINE
Will raise more ore than any other AT LESS COST.
MANY IN USE, Giving Satisfaction.
Built for any Capacity and for any Purpose.
Pumping Water, Propelling Boats, Hoisting Ore, Machine Shop Power, Etc.
Send for Particulars and Catalogue.

ADAM SCHILLING & SONS,
213 & 215 Main St., San Francisco, Cal.

VULCAN DOUBLE ROPE TRAMWAYS.

VULCAN ROPEWAYS (SINGLE ROPE SYSTEM).

AUTOMATIC LOADING AND DUMPING APPLIANCES



AND OTHER ROPE HAULAGE SYSTEMS.

SEND FOR CATALOGUE.

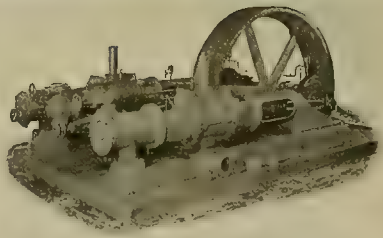
Vulcan Iron Works, Manufacturers of Mining Machinery, SAN FRANCISCO, CALIFORNIA.

P & B Building Paper..

A perfect insulation for cold storage houses and refrigerators.
Unequaled in residence construction.
A protection against heat, cold, dampness, dust, draught and vermin.
Demand it of your dealer — you need it in your buildings.
Paraffine Paint Co — 116 Battery, San Francisco

Figure 152 represents our
DUPLEX STEAM ACTUATED

AIR COMPRESSOR.



Steam Cylinder Outboard and Detachable.
Can be run as a Power Machine also.
We also build Steam and Power Pumps for Mines.
If interested, address
THE STILWELL-BIERCE & SMITH-VAILE CO.,
276 Lehman St., DAYTON, OHIO, U. S. A.

T.P. G.W.P. J.P. E.P.
PENNINGTON
TRADE MARK
SAN FRANCISCO, CAL.

OUR SPECIALTIES ARE:
Hammered Steel Shoes and Dies,
Cam, Crank and Steamboat Shafts,
Rock-Breaker Plates,
Connecting Rods, Well-Boring Tools,
General Blacksmithing.

Correspondence Solicited, and Circulars Mailed Upon Request.

GEO. W. PENNINGTON & SONS,
218 and 220 Folsom St.,............San Francisco, Cal.

GATES IRON WORKS.

HIGH GRADE CRUSHING ROLLS.

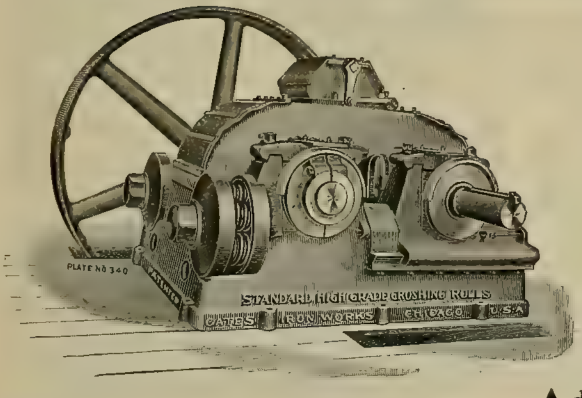


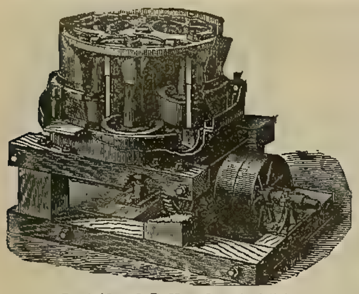
PLATE NO 340
STANDARD HIGH GRADE CRUSHING ROLLS
GATES IRON WORKS CHICAGO U.S.A.

UNEQUALED IN ECONOMY FOR CRUSHING ORES DRY.

Extensively used in connection with Gates Rock and Ore Breakers, Ball Mills and Tube Mills in Cement Plants for very fine pulverizing. : : : : : : : :

BUILDERS OF ROCK AND ORE CRUSHING MACHINERY.

SEND FOR CATALOGUE NO. 5. Address Dept. UU, 650 ELSTON AVE., CHICAGO.

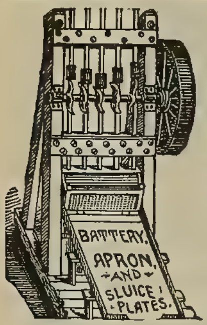

Centrifugal Roller Quartz Mill.

F. A. HUNTINGTON,

—Manufacturer of—

CENTRIFUGAL Roller Quartz Mills.

CONCENTRATORS and ORE CRUSHERS.
Mining Machinery of Every Description
Steam Engines, Shingle Machines.
Room 1, 3d Floor, Mills Building
SAN FRANCISCO, CAL.



To Gold Miners!

Silver Plated Copper Amalgamating Plates

For Saving Gold in Quartz and Placer Mining.

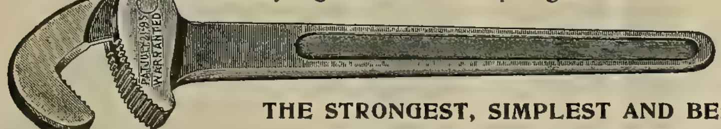
ONLY BEST COPPER AND REFINED SILVER USED. OLD MINING PLATES BOUGHT OR TAKEN IN EXCHANGE FOR NEW PLATES. GOLD EXTRACTED FROM OLD PLATES AT A MODERATE COST. OLD PLATES REPLATED. GOLD, SILVER, NICKEL, COPPER AND BRASS PLATING.

Denniston San Francisco Plating Works,
652 Mission Street, Cor. Annie, San Francisco, Cal.
E. G. DENNISTON, ... Proprietor.
—:Send for Circular.:—

OUR 24-INCH WRENCH IS ESPECIALLY ADAPTED FOR MINE WORK.

The Johnston Patented Pipe Wrench.

A Strictly High-Grade Tool---Drop-Forged---Warranted.



THE STRONGEST, SIMPLEST AND BEST.
Never Jams, Self-Adjusting, Self-Releasing.

MADE IN 3 SIZES:

	10 in.	16 in.	24 in.
Pipe	⅛ to 1 in.	¼ to 1½ in.	½ to 2½ in.
List	$2 25	$3.00	$6 00

WM. B. VOLGER,
SOLE MANUFACTURER,
88 Chambers St , NEW YORK.

Agencies: THE MINE & SMELTER SUPPLY CO., Denver and Salt Lake City.

TRADE MARK.
(M'ARTHUR-FORREST PROCESS.)

CYANIDE PROCESS.

The MacArthur-Forrest Cyanide Process is the Best

For the Treatment of Refractory and Low Grade Gold and Silver Ores and Tailings. We are the Originators of the Cyanide Treatment, and have kept up with the times in all Improvements in Cyanide Methods.

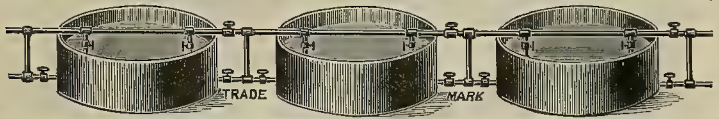
Successful Plants in Operation in all Western Mining States.

Samples Assayed and Fully Reported Upon. Properties Examined Designs Furnished. For Terms and Particulars, Address

The Gold and Silver Extraction Co. of America, Ltd.
GEO. A. ANDERSON, General Manager,
208-210 McPhee Building, Denver, Colo.
Testing Works: 1716 Blake Street, Denver, Colo.
ALMARIN B. PAUL, Agent, 27 Crocker Building, San Francisco, Cal.

"PNEUMATIC" CYANIDE PROCESS.

(Patented in U. S., So. African Republic, New Zealand, Victoria, New So. Wales, So. Australia.)



WILL DO IN 7 HOURS WHAT REQUIRES FROM 2 TO 6 DAYS BY OLDER METHODS.
SEND FOR PAMPHLET.
THE PNEUMATIC CYANIDE PROCESS CO., 306 Boston Bldg., Denver, Colo.

CARY SPRING WORKS,

240 & 242 WEST 29th STREET, NEW YORK, U. S. A.
Telephone, 3346—38th St.

WIRE SPRINGS
OF EVERY DESCRIPTION.

MANUFACTURERS OF
All kinds of ROUND AND FLAT WIRE, TEMPERED AND UNTEMPERED.
SPRINGS
For Machinery, Rolling Shutters, Motors, Etc.

MUSIC BOX AND FINE SPRINGS OUR SPECIALTY.

THE ROBERT AITCHISON PERFORATED METAL CO.
305 TO 305 DEARBORN ST. CHICAGO, ILL.

SMOOTH-ON CASTINGS.

TRADE MARK

An iron cement for repairing leaks or fractures in steam or hydraulic work. When hard it will withstand a red heat, steam, water or oil, and expands and contracts with heat and cold the same as iron, insuring a tight joint at all temperatures. Difficult flange connections can easily be made with Smooth-On, as it adapts itself to the flanged faces whether parallel or not. Connections are easily taken apart. Unequaled for boiler patching, and repairing blemishes in iron castings. Write for catalogue and prices. Sole proprietors and manufacturers: Smooth-On Mfg. Co., Jersey City, N. J., U. S. A.

MESSRS. MADISON, BRUCE & SELLERS,
34-36 STEUART ST., SAN FRANCISCO, CAL.......................AGENTS FOR PACIFIC COAST.

THE

Pelton Water Wheel Company

Gives exclusive attention to the development and utilization of water powers by the most modern, economic and improved methods. An experience of more than fifteen years, involving both the theory and practice of hydraulic engineering as relates to power development in its widest range of application, is at the service of its customers.

Nine Thousand Wheels Now Running,

Averaging some 700,000 H. P.

ELECTRIC POWER TRANSMISSION.

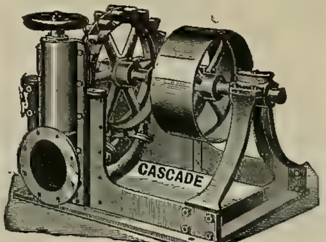
Pelton wheels afford the most reliable and efficient power for such service and are running the majority of stations of this character in the United States, as well as most foreign countries. Highest efficiency and absolute regulation guaranteed under the most extreme variations of load.

The Pelton Water Wheel Company,
121 & 123 MAIN STREET, SAN FRANCISCO, CAL.

TURBINE AND CASCADE WATER WHEEL

Adapted to all Heads from

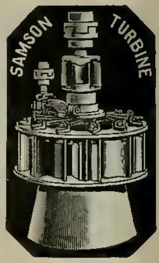
3 Feet to 2000 Feet.



Our experience of 38 YEARS building Water Wheels enables us to suit every requirement of Water Power Plants. We guarantee satisfaction.

State your Head and requirements. Send for pamphlet.

JAMES LEFFEL & CO.
SPRINGFIELD, OHIO, U. S. A.



McFARLANE & CO.,

1734 FIFTEENTH ST., DENVER, COLO.

Mining and Milling Machinery.

STAMP AND CONCENTRATING MILLS BUILT AND ERECTED.

STEAM AND ELECTRIC HOISTS, CRUSHERS, ROLLS, REVOLVING SCREENS, JIGS. ORE CARS, CYANIDE TANKS, CORNISH PUMPS, CORLISS ENGINES.

THE WM. HAMILTON MANUFACTURING CO.,
LIMITED,

MINING MACHINERY,

PETERBOROUGH, ONTARIO,

CANADA.

SULPHURIC ACID

MANUFACTURED BY
THE WESTERN CHEMICAL CO.
DENVER, COLO.

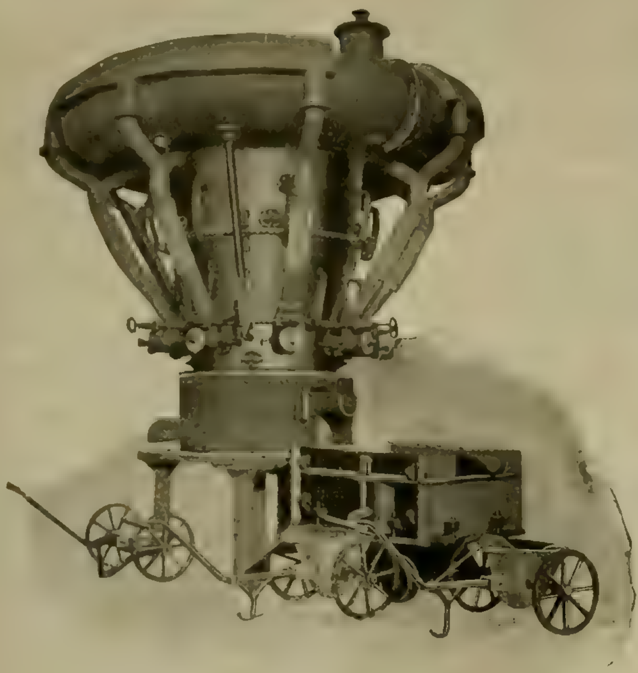
For Chlorination, Refining and other processes. Also Muriatic and Nitric Acids, Blue Vitriol, Copperas Commercial and C. P. Our chemically pure Acids and Ammonia are guaranteed perfect.

Aaron's Assaying, PARTS II and III.

THIRD EDITION---REVISED AND REWRITTEN.

The Third Edition of Parts II and III of this great work on assaying is now ready; new type; new illustrations; new matter; better than ever; reduced in price to $1.50 postpaid to any part of America. The practical character of this book has made it the favorite everywhere in the mining world among men who want such a manual on assaying.

Address Book Dept. Mining and Scientific Press,
330 MARKET ST., SAN FRANCISCO, CAL.



THE COPPER FURNACE

Here illustrated has OUR PATENT

WATER VAPORIZING ATTACHMENT.

Experience has proven this to be the best of all methods for applying water for the cooling of jackets. It has the further great advantage of using only about one-eighth the usual amount of water needed for that purpose, and all jackets are kept at the same temperature.

We Manufacture Smelting Furnaces and Equipments

FOR THE TREATMENT OF

GOLD, SILVER, LEAD, COPPER and NICKEL ORES.

of any desired tonnage capacity above forty tons per day, and put them into successful operation under guarantee. Write for catalogue showing different styles of furnaces.

We also design, manufacture and erect Smelter Sulphide Mills for crushing and sampling ores. We are the originators of the Narrow Face, Large Diameter, High Speed Crushing Rolls. A full description of our Crushing Machinery is given in a special catalogue, which will be sent on application.

THE COLORADO IRON WORKS CO.

ESTABLISHED
1860.

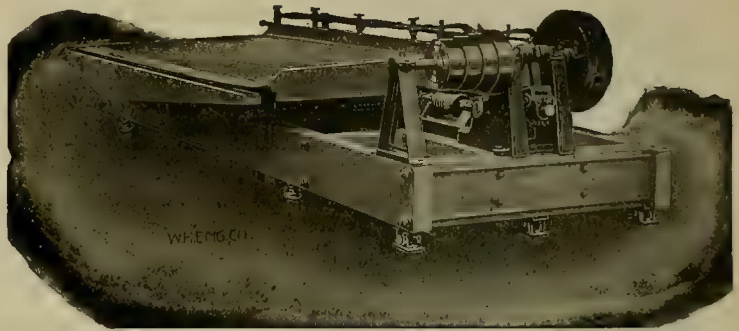
DENVER, COLO., U. S. A.

THE : CAMMETT : CONCENTRATOR.

Designed with some Regard for the Laws of Concentration.

From The Denver Evening Post, July 15th, 1900.

* * * "Now about concentrating tables. Here's a fellow who says there's nothing equal to the Wilfley, and I am trying to convince him that old man Woodbury over in California makes the finest table in the world." "No, sir," said his comrade, "you're way off. I've tried the CAMMETT too thoroughly to believe there's anything made to equal it."



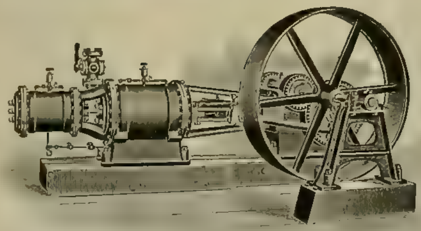
Manufactured Under U. S. Patent No. 632,892; Dated Sept. 12, 1899.

Denver Engineering Works,---Shepard & Searing,---Sole Manufacturers,

30th and Blake Streets, - - - - DENVER, COLORADO.

WHY NOT have our catalogues, specifications and prices before you purchase

AIR DRILLS OR COMPRESSORS?



Our guarantees are strong; our customers are satisfied. We can satisfy YOU.

J. Geo. Leyner,
729 Seventeenth St.,
DENVER, COLO.

FOR CYANIDE PLANTS OR MINING—TANKS

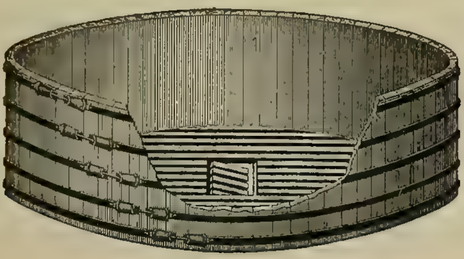
OF ANY DESCRIPTION.

Write to

PACIFIC TANK CO.,

348 E. 2nd Street, Los Angeles.
35 Beale Street. San Francisco.

Illustrated Catalogue Mailed Free.



The Best MINE PUMPS in the World.

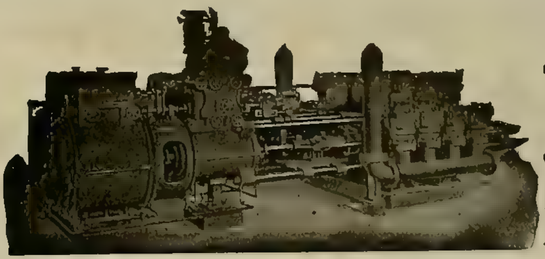
COMPOUND CONDENSING AND TRIPLE EXPANSION STATION PUMPS.

We carry in our Denver store a stock of Improved Pattern Sinkers and Duplex Station Pumps, with duplicate parts for repairs.

Write for Catalogue and Estimates.

Jeanesville Iron Works Co.,
JEANESVILLE, PA

Western Office,
Columbia Hotel Building,
1328 17th St.
Denver, Colo.
Telephone 2298 A.
A. MIDDLEBROOK, Manager.



SCREENING MACHINERY FOR ALL PURPOSES.

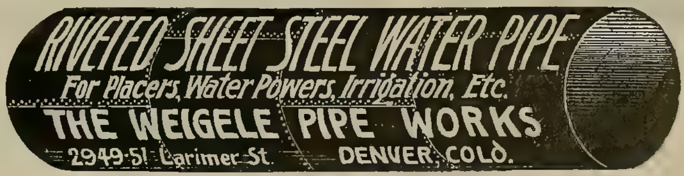
VIBRATORY, SHAKING, REVOLVING, STATIONARY AND MECHANICAL HAND SCREENS FOR ALL MATERIALS.

SCREENS SPECIALLY ADAPTED FOR MINING PURPOSES.

COMPLETE PLANTS ERECTED.

SEND FOR DESCRIPTIVE MATTER.

WESTERN MACHINERY & SUPPLY CO., Engineers and General Machinists,
161 La Salle Street, CHICAGO.



RIVETED SHEET STEEL WATER PIPE
For Placers, Water Powers, Irrigation, Etc.
THE WEIGELE PIPE WORKS
2949-51 Larimer St. DENVER, COLO.

PROFESSIONAL CARDS.

R. H. POSTLETHWAITE, M.I.E.E.
Hydraulic Mining Engineer.
River Dredging for Gold a Specialty.
1315 Leavenworth St........San Francisco, Cal.

THEO. F. VAN WAGENEN, E. M.
Consulting Mining and Hydraulic Engineer.
1508 Fillmore St., DENVER, COLO.

D. B. HUNTLEY,
Mining Engineer and Metallurgist,
De Lamar, Owyhee Co., Idaho.

BERNARD MACDONALD,
Consulting Mining Engineer.
General Manager British America Corporation, Ltd., Rossland, B. C.

DRAPER & McLEOD,
Assayers, Chemists, and Mining Engineers,
1736 CHAMPA STREET,
DENVER.................. ....COLORADO.

JOHN DWYER, Mining Engineer,
MEXICO.
Address 762-17th Street......East Oakland, Cal.

Established 1879.
CHAS. B. GIBSON,
Chemist, Metallurgist and Mining Engineer,
81 CLARK ST., CHICAGO, ILL.

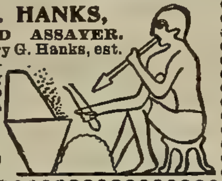
W. C. WYNKOOP, M. E.
Woodbury (Cochiti District),
New Mexico.
Economic Geology and Mine Examinations.

E. H. BENJAMIN, Mining Engineer.
A. M. HUNT, Mechanical & Hydraulic Engineer.
WYNN MEREDITH, Electrical Engineer.
EXPERT EXAMINATIONS. ADVISORY REPORTS.
CONSTRUCTION SUPERVISION
331 Pine Street,...........San Francisco, Cal.
Telephone Main 1870. Cable Address "Edben."

JOHN W. GRAY,
Mining and Hydraulic Work.

Prospecting Operations and Exploration Work.
Examinations, Surveys, Development, Equipment of Mines, Gold-Bearing Gravels, and Water Supplies.
933 Linden St.,.................Oakland, Cal.
Cable "Espra." Correspondence invited.

ABBOT A. HANKS,
CHEMIST AND ASSAYER.
Successor to Henry G. Hanks, est. 1866. The supervision of sampling of ores shipped to San Francisco a specialty.
—531—
California Street,
San Francisco.



RICHARD A. PEREZ, E. M.
Assayer and Analytical Chemist,
120 North Main St., - Los Angeles, Cal.

S. W. TYLER,
Mining and Metallurgical Engineer,
6 Windsor Hotel Block.
Cable: Retyl, Denver. DENVER, COLORADO.

The SPOKANE BUREAU OF MINING,
N. E. LINSLEY, Manager.
SPOKANE, : : WASHINGTON.
Consulting Mining and Milling Engineer.
Will Examine and Report on Mines.

W. J. ADAMS, E. M.,
Mining Engineer and Metallurgist.
Graduate of Columbia School of Mines.
Author of "Hints on Amalgamation," etc., etc.
ROOM 14, 434 CALIFORNIA STREET,
SAN FRANCISCO, CAL.

CLARENCE HERSEY,
Assayer and Chemist,
(Established 1879.) LEADVILLE, COLO.
Gold, Silver and Lead..................$1.00.
Any two of above 75c; any one of above 50c.
Copper analysis...............................$1.00.
Platinum, Nickel or Tin, each..............$5.00.
Twenty-one years successful experience in the mining metropolis of Colorado.
Write for mailing envelopes and price list.

ALMARIN B. PAUL, M. E.,
ROOM 27, CROCKER BUILDING, SAN FRANCISCO.
Will act as AGENT for the sale of RELIABLE Mining Property. SPECIAL AGENT FOR
MacArthur-Forrest Cyanide Process
for California north of and including Mono, Madera and Merced counties; also for State of Nevada. Will act as agent for Eastern parties owning mining interests in California.

F. H. HARVEY,
GALT, CAL.,
Mining and Metallurgical Work in All Branches.
Assays, Chemical Analysis of Ores and experiments on rebellious ores for treatment by cyanide or other processes. Surveys and reports upon mining properties.

COBB & HESSELMEYER,
Designing and Consulting
MECHANICAL AND HYDRAULIC
ENGINEERS.
421 Market St., Cor. First St.,
Telephone BLACK 3882....San Francisco, Cal.

Simonds & Wainwright,
Mining Engineers,
Assayers and Chemists,
159 Front Street,
NEW YORK.

DAVIDGE & DAVIDGE, Attorneys and Counsellors at Law, Corcoran Building, Washington, D. C. Practice in the Supreme Court of the United States, the Court of Claims, the Courts of the District of Columbia, and the General Land Office. Western Union Code.

WM. VAN SLOOTEN,
Consulting Mining Engineer and Metallurgist.
Cable address: "Yadoplata."
35 WALL STREET........... ....NEW YORK, N. Y.

R. J. WALTER,
1452 Blake St., DENVER, COLO.
Mining Engineer and Metallurgist.
Reports on mining properties.
Assay office and chemical laboratory. Established in Colorado 1879.

SAM'L A. RANK,
MINING ENGINEER,
U. S. DEPUTY MINERAL SURVEYOR.
Mine Examinations and Reports.
514 Cooper Building,
DENVER ....COLORADO.

EDWARD L. HAFF,
MINING ENGINEER,
U. S. DEPUTY MINERAL SURVEYOR.
Mine Examinations and Reports.
National Annex Block,
P. O. Box 21. CRIPPLE CREEK, COLO.

FRANK C. MANDELL,
MINING ENGINEER,
U. S. Deputy Mineral Surveyor for Idaho and Oregon.
Mine Examinations, Surveys and Reports.
HAILEY, IDAHO.

ERNEST H. SIMONDS,
Late Instructor in Assaying, University of California.
ASSAYS AND ANALYSES.
LABORATORY TESTS OF ORES.
Special Attention Given to the Instruction of Students.
521 Sacramento St., Cor. Leidesdorff. S. F., Cal.

RALPH E. STEVENS,
ATTORNEY AND COUNSELOR,
43-44 Jacobson Building, DENVER, COLO.
Special attention to examination of titles. Corporation, commercial, mining law. Collections receive prompt attention. Notary in office. Refers to Denver representative of Mining and Scientific Press.

School of Practical Mining, Civil,
Mechanical and Electrical Engineering.
Surveying, Architecture, Drawing, Assaying, Cyanide Process and Metallurgy.
933 Market St., S. F., Cal. OPEN ALL YEAR.
A. VAN DER NAILLEN, President
Assaying of Ores, $25; Bullion and Chlorination Assay, $25; Blowpipe Assay, $10. Full course of Assaying, $50. Established 1864.
☞ Send for Circular.

FRED H. BROWN,
Electrical Mining Expert.
Inventor of the Electro-Geodetic Mineral Locator. Patented March 20, 1900.

Will electrically survey mines and lands for mineral; furnish charts showing run of ore, extensions, pay streaks, and their approximate depth from surface.

References include scientific men, and miners for whom we have located rich mines.

Address, 1025 West 7th St.,
LOS ANGELES, CAL.

Geo. W. Schneider, E. M.,
Mining Engineer,
U. S. Deputy Mineral Surveyor.
Mineral Properties examined and reported on.
Central City. Colorado.

A. F. WUENSCH, M. E.
Inspection and Valuation of Mines.
Ref. D. H. Moffat, Pres. 1st Nat'l Bank, Denver.
827 Equitable Bldg..................Denver, Colo.

DANIEL G. JEWETT,
Metallurgist and Assayer.
Specialty: The Mining and Smelting of Copper or Lead Ores.
P. O. BOX 5, GUFFEY, PARK CO., COLO.

HUDSON H. NICHOLSON,
Consulting Mining Engineer,
Rooms 216 and 217, Boston Building,
DENVER, COLO., U. S. A.
Cable address: Aichen, Denver.
Expert examinations of and advisory reports on mining propositions.
Specialty: The chemical treatment of ores

MINERS' ASSAY OFFICE.
(JNO. HARRIGAN)
10 Stevenson Street, - San Francisco, Cal.
Telephone Clay 972.
Assaying, Analyses, Sampling, Grinding and Pulverizing of all kinds.
Practical Working Tests of Ore by all Processes. Mining Machinery Bought and Sold. Check Assays. Instructions given in Assaying. All Work Guaranteed. Mines Examined, Sampled and Reported on by M. P. BOAG, M. E. and Cyanide Expert.

LOUIS FALKENAU,
STATE ASSAY OFFICE,
434 California St., near Montgomery.
Analysis of Ores, Metals, Soils, Waters, Industrial Products, Foods, Medicines, etc., etc.
Court Experting in all branches of Chemical Technology. Working Tests of Ores and Investigation of Metallurgical and Manufacturing Processes. Consultations on all questions of applied chemistry. Instructions given in assaying and all branches of chemistry.

RELIABLE ASSAYS.

Gold...............	$ .50	Gold and Silver....	$ .75
Lead	.50	Gold, silver, copper	1 50

Samples by mail receive prompt attention.
Rich Ores and Bullion Bought.
OGDEN ASSAY CO.,
1429-16th St., Denver, Colo.

HENRY E. WOOD,
ASSAYER,
1734 Arapahoe St., DENVER, COLO.
Ore Tested in Carload Lots.
Write for Circular.

J. W. RICHARDS,
(Late of Aspen, Colo.)
ASSAYER AND CHEMIST. 1754 Champa Street, DENVER, COLO.
Ore Shippers' Agent. Write for Terms.

CHAS. BUTTERS & CO., Limited.
E. S. LEAVER, Manager.
Ore Testing Works,
Chemical and Metallurgical Laboratory,
Assay Office,
DOOLY BLOCK, - SALT LAKE CITY, UTAH.

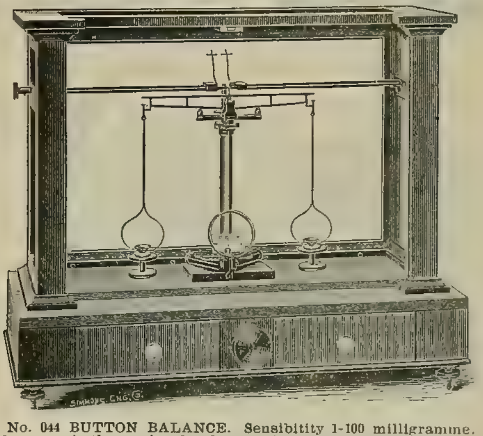
Telephone, MAIN 5104.
Cable Address, LUCKWARD.
—ESTABLISHED 1869.—
A. H. WARD.
C. A. LUCKHARDT CO.,
NEVADA METALLURGICAL WORKS,
71 & 73 STEVENSON STREET, - - - - SAN FRANCISCO, CAL.
Assaying, Analyses, Sampling.
PRACTICAL WORKING TESTS OF ORE BY ALL PROCESSES.
STAMP MILL AND CONCENTRATOR IN OPERATION ON PREMISES.

Thomas Price & Son,
Assay Office, Sampling Works
And Chemical Laboratory.
526 Sacramento Street, San Francisco, Cal.

Operator taking courses or horizontal angles with BRUNTON'S PAT. POCKET MINE TRANSIT.

If you wished to find the angle between two points below the horizontal with a sighting compass or an ordinary transit, you would first have to set up your tripod or staff and then level up your instrument. All this takes time.

If you only wanted to get the angle within a degree or so, you could take a BRUNTON TRANSIT, and, holding it in the position shown, take your readings in less time than you can dlace any other instrument. Send for descriptive catalogue B to



No. 044 BUTTON BALANCE. Sensibility 1-100 milligramme. If you are in the market for the very best balance obtainable at a moderate price, write us for particulars about the No. 044. You will be surprised to find how cheaply it can be purchased for cash. While we cannot recommend this balance for fine gold work, a great many assayers are using it for such successfully. Send for illustrated catalogue A, for complete description and prices, to

WM. AINSWORTH & SONS,
(Successors to WM. AINSWORTH.)
DENVER, COLO., U. S. A.

PACIFIC COAST AGENTS:
JOHN TAYLOR & CO., 63 First St., San Francisco, Cal,
F. W. BRAUN & CO., Los Angeles, Cal.

JAMES ANGUS SNEDAKER,
Mining Engineer,
721-722 Equitable Building, Denver, Colo., U. S. A.

Samples by Mail or Express Will Receive Prompt Attention.
ALBERT I. GOODELL,
ASSAYER AND CHEMIST,
1430 Stout Street……………………DENVER, COLO.

MILL PLANS.
Cyanide, Concentration, Smelting, Sampling.
F. D. BAKER, Mech. Eng., DENVER.

HERMANN J. VAN DIEREN,
Assayer and Metallurgist,
1407 Seventeenth St., DENVER, COLO.

Stamp Mill and Reduction Works: 19th St. and Platte River.

Buyer of every description of Ores and Precious Stones. Rights for sale for process of treating refractory gold ores; also process for treating low grade copper ores. Write for particulars.

Independent Assay Office.
ESTABLISHED 1866.
D. W. Reckhart, E. M., Proprietor.
Agent for Ore Shippers.
Assays and Chemical Analysis.
Mines Examined and Reported Upon.
BULLION WORK A SPECIALTY.
P. O. Box 88. Office and Laboratory:
Cor. SAN FRANCISCO & CHIHUAHUA Sts.
EL PASO, TEXAS.

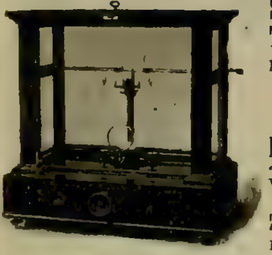
ALVIN PHILLIPS & CO.,
Chemists, Mining and Metallurgical Engineers,
1761 MARKET STREET,
DENVER, - COLO.

Complete Ore-Testing Works — capacity ten pounds to two tons. Modern Methods of Lixiviation, Cyanide and Chlorination. Concentration on Bartlett Table. Assaying and Bullion Refining. Chemical Analyses of Oils, Coal, Water, and all solutions. WRITE FOR PRICES.

Hoskins' Patent Hydro-Carbon Blow-Pipe and Assay Furnaces.

No dust. No ashes. Cheap, effective, economical, portable and automatic.

SEND FOR PRICE LIST TO
W. HOSKINS, 81 South Clark St., Room 55, CHICAGO, ILL.



SMITH & THOMPSON,
Manufacturers of Fine
ASSAY BALANCES.
Write for Catalogue.
2219 Stout St.,
Denver, Colo.

THE ROESSLER & HASSLACHER CHEMICAL CO.,
100 William Street, New York.

THE ROESSLER & HASSLACHER CHEMICAL COMPANY CHEMISTS NEW YORK

CYANIDE
Peroxide of Sodium
Hyposulphite of Soda
Chloride of Lime
Sulphide of Iron
And Other Chemicals for Mining Purposes.

"CRACK PROOF"
GOODYEAR RUBBER CO. GOLD SEAL 1872 TRADE MARK

PURE RUBBER BOOTS
Are the CHEAPEST because
They Are the Most Durable.

Beware of Imitations.

GOLD SEAL, BADGER AND PIONEER
Belting, Packing and Hose.

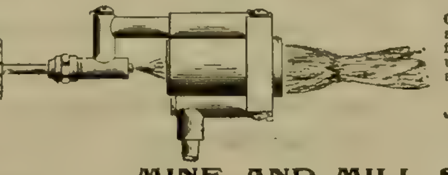
RUBBER FACTORY IN SAN FRANCISCO.
Valves, Gaskets, Etc., Made to Order.

GOODYEAR RUBBER CO.
R. H. PEASE, Vice-Pres't and Manager,
Nos. 573, 575, 577, 579 MARKET ST., San Francisco.
Nos. 73, 75 FIRST ST., Portland, Or.

Dearborn Compounds for That Oil Getting Back Into Boilers.

DEARBORN DRUG & CHEMICAL WORKS,
MANUFACTURING AND ANALYTICAL CHEMISTS,
ANALYZERS OF EVERYTHING. OIL CHEMISTS.
MAKERS OF BOILER COMPOUNDS WATER CHEMISTS.
Offices and Laboratories:
29, 30, 31, 32 and 33 Rialto Bldg. - - - CHICAGO, ILL.

Taylor's Coal Oil and Gasoline Burner
(PATENTED)



A new heating burner for Assayers and Chemists, or for brazing, in which coal oil at 33 deg. to 45 deg., Beaume and 150 deg. fire test, or gasoline at 74 deg. test can be used for fuel. Adapted to crucible, muffle and brazing work. Price $6. For sale by

JOHN TAYLOR & CO.,
63 FIRST STREET,
SAN FRANCISCO, CAL.

MINE AND MILL SUPPLIES.
Importers and Manufacturers of Assayers' Materials, Chemicals and Acids, Etc.
CATALOGUE ON APPLICATION.

IMPROVED BONE ASH.

It is 100% better than Bone Ash now being used; will absorb more lead, will never crack or split in the Muffle, can be dropped before or after using without breaking. Cupels can be made and used at once; no drying required. Excessive heat has no effect on them. Will stand shipping any distance. It takes up none of the precious metals in cupeling. Cupels much quicker. Once used always used. Sold under a positive guarantee or money refunded. Now being used by all smelters and assayers who have tried it.

Price of Improved Bone Ash, $60.00 per ton; $3.50 per 100 lbs.; or manufactured Cupels, $1.50 per hundred.

J. J. CUMMINGS & CO., Sole Mfrs.,
Telephone Clay 972. 10 STEVENSON ST., SAN FRANCISCO, CAL.
For Sale also by Justinian Caire Co., Dealers in Assay Goods and Mining Supplies, 521-523 Market St.

PIONEER REDUCTION CO.
Established 1858. Nevada City, Cal.

Buyers of Gold, Silver and Copper Ores and Concentrates.

HIGHEST PRICES PAID FOR COPPER ORES.
WRITE FOR RATES.

ESTABLISHED 1856.

Controls AND Check Assays
(A SPECIALTY.)

MARINER & HOSKINS,
ASSAYERS AND CHEMISTS,
Mining Engineers and Metallurgists.
81 South Clark Street.
Rooms 51-55,
CHICAGO, ILLINOIS.

SEND SAMPLES BY MAIL OR EXPRESS.
MAILING SACKS ON APPLICATION. : :

SAINT LOUIS SAMPLING AND TESTING WORKS 1886

ST. LOUIS SAMPLING & TESTING WORKS,
1225 and 1227 Spruce St.,
ST. LOUIS, MO.

The Largest and Most Complete Ore Testing Works in Existence for Making all Kinds of Practical Working Tests of Ore, etc., to Determine the Most Suitable Method of Treatment.

PLANT FOR COAL WASHING, COKING AND STEAMING TESTS OF FUELS. ASSAYS, ANALYSES, CHEMICAL AND PHYSICAL INVESTIGATIONS OF ALL KINDS. MINERAL PROPERTIES, MINES AND METALLURGICAL PROCESSES EXAMINED AND REPORTED UPON. CORRESPONDENCE SOLICITED.

MINING HOISTS.
Engines, Boilers,
Saw Mills, Hoe Saws,
Mill Supplies.

TATUM & BOWEN,
34-36 Fremont Street, San Francisco, Cal.
29-35 First Street, Portland, Or.

TELEPHONE MAIN 5303
Union Photo-Engraving Co.
DESIGNING HALF-TONES ZINC ETCHING
523 MARKET ST
SAN FRANCISCO, CAL.

HEALD'S
BUSINESS COLLEGE.
24 Post Street, - - - San Francisco.

MINING AND CIVIL ENGINEERING DEPARTMENT: Mathematics, Draughting, Strength of Material, Chemistry, Assaying, Blow-Pipe Analysis, Geology, Mineralogy, Surveying, etc., under the direction of Prof. O. H. Packer, an engineer of national reputation.

ELECTRICAL DEPARTMENT: Theory and Practice; Construction.

BUSINESS: Bookkeeping, Shorthand, Typing, Modern Languages, etc.

Twenty teachers; individual instruction; can enter at any time; Catalogue and Journal free.

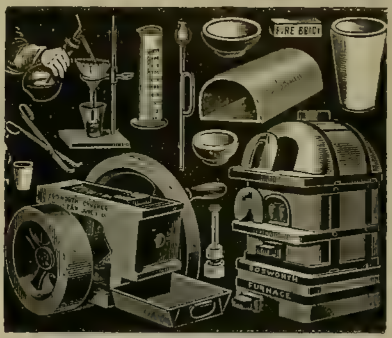
A BORE HOLE
is the cheapest, quickest, most direct, and most effective way to test lands for minerals, oil, gas, salt, sulphur, borax, water, etc.

THE STAR DRILLING MACHINES
excel for these uses. They will drill a hole through anything to any depth from 250 to 2500 feet. The only machines made that are absolutely without annoying springs. They are simple, powerful and efficient. Easy to handle at work or on the road. Used in every State and Territory and in many foreign countries.

We also make full line of drill tool-bits, reamers, sand pumps, spuds, etc., etc. Write for illustrated free catalogue.

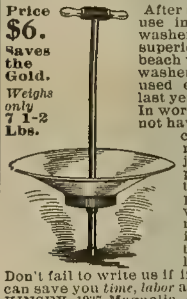
Star Drilling Machine Co.,
Akron, Ohio.

THE DENVER FIRE CLAY CO.,
1742 to 1746 Champa St., DENVER, COLO.



Manufacturers, Importers and Dealers in
Chemicals, Apparatus and Assayers' Supplies, Fire Brick and Tile.
Sole Agents for the "AINSWORTH BALANCES."
WRITE FOR CATALOGUES.

THE LITTLE ALASKA GOLD WASHER.

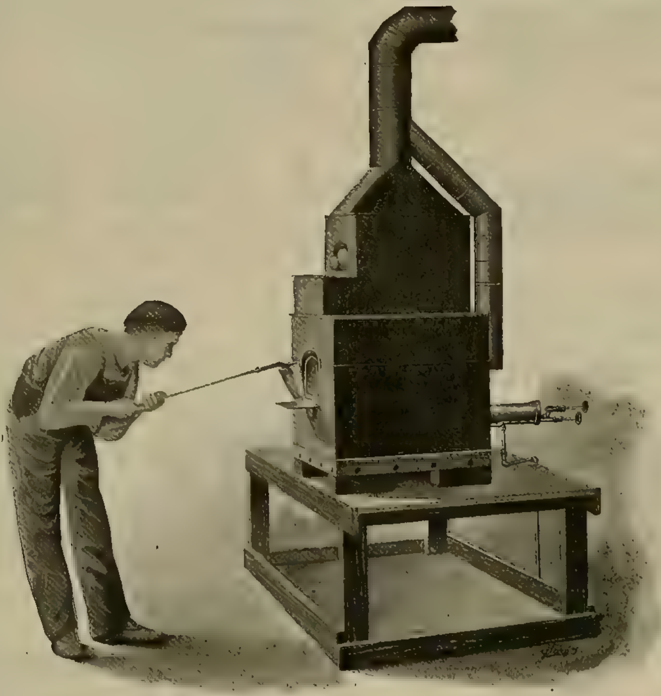


Price $6.
Saves the Gold.
Weighs only 7 1-2 Lbs.

After several years practical use in different fields, our washer has established its superiority over all placer or beach washers. It is just the washer for Cape Nome; it was used extensively in Alaska last year with every success. In working the operator does not have to wet his hands and can stand in an upright natural position. It is just the washer for the poor man who has not the money to put in expensive machinery. It will do the work of ten men with gold pans. It is just the washer for the prospector, being light and easy to pack. Don't fail to write us if in need of a washer; we can save you *time, labor* and *money*. RUSSELL & KINSEY, 1237 Magnolia Ave., Los Angeles, Cal.

PIPE PIPE
PIPE for Hydraulic Power and Irrigation.
OIL STORAGE TANKS.
GENERAL SHEET IRON WORK.
Lacy Manufacturing Co.,
LOS ANGELES.

DEWEY, STRONG & CO.
SCIENTIFIC PRESS PATENTS PATENT AGENCY
330 MARKET ST. S.F.



NO TROUBLE TO OPERATE--A BOY COULD RUN IT.

TO ASSAYERS:

This is our DOUBLE MUFFLE FURNACE, No. 37. The lower muffle is 10x16x6 inches, and will hold eight 20-gramme crucibles. The upper muffle is 6x12x4 inches.

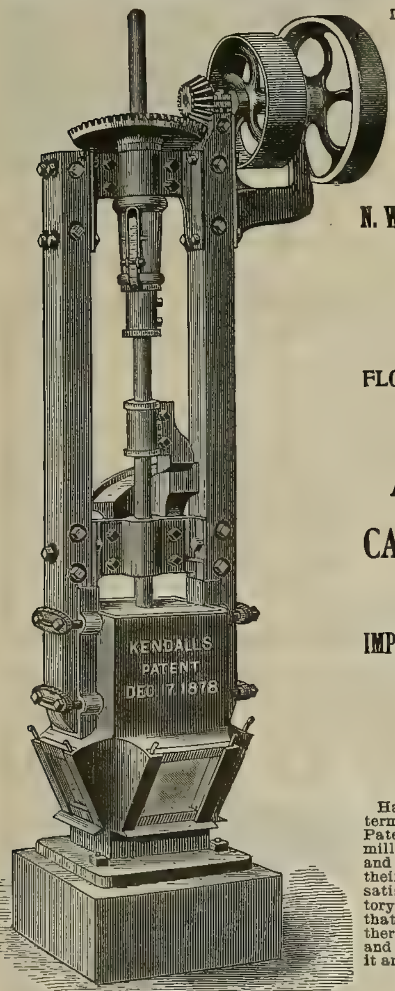
One Cary burner, size 2 1-4 inches, heats both muffles simultaneously.

Starting with a cold furnace and burner, the first batch of eight crucibles can be poured in less than one hour from time of lighting match, and same cupelled in one hour and a half.

When furnace has become thoroughly heated, melts may be made every twenty minutes and cupellations every twenty-five minutes.

Further particulars on request to

F. W. BRAUN & CO.,
Modern Appliances for Assayers,
LOS ANGELES, CAL.



L. C. MARSHUTZ. T. G. CANTRELL.

NATIONAL
IRON WORKS,
N. W. Cor. Main & Howard Sts., San Francisco.

MANUFACTURERS OF
STATIONARY AND COMPOUND
ENGINES,
FLOUR, SUGAR, AND QUARTZ MILL
MACHINERY.

AMALGAMATING MACHINES.

CASTINGS AND FORGINGS
OF EVERY DESCRIPTION.
All work tested and guaranteed.

IMPROVED PORTABLE HOISTING ENGINES

Sole Manufacturers of
Kendall's Patent Quartz Mills.

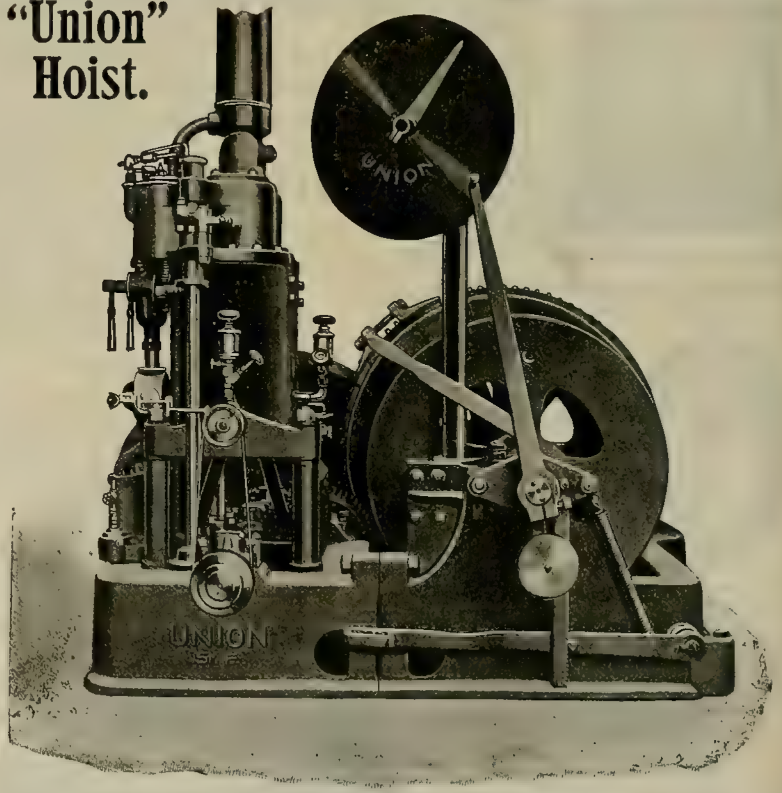
Having renewed our contract on more advantageous terms with Mr. S. Kendall for the manufacture of his Patent Quartz Mill, we are enabled to offer these mills at **Greatly Reduced Prices.** Having made and sold these mills for the past 16 years, we know their merits, and know that they have given perfect satisfaction to purchasers, as numbers of commendatory testimonials prove. We feel confident, therefore, that at the prices we are now prepared to offer them, there is placed within the reach of all a light, cheap and durable mill that will do all that is claimed for it and give entire satisfaction.

MARSHUTZ & CANTRELL

Send for Circulars and Price List.

THE CAL. ANTI-CALORIC COMPANY,
Tel. Main 5752. Office, 217-219 Mission St., San Francisco, Cal.

Sole Manufacturers of CAL. ANTI-CALORIC SECTIONAL COVERINGS AND BLOCKS FOR BOILERS. PLASTIC (dry) for Steam Domes, Etc. Sole Agents for the Boston Asbestos Paper Co. Asbestos Goods of All Kinds. Send for Information. Factory, Potrero.



"Union"
Hoist.

The above illustrates the 25 H. P. double cylinder, single drum "Union" hoist, with all the latest improvements.

THE UNION GAS ENGINE CO.
—BUILD THE—
"Union" Gas Engines,

Which use either MANUFACTURED or NATURAL GAS, ORDINARY STOVE GASOLINE (NAPHTHA or BENZINE), DISTILLATE or KEROSENE.

STATIONARY ENGINES for All Kinds of Work in Sizes from 3 to 300 h. p in actual use.
"UNION" COMBINED HOISTS in Sizes from 2 to 130 h. p. in actual use.
"UNION" COMBINED COMPRESSORS—20, 30, 40 h. p.
HOISTS and COMPRESSORS Can Be Built in Larger Sizes to Order.
"UNION" MARINE ENGINES, 4 to 200 h. p., of Single, Double and Four-Cylinder Types.
FIFTEEN YEARS' EXPERIENCE Building Gas and Oil Engines.
"UNION" ENGINES Are In Use All Over the United States.
"UNION" ENGINES Are Simple, Durable and Economical.

Office, 248 First Street. Works, Corner First and Clementina Streets. SAN FRANCISCO, CAL.

SELBY SMELTING AND LEAD CO.,

REFINERS OF GOLD AND SILVER BARS, GOLD DUST, ETC.

Buyers of Gold, Silver, Lead and Copper Ores, Gold Concentrates, Lead Bullion, Cyanide Product, Etc.

ORE AND BULLION ASSAYERS.

Works at VALLEJO JUNCTION, CAL. Office, 416 MONTGOMERY ST., SAN FRANCISCO, CAL.

THE IMPROVED BARTLETT CONCENTRATING TABLE.

The BARTLETT CONCENTRATING TABLE has been GREATLY IMPROVED recently by the substitution of iron in place of wood wherever possible. It is now built with SOLID IRON TOP, PLANED TO A TRUE SURFACE AND POLISHED; all parts are made by template and EACH PART BEING INTERCHANGEABLE. As now constructed, the table has no special wearing parts and will last for many years. It has a CAPACITY OF FROM FIFTEEN TO FORTY-FIVE TONS IN TWENTY-FOUR HOURS, according to the class of ore worked. It is the only table in the world which will take the place of jigs and do away with all costly and complicated machinery.

It is Especially Designed for Separating Zinc from Lead.

Send for our illustrated catalogue, containing all the latest information on the concentration of ores.

THE COLORADO IRON WORKS CO.,

Established 1860. DENVER, COLO., U. S. A.

CHAS. C. MOORE & CO.,

—ENGINEERS AND DEALERS IN—
MAGNOLIA ANTI-FRICTION METAL,
HAMILTON CORLISS ENGINES, N. Y. SAFETY AUTOMATIC ENGINES,
BABCOCK & WILCOX BOILERS, McINTOSH & SEYMOUR ENGINES,
GREEN'S ECONOMIZERS, HOPPES LIVE STEAM PURIFIERS,
WHEELER CONDENSERS, BARNARD-WHEELER COOLING TOWERS,
EDMISTON FEED WATER FILTERS, BUNDY STEAM TRAPS,
SNOW STEAM PUMPS, QUIMBY SCREW PUMPS,
GOUBERT FEED WATER HEATERS, STRATTON STEAM SEPARATORS,
SPENCER DAMPER REGULATORS, HYATT ROLLER BEARINGS.

Contracts for Installation of Power Plants, Any Capacity.

SEND FOR CATALOGUES AND FULL INFORMATION.

32 FIRST STREET, SAN FRANCISCO, CAL.

SEATTLE BRANCH............313 FIRST AVE. SOUTH.
LOS ANGELES BRANCH.......103 SOUTH BROADWAY.

SHOES and DIES

of **SUPERIOR** quality and at prices 20 to 30% lower than any other maker.

FURNISHED BY

ARTHUR KOPPEL,
66 Broad St., N. Y. City.
Write for Particulars.

MINING CARS of every description.

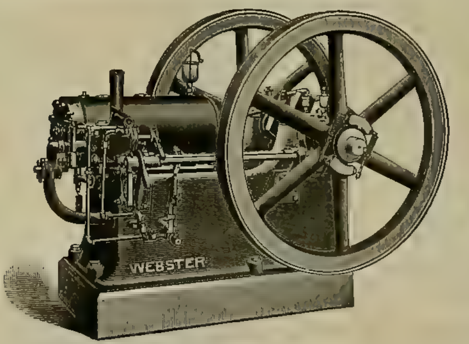
PORTABLE RAILWAYS,

Rolling Stock, Railway Outfits for Mines of every description.

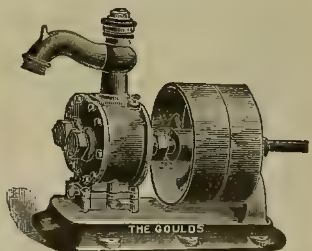
Export Work a specialty.

ARTHUR KOPPEL,
66 Broad St , N. Y. City.
Send for Catalogue and Estimates.

Pacific Coast Agents, BAKER & HAMILTON, SAN FRANCISCO and SACRAMENTO.



WEBSTER GASOLINE ENGINES.



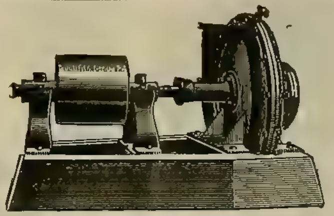
ROTARY PUMPS.

Send for Our Large Catalogue, Mailed Free.

We carry a full line of Gasoline Engines.

Pumps for all depths of wells—for Hand, Wind Mill use, Power Pumps, Electric Pumps. Irrigating Pumps of all capacities. Mining Pumps. Tanks. Iron Pipes. Pipe Fittings. Brass Goods. Tools, Etc. Send for Catalogue, sent free.

WOODIN & LITTLE,
312-314 MARKET STREET,..SAN FRANCISCO, CAL.

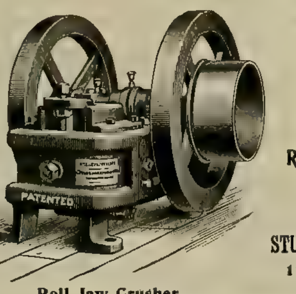


CENTRIFUGAL PUMPS

COMPLETE PUMPING PLANTS INSTALLED.

JOHN WIGMORE & SONS CO.,
117-123 S. Los Angeles St., LOS ANGELES, CAL.

The ONLY **FINE** CRUSHER OF HARD ROCK.



Roll Jaw Crusher.

Reduces to Gravel and Sand.

Does as fine work as Breaker and two sets of rolls.

STURTEVANT MILL CO.
113 CLAYTON ST.
BOSTON, MASS.

SEND FOR CIRCULAR.

DEWEY, STRONG & CO., Patent Solicitors, 330 Market St., San Francisco, Cal.

TO SECURE GOOD RESULTS BUY

JESSOP'S STEEL

FOR TOOLS, MINING DRILLS, ETC.

Chief American Office,
91 John St., New York, N. Y.

Wm. Jessop & Sons. Ltd.
Manufactory, Sheffield, England.

I. WILLARD BEAM, Agent,
29 MAIN STREET,
SAN FRANCISCO, CAL.

Founded by Mathew Carey, 1785.

HENRY CAREY BAIRD & CO.,
INDUSTRIAL PUBLISHERS, BOOKSELLERS & IMPORTERS,
810 Walnut St., Philadelphia, Pa., U. S. A.

☞ *Our New and Revised Catalogue of Practical and Scientific Books, 92 pages, 8vo; a Catalogue of Books on Steam and the Steam Engine, Machinery, etc.; a Catalogue of Books on Sanitary Science, Gas Fitting, Plumbing, etc., and our other Catalogues and Circulars, the whole covering every branch of Science applied to the Arts, sent free and free of postage to any one in any part of the world who will furnish his address.*

Duncan.—The Practical Surveyor's Guide:

Containing the necessary information to make any person of common capacity a finished Land Surveyor, without the aid of a Teacher. By Andrew Duncan, Land Surveyor and Civil Engineer. A new, revised and greatly enlarged edition. Illustrated by 72 engravings. 214 pages, 12mo................**$1.50**

ABSTRACT OF CONTENTS.—Introduction; Object of Surveying; What a Survey should include; Definition of Points; Determination of a Straight Line and of a Plane Surface; Map of a Survey; Scale according to which Maps of Surveys are Drawn; Instruments for Measuring Distances and their Use; Instruments for Setting out Right Angles and their Use; Survey of Smaller Tracts with the Assistance of the Previously Described Instruments; Problems; Trigonometrical Surveying; Tables of Surveys; Systems of Rectangular Surveying for Surveying the Public Lands of the United States; Index.

WE ALSO PUBLISH:

The Assayer's Guide: Or, Practical Directions to Assayers, Miners and Smelters for the Tests and Assays, by Heat and by Wet Processes, of the Ores of all the Principal Metals, of Gold and Silver Coins and Alloys, and of Coal, etc. By Oscar M. Lieber. A new, revised and enlarged edition. 288 pages, 12mo. Price **$1.50**

☞ *The above or any of our Books sent by mail, at publication prices, free of postage to any address in the world.*

☞ *Illustrated circulars of the above Books, showing full Tables of Contents, will be sent free to any one who will furnish his address.*

HENRY CAREY BAIRD & CO.,
INDUSTRIAL PUBLISHERS, BOOKSELLERS & IMPORTERS,
810 Walnut St., Philadelphia, Pa., U. S. A.

Important Technical Books in Preparation.

Brannt.—The Manufacture of Vinegar, including Wood Vinegar, and other By-Products obtained in the Destructive Distillation of Wood, Acetates, Cider, etc. Elaborately illustrated. 8vo, 500 pages.

Erni.—Mineralogy Simplified. Easy Methods of Identifying Minerals, including Ores. By Henry Erni, M. D. Third edition revised and improved by Prof. Amos P. Brown of the University of Pennsylvania. Elaborately illustrated. 400 pages, 12mo.

Kerl.—The Assayer's Manual. By Bruno Kerl. Translated and Edited by William T. Brannt and F. Lynwood Garrison. A new, revised and improved edition. Illustrated. 8vo, 350 pages.

☞ *Advance orders solicited.*

HENRY CAREY BAIRD & CO.,
INDUSTRIAL PUBLISHERS, BOOKSELLERS & IMPORTERS,
810 Walnut St., Philadelphia, Pa., U. S. A.

DELINQUENT SALE NOTICE.

NATIONAL CONS. MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Rich Gulch, Shasta County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 12) levied on the 4th day of June, 1900, the several amounts set opposite the names of the respective shareholders, as follows:

Name.	No. Cert.	No. Shares.	Amt.
F. Knottner	20	1.000	$50 00
F. Knottner	110	500	25 00
F. Knottner	111	500	25 00
L. Knottner	112	150	7 50
E. Knottner	113	150	7 50
O. Knottner	114	100	5 00
G. Knottner	115	100	5 00
J. Gretz (balance)	186	1,600	70 00
F. E. Hartmann	223	250	12 50
C. A. Mueller	226	500	25 00
C. A. Mueller	229	500	25 00
G. Berbert	228	350	17 50

And in accordance with law, and an order from the Board of Directors, made on the 4th day of June, 1900, so many shares of each parcel of such stock as may be necessary, will be sold at public auction, at the office of the company, 773 Mission street, San Francisco, California, on MONDAY, the 20th day of August, 1900, at the hour of 1 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

GEO. W. FLEISSNER, Secretary.

Office—773 Mission street, San Francisco, California.

DELINQUENT SALE NOTICE.

COLUMBIA ATHLETIC CLUB (INC.)—Location of principal place of business, San Francisco, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 4) levied on the 27th day of June, 1900, and payable Saturday, June 30, 1900, the several amounts set opposite the names of the respective shareholders, as follows:

Name.	No. Cert.	No. Shares.	Amt.
Daniel F. Crowley		15	$50 00

And in accordance with law, and an order from the Board of Directors, made on the 27th day of June, 1900, so many shares of each parcel of such stock as may be necessary, will be sold at public auction at the office of the club, 1200 Market street, San Francisco, California, on THURSDAY, the 30th day of August, 1900, at the hour of 12:30 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

JNO. H. EFFINGER, Secretary.

Office—1200 Market street, San Francisco, California.

THE MINES OF
Eastern Oregon
Which are now attracting so much attention
are reached only by the lines of the
OREGON RAILROAD
& NAVIGATION CO.
For Descriptive Pamphlets, Through Rates, Etc.,
Address
E. C. WARD, Gen. Agt.,
630 Market Street, San Francisco.

ASSESSMENT NOTICES.

MARIPOSA COMMERCIAL AND MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Mariposa County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 11th day of July, 1900, an assessment (No. 17) of Ten ($10) Dollars per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 320 Sansome street, room 24, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 14th day of August, 1900, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 4th day of September, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

JOSEPH H. MOOSER, Secretary.

Office—320 Sansome street, room 24, San Francisco, California.

SIERRA NEVADA SILVER MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Virginia Mining District, Storey County, State of Nevada.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 9th day of July, 1900, an assessment (No. 119) of fifteen cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Room 14, Nevada block, No. 309 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on Tuesday, the 14th day of August, 1900, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 3d day of September, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

E. L. PARKER, Secretary.

Office—Room 14, Nevada block, No. 309 Montgomery street, San Francisco, California.

GOULD & CURRY SILVER MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Virginia, Storey County, Nevada.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 6th day of August, 1900, an assessment (No. 91) of fifteen (15) cents per share, was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, room No. 69, Nevada block, No. 309 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 8th day of September, 1900, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 1st day of October, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

ALFRED K. DURBROW, Secretary.

Office—Room No. 69, Nevada block, No. 309 Montgomery street, San Francisco, California.

BEST & BELCHER MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Virginia District, Storey County, Nevada.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 3d day of August, 1900, an assessment (No. 71) of fifteen (15) cents per share, was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, room 33, Nevada block, No. 309 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 7th day of September, 1900, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on FRIDAY, the 28th day of September, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

M. JAFFE, Secretary.

Office—Room 33, Nevada block, No. 309 Montgomery street, San Francisco, California.

ALLIANCE EXPLORATION & MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Ophir, Placer County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 3d day of August, 1900, an assessment (No. 3) of five (5) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 236 Sutter street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 11th day of September, 1900, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 2nd day of October, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

S. GOLDSMITH, Secretary.

Office—236 Sutter street, San Francisco, California.

DENVER & RIO GRANDE R.R.
SCENIC LINE OF THE WORLD

The ∴ Mining Man's Favorite Route

BETWEEN

Denver, Colorado Springs, Pueblo and Florence, Cripple Creek, Leadville, Glenwood Springs, Aspen, Gunnison, Lake City, Creede, Durango, Silverton, Telluride and Ouray.

Reaching all the Mining, Milling, Cyaniding, Chlorinating and Smelting centers in Colorado and Utah, and all mining points in California, British Columbia and the Pacific Northwest by close connections and a perfect system of through car service.

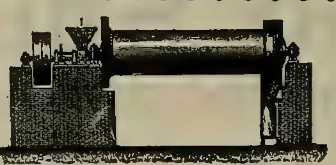
Pullman Palace and Tourist Sleeping Cars between Denver and San Francisco and Los Angeles, and Pullman Palace and Tourist Sleeping Cars and Free Reclining Chair Cars between Denver and Portland. : : A Perfect Dining Car Service on All Through Trains. : :

For Illustrated Pamphlet, address

W. J. SHOTWELL,
G. A. D. & R. G. R. R.,
126 California St.,
San Francisco, Cal.

S. K. HOOPER,
G. P. & T. A.,
Denver,
Colo.

THE DAVIDSEN PATENT TUBEMILL.

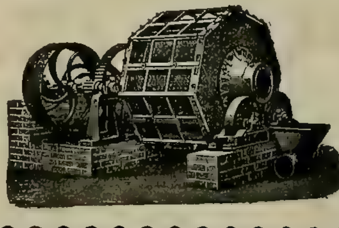


FOR FINE GRINDING,
Uniformity of Output, Effectiveness, Simplicity, or Economy of Operation and Maintenance, "THE DAVIDSEN" HAS NO EQUAL.
ENORMOUS GRINDING SURFACE. ❧ SLOW SPEED. ❧ ANY DEGREE OF FINENESS.
WRITE FOR CATALOGS.

F·L·SMIDTH & CO
ENGINEERS
66 MAIDEN LANE, NEW YORK
COPENHAGEN, VESTERGADE 29.K. LONDON. 9 BRIDGE ST., S.W.

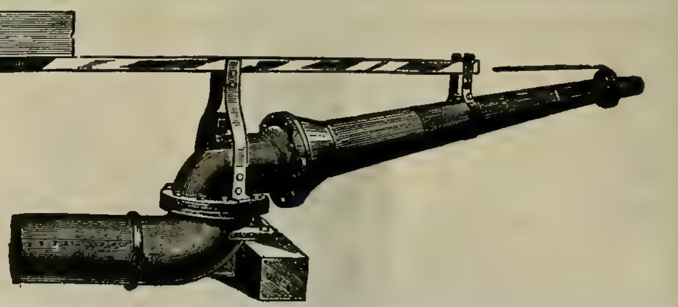
THE SMIDTH BALLMILL
Crushes, Grinds and Sifts in One Operation, Working Continuously.
AMONG ITS SPECIAL FEATURES OF MERIT ARE:
Maximum Output, Slow Speed, Low Horse Power, Absolute Uniformity, Ease of Access, Slight Cost of Repairs.
OUR AUTOMATIC FEEDER INSURES REGULARITY AND EFFECTIVENESS.

THE SMIDTH BALLMILL.



BEST.
CHEAPEST.
MOST SIMPLE.

Double-Jointed Ball-Bearing Hydraulic Giants.



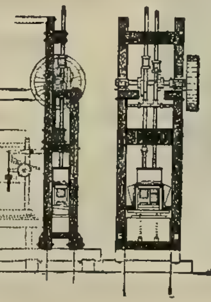
The above presents an improved **Double-Jointed Ball-Bearing Hydraulic Giant** which we build. The improvement consists of the introduction of a **Ball Bearing** by which the pressure of the water is reduced to a minimum and the direction of the nozzle changed at will with ease.

Catalogues and prices of our specialties of HYDRAULIC MINING MACHINERY furnished upon application. **JOSHUA HENDY MACHINE WORKS, 38 to 44 Fremont St., San Francisco, Cal.**

TANKS!
LUMBER AND HOUSE FINISH.
TANKS FOR WATER, WINE OR OIL.
Jig Frames, Jig Screens, Zinc Boxes,
and Tanks of Every Description for Mining Purposes.
WRITE FOR ESTIMATES ON YOUR WANTS.

C. A. HOOPER & CO., Agents,
204 Front Street, San Francisco, Cal.

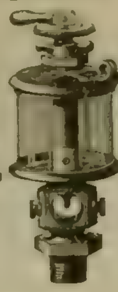
THE EXCELSIOR REDWOOD CO.,
FOURTH AND CHANNEL STREETS,
SAN FRANCISCO, CAL.



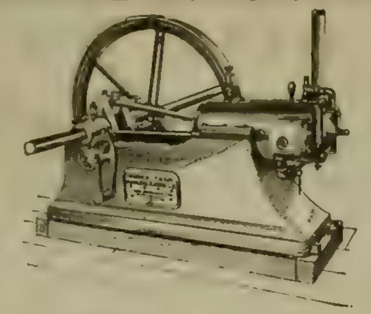
MODERN MINING MACHINERY.
QUARTZ MILLS of any capacity,
IN UNITS OF TWO AND FIVE STAMPS.
Acme Amalgamators for CAPE NOME
and other placer mining. Successfully applied to quartz mills in addition to or displacing plates.
SUCCESSFUL GRAVEL MILL RECENTLY IMPROVED.
Special Gold Dredging Pumps and Machinery. Concentrators, Feeders, Rock Breakers and Power Plants.
Largest manufacturers of Irrigation and Reclamation Pumps in the United States.
Catalogues: No. 20, Pumps; No. 22, Cape Nome; No. 25, Mining.
KROGH MANUFACTURING CO.,
9-17 Stevenson St. and 134-136 Main St., SAN FRANCISCO, CAL.

Powell's Signal Oiler.

LEVER UP,
Oil
Dropping;
LEVER DOWN,
Oil
Shut Off.



**Doesn't interfere with the adjustment.
Most perfect Oiler in the world.
Haven't you need for such an Oiler?**
In stock by all Jobbing Supply Houses
Manufactured only by
**THE WM. POWELL CO.,
Cincinnati, O.**



Distillate Engines and Hoists.

Air Compressors.

HADWEN SWAIN MFG. CO.,
215-217 SPEAR ST., SAN FRANCISCO, CAL.
CATALOGUES MAILED.

WITTE GASOLINE HOISTS

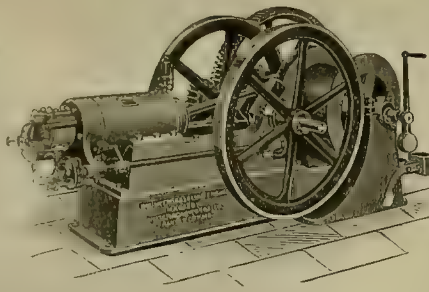
ARE MONEY EARNERS.

Made for use in places far from factory. Are built in parts and in duplicate. Renewals easy and quick to get. Strong, substantial and reliable.

Operate on GAS, GASOLINE or DISTILLATE.

There Are Others, but None as SAFE AND RELIABLE.

Write for Illustrated Catalogue G.



WITTE IRON WORKS CO.,
515 WEST 5th ST.,
KANSAS CITY, MO., U. S. A.

Hendrie & Bolthoff Mfg. & S. Co., Denver, Colo.
C. B. Boothe & Co., Los Angeles, Cal.
Tracy Engineering Co., San Francisco, Cal.

THE MARION STEAM SHOVEL CO.,

Steam Shovels
Dredges and
Traction Dredges

Suitable for all kinds of **Excavating Work,** making a specialty of

PLACER MINING MACHINES,

separate or self-contained, either as a **dry land excavator** or **floating dredge.**

**The Marion Steam Shovel Co.
MARION, OHIO.**

GEO. W. BARNHART, No. 4 Sutter St., San Francisco, Cal.

RIVETED IRON AND STEEL PIPE

FOR HYDRAULIC MINES, IRRIGATION AND POWER PLANTS. Manufactured from the best grades of IRON or STEEL by **MODERN MACHINERY.**

AGENTS FOR THE Celebrated **CANTON STEEL.**

Schaw, Ingram, Batcher & Co.,
539 Mission St., SAN FRANCISCO.
211 to 219 J St., SACRAMENTO.

TRUAX ORE CARS

WE HAVE MOVED TO LARGER QUARTERS.

CARS ALWAYS IN STOCK TO FILL RUSH ORDERS.

WE MAKE CARS FOR YOUR CAGE AND SKIPS FOR YOUR INCLINE SHAFT.

SEND FOR PAMPHLET AND REFERENCES.

Truax Mfg. Co., 69 STEVENSON ST., S. F.

California Vigorit Powder Co.

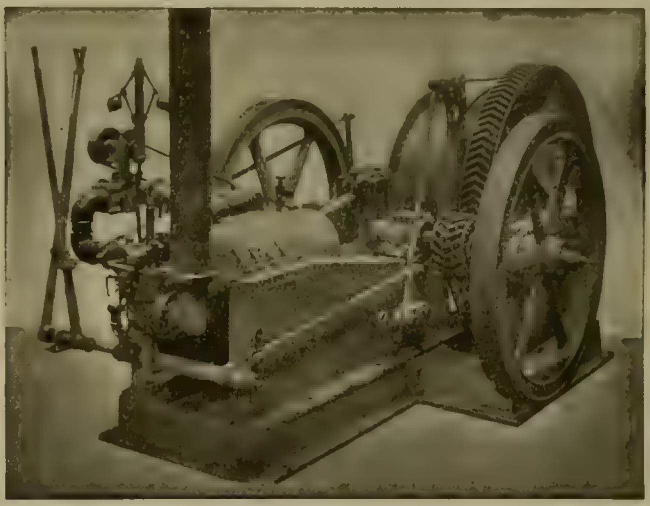
—Manufacturers of—

Dynamite High Explosives and "Vigorit Low" Blasting Powder.

OFFICE: 208 CALIFORNIA STREET,
SAN FRANCISCO, CAL.

WORKS: POINT ISABEL,
CONTRA COSTA CO., CAL.

HERCULES HOISTS Are Sold the World Over.



Hercules Gasoline Hoist--Speed 385 Ft.; Load 2500 Lbs.

HERCULES GAS ENGINE WORKS,............141-143 FIRST STREET, SAN FRANCISCO, CAL

HERE'S THE "HOIST" THAT HOISTS---

The Weber Gasoline or Oil "Hoist." It is a money maker wherever used, and is especially adapted for mining, quarry and ship use. In sizes from 6 to 150 H. P., Single or Double Drum, operated on Gas, Gasoline or Distillate. Write for details, stating size wanted and for what purpose.

WEBER GAS & GASOLINE ENGINE CO.,
430 S. W. Boulevard,
Kansas City, Mo.

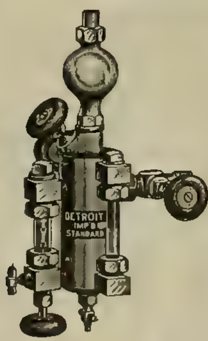
The Lunkenheimer Automatic Injector

For All Classes of Steam Boilers.

Well designed, compact, efficient, durable, low priced and reliable. In action it is easy to start, has large range of work, full capacity, is absolutely Automatic and the discharge can be graded within wide limits. All parts are well proportioned, strong and durable, and any worn-out piece can be easily and quickly replaced at slight expense. Send for descriptive Circular and Catalogue of superior brass and iron Steam Specialties.

THE LUNKENHEIMER COMPANY,
Sole Makers and Patentees,
General Offices and Works, Cincinnati, Ohio, U. S. A.

—— BRANCHES: ——
26 Cortlandt Street.......................NEW YORK.
35 Great Dover Street..........LONDON, ENGLAND.



ALL ABOUT Sight Feed Lubricators.

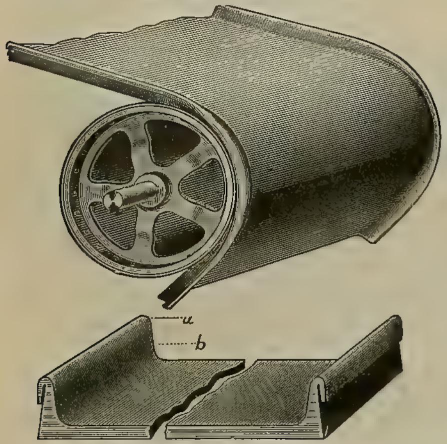
Our new catalogue for 1900 is ready for distribution. It explains in detail the principles governing the operation of **Sight Feed Lubricators,** using sectional view to show the internal construction, and containing cuts of the different styles in parts before being assembled into the complete lubricators, thus enabling every one to understand their construction and operation thoroughly.

In addition it shows our full line of **Glass Oilers, Oil Pumps, Oiling Devices, Multiple Oilers, Valves, Etc.** It will be sent to any address on application.

DETROIT LUBRICATOR CO., DETROIT, MICH.

MACHINERY BARGAINS.

I have some splendid Air Compressors, Hoisting Engines, Rock Drills, Rock Crushers, Channeling Machines, Steam Pumps, Boilers, Steam Shovels, Locomotives and Relaying Rails, all in splendid condition. Send for printed list and specify your requirements. I can save you money. WILLIS SHAW, 627 New York Life Building, CHICAGO.



THE BROWNELL "PATENT LIP" FLANGE FRUE VANNER BELTS.

It has taken years of ceaseless testing and experimenting to produce the superior belt which we now offer, with elastic flanges and pliable body reinforced with specially woven duck. Every belt is manufactured by experienced workmen, and carefully tested on machines especially built for that purpose; consequently we are to-day manufacturing the best belts that mechanical ingenuity, combined with honesty of construction, can possibly produce.

ORIGINAL EMPIRE MILL & MINING COMPANY,
GRASS VALLEY, NEVADA CO., CAL., Feb. 20, 1897.

JAS. S. BROWNELL, ESQ., San Francisco, Cal.—DEAR SIR: The Brownell Patent Lip flange belt for ore concentrators, which I bought of you nearly two years ago, has been in constant use and is in good order and gives us perfect satisfaction. We have several other kinds of belts in the mill, and your belt and flange I consider the best of all. Yours respectfully, ROBT. WALKER, Superintendent.

ROANOKE MINING COMPANY,
MOKELUMNE HILL, March 4, 1897.

MR. JAS. S. BROWNELL, 132 Market St., San Francisco, Cal.—DEAR SIR: We have in our 20-stamp mill at this place five Frue vanners; three of these are equipped with the Patent Lip flange belt and two with the plain flange belt. We certainly consider the former a great improvement on the latter. They will certainly wear much longer, as cracking now seems out of the question. Any one purchasing the Frue vanning machine should see that it is equipped with the Patent Lip flange belt. Very truly yours, ROANOKE MINING COMPANY.
Per G. M. WILDE, Acting Superintendent.

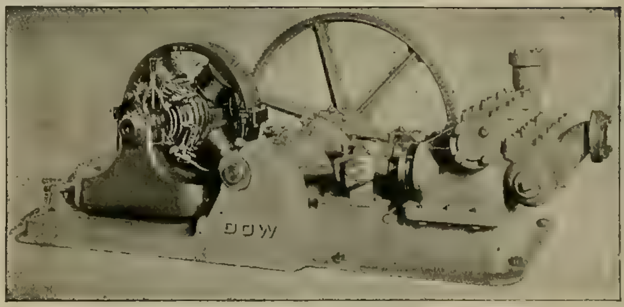
For any information regarding Frue Vanner or Belts, call on or address

JAS. S. BROWNELL, Western Agent FRUE VANNING MACHINE CO.
(Successor to Adams & Carter.) 132 MARKET STREET, ROOM 15, SAN FRANCISCO.

GEO. E. DOW PUMPING ENGINE CO.
(Successors to DOW STEAM PUMP WORKS.)
108-120 BEALE ST., - - SAN FRANCISCO, CAL.

—MANUFACTURERS OF—

DOW PUMPS
FOR MINING PURPOSES,
Operated by STEAM, AIR, ELECTRIC or WATER POWER.
VERTICAL SINKING PUMPS, BUCKET OR DOUBLE PLUNGER PATTERN.
DEEP MINE STATION PUMPS.
PUMPING MACHINERY FOR EVERY POSSIBLE DUTY.



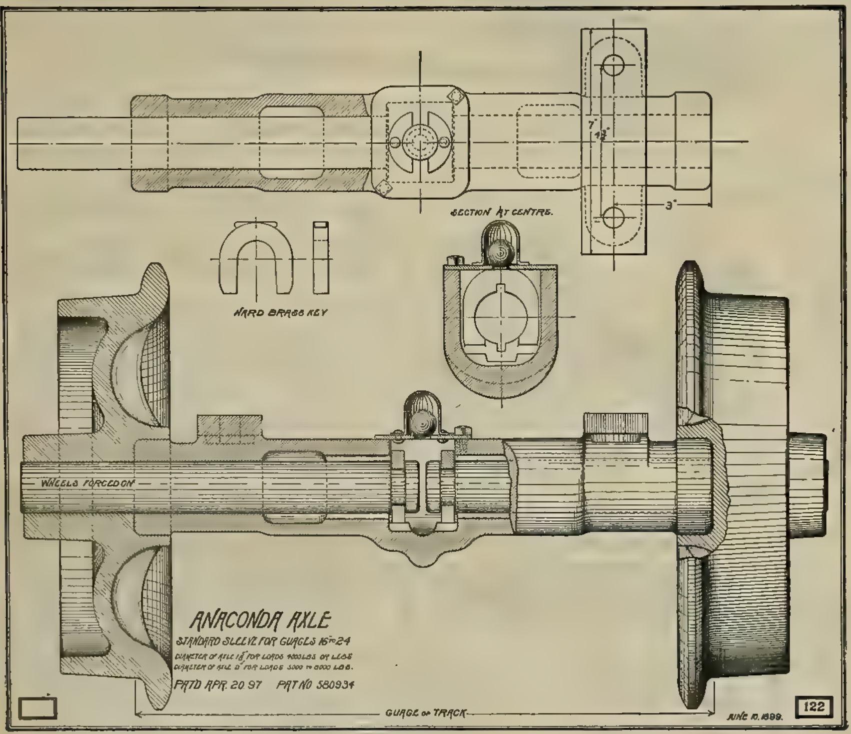
HOR. TRIPLEX MINE STATION PUMP WITH ELECTRIC MOTOR.

THE HALLIDIE ROPEWAY
For Transporting Ore, Fuel, Earth, Sugar Cane, etc., by Wire Ropes.
SIMPLE, ECONOMICAL, PRACTICAL, DURABLE.
LOADS MECHANICALLY. DUMPS AUTOMATICALLY.
WIRE TRAMWAYS (Single and Double Rope Systems),
Cableways, Transmission by Wire Ropes,
Incline Planes, Cable Grips,
Logging by Cables, Automatic Loaders,
PLOWING, SCRAPING AND TRANSPORTING by Wire Ropes,
DESIGNED, SUPPLIED AND ERECTED. Estimates Furnished.

Improved GRIP PULLEY.
Patents Nos. 483,442; 610,353.

EFFECTIVE, SIMPLE, AUTOMATIC.
Saves Wear on Wire Rope and Cable.
Send for Illustrated Pamphlet.
Correspondence Solicited.

CALIFORNIA WIRE WORKS, - 9 Fremont St., San Francisco, Cal.


7"
4½"
3"
SECTION AT CENTRE.
HARD BRASS KEY
WHEELS FORCED ON
ANACONDA AXLE
STANDARD SLEEVE FOR GUAGES 16" TO 24
DIAMETER OF AXLE 1½" FOR LOADS 4000 LBS OR LESS
DIAMETER OF AXLE 2" FOR LOADS 5000 TO 8000 LBS.
PATD APR. 20 97 PAT NO 580934
GUAGE OF TRACK
JUNE 10.1899.
122

Anaconda Self Oiling Axles
FOR MINE CARS.

Over 5000 cars equipped with these axles are being used by the Anaconda Copper Mining Co. in Montana, and large numbers are in use at other mines in the Western States. Axles are made to suit any gauge from 18-inch to 40-inch. Wheels of any type or size can be supplied. The wheel usually furnished is 12-inch in diameter with chilled tread, of form as shown in cut.

PARKE & LACY CO.,
21 & 23 FREMONT ST., SAN FRANCISCO, CAL.
Mining Machinery and Supplies,
SOLE AGENT FOR
INGERSOLL-SERGEANT ROCK DRILLS AND AIR COMPRESSORS,
KNOWLES PUMPS AND PULSOMETER PUMPS,
BULLOCK DIAMOND DRILLS.

DEWEY, STRONG & CO., Patent Agents, 330 Market St., S. F., Cal.

This Paper not
be taken from
the Library. * * * *

CALIFORNIA
STATE
LIBRARY

MINING AND SCIENTIFIC PRESS.
AND PACIFIC ELECTRICAL REVIEW.

No. 2091.—VOLUME LXXXI. Number 7. SAN FRANCISCO, SATURDAY, AUGUST 18, 1900. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

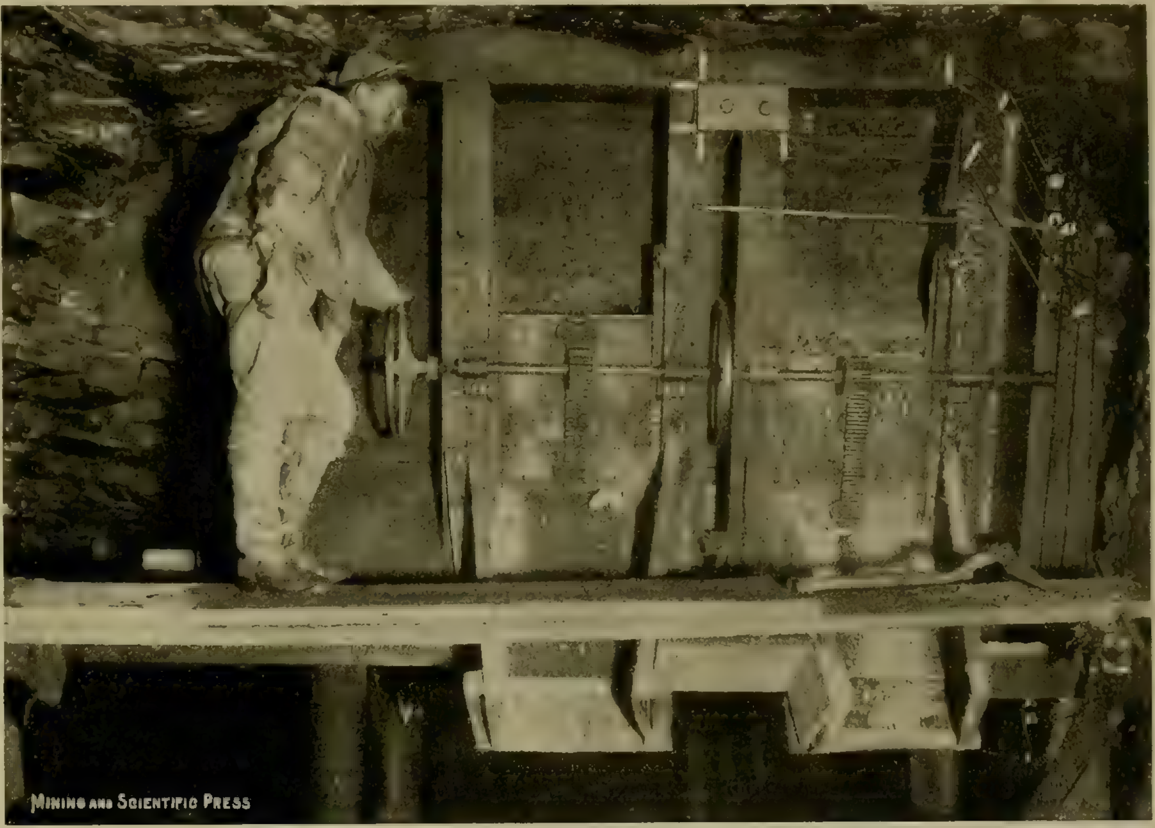
Lead Ore Imports.

In an extended editorial discussion of "Lead Tariff, Prices and Supply" in the issue of July 21st, regarding the importation of Mexican lead ores, the statement was made that, "the chairman of the Bureau of Statistics for the U. S. Treasury Department in 1898 made official report that 21,000,000 pounds of lead had been entered that could not be accounted for."

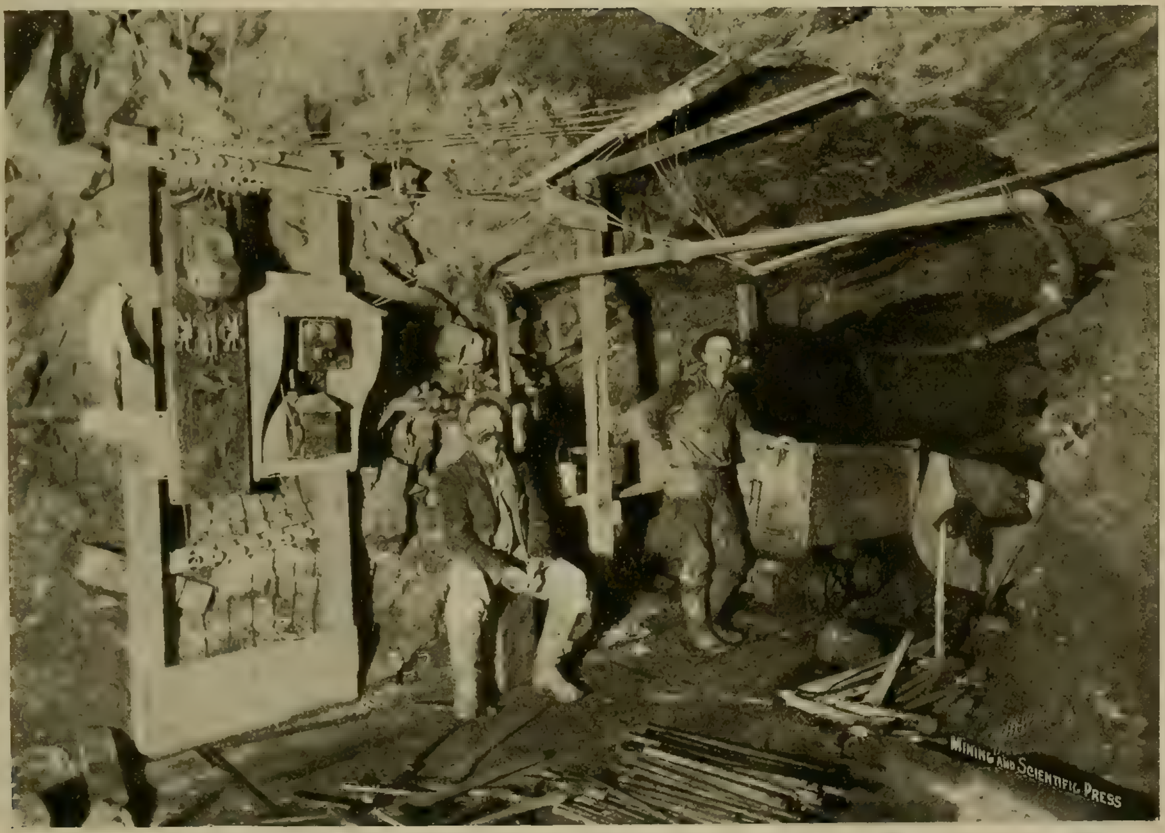
The accuracy of this statement has been questioned, and the fact has been denied. The chief of the Bureau of Statistics in Washington furnishes the following statement:

	Pounds.
Lead in warehouses beginning of fiscal year 1896	21,000,000
Imported in bond	187,522,267
Total	208,522,267
Retained for home consumption	109,000,000
Exported	64,888,000
In warehouse at end of 1896	13,634,267
Total	187,522,267
Short	21,000,000

This establishes the truth of the statement in the issue of July 21st. Each statement made in that article is susceptible of similar substantiation.



Ore Bins in Shaft, Empire Mine, Grass Valley, Nevada Co., Cal. (See page 184.)



The 2100-Foot Station, Empire Mine, Grass Valley, Nevada Co., Cal. (See page 184.)

Official U. S. Treasury statistics show that in the year 1896 were imported from Mexico 231,747,741 pounds silver-lead ore, of the value of $6,153,894; this contained 29,207 tons of lead. During the same year British Columbia shipped into the United States 63,785,106 pounds lead ore. It is true that less than 183,000,000 pounds lead ore were imported in 1890, but lead in ores was duty free prior to Oct. 5th of that year. Following is further official U. S. Treasury report of the quantity of ore imported in each of the three succeeding years and the lead contained therein:

	Pounds of Ore.	Lead Contained.	Per Cent Lead.
1891	239,086,809	40,289,808	16.85
1892	317,599,298	50,382,297	15.86
1893	406,209,367	59,426,588	14.63

These figures show that Mexican silver-lead ores do not contain more than enough lead to smelt themselves successfully, and that the present duty on lead in ore is not prohibitory.

◆

ELECTRIC RAILWAYS in most large cities develop newer and suburban sections at the expense of older settled districts; more especially is this the case in that part of a city which is too near the business center to be valuable for residence purposes, and, at the same time, too remote from the business centers to be of value for business purposes. Such property is the worst kind to own as an investment proposition, and the most dangerous upon which to loan money, as there is no guide in establishing its market value.

MINING AND SCIENTIFIC PRESS.

ESTABLISHED 1860.

Published Every Saturday at 330 Market St., San Francisco, Cal.

ANNUAL SUBSCRIPTION:
United States, Mexico and Canada..............$3 00
All Other Countries in the Postal Union..............4 00

Entered at the S. F. Postoffice as second-class mail matter.

J. F. HALLORAN..............Publisher.

Special Representatives:
EASTERN.
E. H. HAVEN..............150 Nassau St., New York City.
MIDDLE WEST.
CHAS. D. SPALDING..............153 La Salle St., Chicago, Ill.
INTER-MOUNTAIN.
W. A. SCOTT..............43 Jacobson Building, Denver, Colo.
SOUTHERN CALIFORNIA.
W. D. CURTIS..............223 W. Second St., Los Angeles, Cal.

San Francisco, August 18, 1900.

TABLE OF CONTENTS.

ILLUSTRATIONS.—Ore Bins in Shaft, Empire Mine, Grass Valley, Nevada Co., Cal.; The 2100-Foot Station, Empire Mine, Grass Valley, Nevada Co., Cal., 181. Skips in Shaft, Empire Mine, Grass Valley, Nevada County, Cal., 184. Latest Mining and Metallurgical Patents, 186. Geo. W. Pennington, 187. 40-Stamp Mill, Octave G. M. Co., Weaver, Arizona; 175-ton Cyanide Plant, Octave G. M. Co., Weaver, Ariz.; Octave Battery Room, Weaver, Ariz.; Octave Mill Concentrator Room, Weaver, Ariz.; Octave Mill Concrete Mortar Blocks, Weaver, Ariz., 188. Grab Bucket and Trolley; General View of Barge (Looking Toward Bow), Showing Grab Bucket About to be Dropped, 189. The Bell Gyrating Disc Engine, 190.

EDITORIAL.—Mining Combinations; Disregard of Petty Detail; Permanence in Depth, 182.

MINING SUMMARY.—191-192-193-194.

LATEST MARKET REPORTS.—195.

MISCELLANEOUS.—Lead Ore Imports, 181. Concentrates, 183. The Empire Mines, Past and Present, 184. Silver Smelting in Mexico, 185. Latest Mining and Metallurgical Patents, 186. Copper Statistics; A California Stamp Mill; Geo. W. Pennington; Quantitative Test for Molybdenum, 187. Stamp Mill of Octave G. M. Co., Weaver, Ariz., 188. New Discharging Device for Transfer Coal Barge; Grease in Quicksilver; Recent Additions to the California State Mining Bureau, 189. The Bell Gyrating Disc Engine, 190. Personal; Commercial Paragraphs; List of U. S. Patents for Pacific Coast Inventors; Recently Declared Mining Dividends, 194-195.

"NEXT WINTER will be the wettest of any for twenty years in California," is the prophecy of California coasting captains, which will not be objected to by California miners.

AND now it is seriously proposed by well meaning but mistaken Canadian legislators to reopen the whole vexed question of mining law in that province. Like all other sections, all that the miners of British Columbia need or ask is just to be let alone. It would seem from past experience that Canadian legislators should know this. Their action in 1899 created turmoil and entailed loss. The only result of the proposed Canadian legislation would be to again check the progress of the mining industry throughout that whole area.

IT used to be said that "trade follows the flag," and that belief still exists, but statistics do not substantiate it. There is no sentiment about trade, its function being to supply human wants that it sometimes helps to create. What a great many consume constantly they will buy where they can get it the cheapest, asking and caring little where the supply originated. Patriotism is not dominant in buying and selling. Taste and fashion are more potent. Geographical situation, the cost of the product laid down, are prime factors also. Trade will, however, "follow the flag" that shelters it. If the flag secures peace and rightful law to the trader, and if its folds carry assurance of protection, trade will follow wherever it flies.

LOFTY disregard of petty detail is not characteristic of the successful man. It is not he who makes the general suggestion or to whom occurs the abstract idea that has contributed most to mining or scientific progress, but the man who patiently wrought out the idea into practical shape. Like other crude material, it is the workmanship, the detail, put upon an idea that makes it of value. Probably to many had occurred the idea that some kind of vegetable fiber would well serve in the incandescent electric light, but it was the patient, steady experiments of Edison and his expenditure of thousands of dollars that produced the practical result. To many minds had doubtless occurred the idea of some swift process of effectually converting iron into steel by blowers, but Bessemer and his years of research and expensive experiment constituted the necessary detail that made it commercially profitable.

Permanence in Depth.

In the last paragraph of the third and concluding part of Manager Starr's excellent paper on the Empire mine, Grass Valley, Cal., on page 185, occurs a suggestion deserving of editorial endorsement and observance by many. Speaking of the mine as a permanent, profitable proposition, in the last sentence in his article, he refers to the desirability that the "shareholders will be willing to receive a reasonable interest return on their capital and will endeavor persistently to open up reserves in excess of extraction."

The non-observance of such suggestion, the clamor for constant dividends, and the hesitancy marked by their being passed, have ofttimes proved fatal to successful continuance of work that would have made a good, permanent mine out of a promising property—this without any individual reference, but as a general observation. It is to be noted that in most ore shoots there are frequent local irregularities, as occurred in the Ophir vein, in the mine of which Mr. Starr so instructively writes; and such local irregularities make it difficult to judge without extensive exploration whether the end of any certain ore body has been reached.

Where there exists among stockholders a constant demand for dividends, an insufficient understanding of the true economy of mining; where thereby has resulted the habit of immediate distribution of all of the mine's profits as dividends; where reserve funds for necessary development or exploratory work are thus unavailable, splitting or pinching or local impoverishment in any level at any depth has too often been the occasion of closing down a good mine. Lack of nerve, a discounting of the future, and limited understanding of the requirements of the situation on the part of those who hold the purse strings, are among the causes of idle and deserted mining camps in many a section where, under better understanding, should be constant and profitable extraction of ore.

The truth of this is manifest by simply referring to the best gold quartz producers in California to-day; and this applies to other States as well. A score of mines whose names will occur to California miners attest the fact that a pay shoot continues far below the depth at which at one time many of such mines had been developed.

In this regard it is to be noted that while many smaller veins carry only one ore shoot, in larger fissures there are generally several of them, and there is a constant probability that in such veins thorough exploration laterally or in depth will develop new bodies of ore, if the one on which exploitation has been carried on is found to pinch out. Of course, the first question naturally arising is as to whether with increased depth and cost of mining it would be good business or of likely profit to carry on necessary dead work. That such necessary dead work has been resultant in the making of many a great mine should go far toward taking the question out of the domain of theory and placing it among established fact. In each individual case this question of such interest to mine owners must naturally be decided by the record of the mine and the character of the fissure.

In an extended discussion of this subject of permanence in depth in California gold mines, W. Lindgren in a monograph on the quartz veins of Nevada Co., Cal., published by the U. S. Geological Survey, discussing this matter, says:

> It is generally conceded now that fissures are, comparatively speaking, surface phenomena, and that below a certain depth, where plasticity and flow of rocks under pressure come into play, open spaces can not exist. This limit Prof. Heim, for instance, places at 16,000 feet, while Prof. Van Hise, basing his consideration on the strength of rocks, arrives at 33,000 feet as the maximum limit for hard rocks in which fissures can exist. Even the lowest of these estimates far exceeds the depth of practicable mining. But it is not likely that all fissures continue until that limit. On a small scale the discontinuance of fissures may be observed in extensive sheeted outcrops. It is also an incontestible fact that many small veins close up in depth, while others continue unchanged. In considering the probable permanency of a given vein, its general character must be taken into consideration. Continuous well-defined outcrops and large bodies of quartz are in general good indications of the maintenance in depth, as is also any evidence of strong faulting and movement. Some quite extensive veins, though, have relatively short outcrops. Thus, the Eureka-Idaho practically shows croppings only for a distance of 2000 feet, but within that distance they are very prominent. Those of the North Star are less than 2000 feet long. From the developments to the east along the Omaha system it is pretty certain that the vein does not continue far across in that direction. A fissure which can be definitely proved to extend only a short distance will in all probability be found to be correspondingly limited in depth. In regard to probable permanency of the vein in depth, the Ural and Merrifield, along which extensive faulting has taken place, stand first in the districts.
>
> In scrutinizing the scant statistics of the production, in tons and value, of the Grass Valley district, it can not be denied that they show on the whole a distinct increase. There is also a distinct decrease in the average value of the ore. It is not safe, however, to draw too far-reaching conclusions from these data, because there are many factors involved: The cost of treatment and mining has decreased greatly by reason of the modern methods introduced, and more low-grade ores are now milled than formerly; nor are there any rich surface ores left to swell the grade.
>
> Leaving the difficult question of deep mining out of consideration, there are, however, in both districts a large number of veins which have been only slightly developed, but which with improved methods may be converted into paying mines. The development of these will probably maintain the production of the district for many years in the future, even if no new ore bodies are discovered in the old mines.
>
> It can be confidently stated that there is no gradual diminution of the tenor of the ore in the pay shoots below the zone of surface decomposition. Within the same shoot there may be many and great variations of the tenor, but there is certainly no gradual decrease of it from the surface down. This important fact has been previously stated by those conversant with the veins. The statements to the contrary are due to imperfect acquaintance with the facts and generalization from insufficient premises.

Mining Combinations.

The tendency to "trusts," combinations and combines, so manifest in all departments of the industrials, is daily more apparent in the mining world. From Michigan, Colorado, Utah, California, Nevada and Washington come reports of combinations of adjoining mining properties in the interest of economy, it being usually figured that it is cheaper for two or more contiguous mine properties to consolidate interests and dispense with a double set of managers and office force, besides doing away with the ever present possibility of mine litigation. Of course, it is manifest that in the very nature of things the ordinarily accepted elements of "trust" methods do not nor need not enter into any combination of gold mining properties, as that form of industry is exempt from any need of manipulation of price or supply, the product being of fixed value and universal and unlimited demand.

The latest report of metal mine combination is from California, where quicksilver producing properties in Colusa and Lake counties are reported to be consolidated into one organization, formed under the laws of New Jersey.

California has a practical monopoly of quicksilver production on this continent, and the conditions would seem more suggestive of all the possibilities of a "trust" than ordinarily obtains.

In this regard is to be observed the current conflicting conditions of the quicksilver industry. Boston, where several of California's quicksilver mines are owned and managed, wires this week:

> Some fear is felt in the trade that the world's production of quicksilver is likely to prove unequal to the growing demand. The total supply in 1899 was about 95,000 flasks from Spain, Italy, Austria and California. This was less than for quite a number of years, with an exception of two. The production of the cinnabar mines of California, the only large producers upon the American continent, has declined from 79,000 flasks in 1888 to only 28,100 in 1899. The principal mines of Spain and Austria, which have been producing for nearly 2000 years, are the only other producers of importance, except Russia, producing 8700 flasks last year, none of which came out of that country. Spain produced 39,340 flasks in 1899 and Austria only 15,000.

Such statements in the form of an Associated Press report usually precede a rise in the price of the article so discussed. But in this case there is a depreciation in current quotations, which this week, locally, are $48@48.50 per flask, domestic, and "about $45" for export. London advices also report a decline in price there.

Concentrates.

THE amount of tin in commercial tinplate varies from 3% to 9%.

FRANCE imposes a duty on lead ore and lead in pigs, bars and sheets of 30 cents per 100 pounds.

SILVER PLATING amalgam plates for gold mills was thoroughly discussed and illustrated in the issue of Feb. 17, 1900.

THE Carborundum Co, Niagara Falls, N. Y., can correctly answer the Colorado, Utah and Arizona questions concerning abrasives.

THERE are several dry concentrators in New Mexico, Arizona and southern California, and, in a limited way, are said to do good work.

THE attitude of the industrial world to mining development is one of constant and confident expectation and of commercial interest in further possibility of profit.

TO FIGURE the size of a steam pipe, an engine builder says the diameter of the steam pipe in inches equals the square root of one-sixth of the horse power of the engine.

OBTAINABLE DATA would indicate that three and one-half tons of rock per pound of explosive used is the average displacement in cases where there have been large blasts.

COMPOUND ENGINES are now made and in successful use in which the cylinder ratio is 1:7, and are sold under a guarantee to use a maximum of 12½ pounds dry steam per I H. P.

A SUBSTITUTE for German silver can be made by the use of manganese, the different metals and their proportions being as follows: Copper 65.25%, manganese 18.50%, zinc 13%, aluminum 1.25%.

THE Supreme Court of the State of California, in the case of Kern County vs. Lee (July 30, 1900), has decided that the California Mining Act of 1897 was effectually repealed by the act of March 20, 1899.

A "BLEEDER" on a steam boiler is the pipe and valve used to convey live steam from a boiler to make up a deficiency of exhaust steam. It is called a "bleeder" because of the rapidity with which it takes heat from the boiler.

IF it cost 50% of the gross value of the ore to produce, treat and defray all expenes of operation, then it would be necessary for a mine capitalized at $1,000,000 to have $2,000,000 worth of ore in sight to give the stock its full intrinsic par value.

BY actual count 247 notices of this paper were observed in different publications in the period from June 15 to Aug. 15, 1900, that is, during the last sixty days. And of these every one was complimentary. This is believed to be worthy of notice.

VERDIGRIS can be removed from copper plates by thoroughly scrubbing them with very fine sand and water, using a gunny sack or scrubbing brush. After the sand is washed off, scrub with a solution of one part oil of vitriol and four parts water.

IRON can be distinguished from steel by the use of a drop of either dilute nitric or sulphuric acid. If the surface remain unaltered, or nearly so, when so touched, the metal is iron; in the case of steel a black mark will be left, showing the liberation of carbon.

THE grain side of a leather belt should be run next to the pulley. Belt makers say that 25% more power can be transmitted with the grain side than with the flesh side next the pulley. A piece of beeswax occasionally rubbed on the belt and pulley ought to stop the belt from slipping.

THE Supreme Court of California has recently ruled that a technical objection to the manner of fixing monuments to mining claims is not sufficient to depose the original locators, if they have otherwise acted in good faith. This decision was made in a case from San Bernardino county.

FOR spelter—metallic zinc—ores carrying 60% at least are requisite for profitable result, and the less iron or lead the ore carries the better. The ore is not susceptible to smelting, but requires careful roasting. Hence the cost of extraction limits its commercial possibilities in Colorado and elsewhere.

LEAD miners are in no way liable to lead poisoning. The danger only occurs when the ores are smelted. It then results entirely from the formation of lead dust and of volatile lead fumes. In order to obviate the danger it is necessary to prevent lead fumes from being formed, or to conduct them away as rapidly as possible.

ILLUMINATING gas burning 5 feet per hour in an open burner has about 18 candle power. In San Francisco such gas costs about $1.50 per M cubic feet. On that basis electric lighting current would cost about 11¼ cents per kilowatt hour. California electric companies uniformly charge flat rates, others selling by meter measurement.

NOT all the "fakes" are found in the lying prospectuses of Copper Gongs and Golden Crowns. Of equally spurious character is the "capitalist" in alleged search of "a good going mine," or "a thoroughly developed property," who expects the owner of the property to prove its worth at his (the owner's) expense, and then let the "capitalist" have it at the price of an undeveloped prospect. And, sometimes, when one of those "capitalists" and the author of a meretricious mine prospectus get together, each trying to cheat the other, there is considerable undisguised hilarity on the back seats.

"THIS makes six subscribers I have induced to take your paper this year," writes a British Columbia subscriber, enclosing $3 and a new name, "for I feel that I am doing the mining industry a service in extending the circulation of so excellent a paper." This illustrates one of the ways in which the circulation of this paper is extended by its manifest worth.

THEORETICALLY a pipe 10,000 feet long, 12 inches diameter, will discharge 4.25 cubic feet per second under a head of 100 feet. In practice the figure would require modification. Under the conditions stated the mean velocity would be 5.41 feet per second. The area in a square foot of pipe is the same as the contents of 1 foot in length of the pipe in cubic feet.

SAN FRANCISCO'S normal annual rainfall is 23.4 inches. Fluctuations have occurred between a rainfall of 7.4 inches in 1850-51 and 49.2 inches in 1861-62. The variations in the winter rainfall are due to the changes in the positions of the lines upon and along which the areas of low pressure originate and move in their course from the North Pacific ocean into the interior of the continent.

THERE is no limit to the distance compressed air can be carried. The question is one of power, economy and local conditions, and cannot be specifically answered unless all the factors in the problem are supplied. In general working results can be secured with a distance of 4 miles between compressor and drills. By keeping out inch-pipe and elbows the efficiency of a pipe line may be increased.

THE use of even a weak solution of cyanide in cleaning amalgam plates is not favored by many millmen, who use dilute nitric acid, salt and water or scalding hot water, though the last sweating process is not considered good except at long intervals, or in shutting down the mill indefinitely. A page article in the issue of July 1, 1899, gives some practical points on this subject of cleaning plates.

TWO PER CENT would represent, approximately, the average content of silicon in the pig iron produced in American furnaces. Under certain conditions, the effect of manganese added to molten metal is to cause nearly 40% of the combined carbon in pig iron low in silicon to revert to the graphitic form. The strength of test bars so treated is increased 30%, the depth of chill decreased 20% and the shrinkage decreased about as much.

A LOCATOR of a mining claim can let it alone, do no work on it for five or six years, and if every one else lets the claim alone, he can get a patent by doing work or improvements to the amount of $500. But he takes chances right along during the period he fails to comply with legal requirement. His title is good as long as no one thinks the claim worth jumping. The $100 annual work is not "to keep the title alive," but to prevent it from lapsing.

ABOUT as large a storage battery as any in the country is that of the Chicago Edison Co., 139 Adams street. It consists of 166 cells—60 end cells—83 on each side of a three-wire system. Each cell contains 87 plates 15½x32 inches. The tanks are of 2-inch ash, lined with 5-pound sheet lead; each tank is 21½ inches wide, 79¾ inches long, and 43¾ inches high, and weighs 6200 pounds. The entire battery, exclusive of conductors, weighs 1,029,200 pounds. It has a capacity of 22,400 ampere hours at an eight-hour rate.

WATER can absorb about one-twentieth of its volume of air, and all water which has not been boiled contains almost as much air as it can absorb. One pound of water at about 70° F. occupies a volume of 0.016 cubic feet, or 2.3 cubic inches, and one-twentieth of this is 0.115 cubic inch. That is, one pound of water at ordinary temperature contains about 0.115 cubic inch of air. When water is converted into steam the air which it contained passes off with the steam, and occupies a volume which depends upon the pressure and the temperature.

THE Homestake and Highland mines, Lawrence Co., S. D., are owned by Mrs. Phœbe A. Hearst of Washington, Lloyd Tevis and J. B. Haggin of San Francisco, the Portland by Clinton, Iowa, people, the Horseshoe by a Canadian syndicate, the Grand Junction by Spencer & Crary, Custer City, the Holy Terror by J. S. George and the estate of J. J. Frayel of Milwaukee. The Golden Reward belongs to a company of which E. H. Harriman, Stuyvesant Fish, August Belmont, the Robert Goelet estate of New York, Samuel W. Allerton of Chicago and Harris Franklin of Deadwood are the principal stockholders.

SUCH words as "about" and "more or less" are often inserted in a contract of sale in order to relieve the seller from liability in cases where he has used his best efforts to deliver the amount called for. In any case in which the seller, under such a contract, has tried, to make delivery as stipulated, the courts will allow him a fair margin to cover unavoidable mistakes, and as much as 10% has in some special cases been held to be such fair margin. But the seller is never allowed to take advantage of this clause for the purpose of deliberately compelling the buyers to accept more or less than he has contracted for. The Supreme Court of the United States, for example, has held that the words "about," "more or less," and the like, used in such cases, are effective "only for the purpose of providing against accidental variations arising from slight and unimportant excesses or deficiencies in number, measure or weight." (6 Otto, 168.) In every case it is the seller's duty to weigh or measure out, and deliver, as nearly as possible, the exact amount called for by his contract. In doing so he is protected by the terms of his contract against any liability arising from the fact that it is impossible to deliver precisely the amount for which the agreement calls. But a seller cannot claim protection from the saving clause of the contract until he has tried in good faith to fulfill its main stipulation.

ALL substances are either attracted or repelled in some degree when in the field of a strong electro-magnet. If attracted, they are said to be paramagnetic; if repelled, they are diamagnetic. If a rod of any substance is suspended by a fiber so as to swing freely horizontally between the vertical poles of an electro-magnet magnetic induction takes place, and as the lines of force between the poles are essentially horizontal the effect of the pull or thrust upon rotation is greatest for the particles farthest from the axis of rotation. If paramagnetic, therefore, the effect is to pull the rod into a longitudinal or axial position, with its ends as near the poles of the magnet as possible; and if diamagnetic, the rod is pushed into a transverse or equatorial position, with its ends as far from the magnetic poles as possible.

FOR the fiscal year ending June 30, 1900, the exports of copper were 333,340,725 pounds, or 148,813 tons, valued at $55,772,166, as compared with 254,987,164 pounds in 1899, or 113,833 tons, valued at $34,476,343. The manufactures of copper exported in 1900 were valued at $2,079,541, as compared with $1,507,186 in 1899. The exports of sulphate of copper for the fiscal year ending June 30, 1900, were 47,790,765 pounds, valued at $2,120,745, as compared with 27,474,801 pounds, valued at $1,173,186 in 1899. The export trade in sulphate of copper was not separately reported until 1898, in which year was exported 14,736,373 pounds, valued at $475,707. The total value of exports of copper, not including ore, and manufactures thereof, including sulphate of copper, in the fiscal year 1900, was $59,972,452; that of $37,156,715 in 1899 was the next largest.

TO HOLD the possessory title to a mining location not less than $100 worth of labor must be performed or improvements made thereon annually until entry shall have been made. The first annual expenditure becomes due and must be performed during the calendar year succeeding that in which the location was made. Expenditure made or labor performed prior to the first day of January succeeding the date of location will not be considered a part of or applied upon the first annual expenditure required by law. Failure to make the expenditure or perform the labor required upon a location will subject a claim to relocation, unless the original locator, his heirs, assigns or legal representatives have resumed work after such failure and before relocation. Annual expenditure is not required subject to entry, the date of issuing the patent certificate being the date contemplated by statute.

IN last week's issue in response to a question as to how to best get the gold or amalgam off old copper plates, a leading assayer furnished "Concentrates" with suitable answer. Upon its appearance, another experienced authority says that a good way to free copper plates from gold is to put them over a charcoal fire and slowly evaporate the quicksilver. The plates should be cooled gradually, then rubbed with muriatic acid, put in a damp place over night, then rubbed with a solution of sal ammoniac and saltpeter, and slowly heated over a thin red fire, but not allowed to get redhot. When the gold scale blisters the plates should be taken from the fire and the gold scraped off. Where the gold has not blistered it should be treated with the solution and again fired. Collect the gold scales in an earthen dish, cover with nitric acid till the copper is dissolved, when the gold can be smelted; after melting, corrosive sublimate should be used in the crucible till a blue flame ceases to burn.

THE Quintera lode, Sonora, Mexico, is a silver ore containing galena, 11% to 16% zinc, 8% to 11% copper, and arsenical and antimonial sulphides. The yield in silver is 100 ounces per ton; the gangue is quartz. The stamped ore is roasted in reverberatory furnaces with four-graded hearths at a low temperature. Ores containing blende require three hours, other ores, two hours, at each hearth. The addition of 4% to 8% of salt is made at the last hearth two hours before discharge. The chloridized ore is discharged on a cooling floor in heaps, and is then charged into vats with sand filters of a foot in thickness. The lixiviation with water lasts fifteen to twenty-four hours, the chlorides and sulphates of copper, zinc and iron being dissolved. Lixiviation with double hyposulphite of calcium and sodium follows, the best strength of solution being found to be 0.55% to 0.66%. The silver is precipitated by a calcium polysulphite solution. The sulphides are collected twice a week, dried, roasted at low temperatures in a reverberatory furnace and incorporated in the cupellation with litharge. For cementation of the copper in the leaching waters, copper mattes from lead smelting have been used with success. Very poor silver ores are concentrated, agglomerated with clay and 10% of charcoal, and smelted with ores of a superior grade in a water-jacket furnace, the chief difficulty being caused by the high percentage of zinc, arsenic and antimony. The copper matte is concentrated to 40% by resmelting. The slags carry 1.3 ounce of silver per ton. The cost of 1 ounce fine silver at last accounts was stated to be divided as follows: Mining 36.0%, milling 26.4%, administration 6.9%, profit 30.7%.

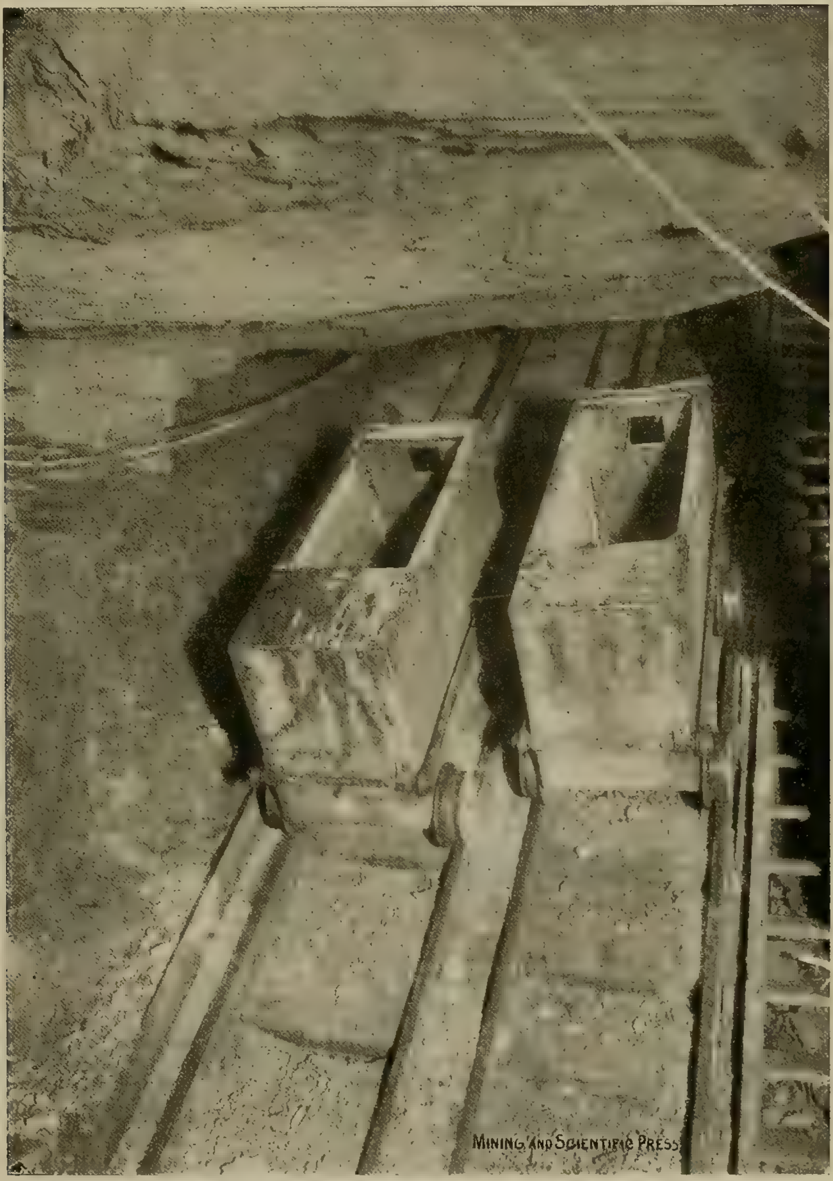
The Empire Mines, Past and Present.

NUMBER III.—CONCLUDED.

Written for the MINING AND SCIENTIFIC PRESS by
GEORGE W. STARR, Resident Manager.

The main working shaft is sunk on the Ophir or Empire ledge, with miles of drives extending along the vein at different levels. The Rich Hill and other veins, lying in the hanging, will be worked by crosscuts run from the 800, 1400 level, etc.; thus many drives on the Ophir vein may have a series of parallel drives on different veins.

Underground development work is carried on with 3½-inch air drills, Rand and Ingersoll-Sargent. The air is supplied (pressure at drill 80 pounds) by a duplex compressor, cylinders 16x24 inches stroke, designed and built by the Risdon Iron & Locomotive Works; two inch Baby drills are used for raises and some stoping. The average cost per foot for 5x7 foot drives being: Materials, $1.16; miners, $2.87; power, maintenance, hoisting, etc., $1.73; total per foot, $5.76. From 1892 to 1898 shaft was sunk 110 feet. In 1899 shaft was sunk 205 feet. This year it is expected we will sink 400 feet, making a total depth on the incline of 3080 feet, All costs of shaft sinking in 1899 amounted to $16.87 per foot; the ground, however, was very favorable.



Skips in Shaft, Empire Mine, Crass Valley, Nevada County, Cal.

Levels were formerly run giving about 100 feet of backs, but owing to their extent (the 2100 level is now 3900 feet long, extending 2500 feet north and 1400 feet south of the shaft), the levels will be kept far enough apart to give 250 feet or more of backs. The veins have general northerly and southerly direction, with an average dip of 30° to the west; they continue without disturbance from the surface rock formation down into the deepest and last intrusive rock formation of the Grass Valley district and can be relied upon to extend to great depth. They vary in width from a mere seam to 1, 2 or 3 feet, and have many branches that, when found, must be drifted upon before it can be determined which one constitutes the main vein. All quartz in the vein is not pay ore, some of it not being worth even a dollar per ton. The bonanza value occurs in shoots or bunches, which in my opinion form laterally (in zones) along the course of the vein, with other shoots horizontally therefrom and parallel thereto on different veins, but without any regular trend or, if any, opposite to the trend of the nearest crossing. The values in the quartz consist of free gold, which is easily amalgamated, and from 2½% to 3½% of sulphurets that run from $60 to $200 per ton. The quartz at times carries so much free gold as to be "specimen rock," and probably a percentage of this rock is lost by theft.

Notwithstanding great care in surface draining and a very complete system of drain tunnels, the mine makes considerable water. In winter 450 gallons per minute are pumped from the 1100 station to drain tunnel and 250 gallons per minute from the 2200 station to 1100. The Cornish pumping system is used and will this year be supplemented with an hydraulic pump at the 1100 station, capable of lifting 600 gallons per minute to the drain tunnel. This pump will be operated with water under a head of 820 feet. In a recent test it was found that our Cornish pump system gave a realized efficiency of 52% of the original power (water) applied to Pelton wheels under a head of 420 feet.

After being mined the ore runs or is shoveled or trammed through intermediate drives into large bins provided with gates. From these bins it runs into the ore train. This train consists of six cars, each holding 1200 pounds, drawn by a mule, the grade of the drives being ½ of 1% in favor of the load. The cars used underground are the Rand "U" type, side tipping, made entirely of iron. The ore is thus hauled and dumped into bins at the shaft, from which the skips, each holding 3500 pounds, are loaded. The shaft is 16x7 feet, divided into three compartments consisting of two haulways, ladderway and pumpway; gauge of track, 30 inches, laid with thirty-pound steel rails. The shaft is lighted with incandescent electric lights placed 50 feet apart. Each hauling compartment is provided with electric return signal bells and a telephone system communicates to the principal stations from the hoist and machine shop. All wires are in conduit.

At a speed of 1000 feet per minute the skips are hoisted and automatically dumped on grizzlies at the top of the headgear, the finer particles falling direct into the lower ore bins, the coarse falling into a separate bin holding 150 tons. In front and just below this bin is a No. 5 Gates crusher, which, when running, is fed with a continuous stream of quartz by opening the gates leading from the bin. The waste rock is loaded into the skips from a compartment of the shaft bins, hoisted and automatically dumped into a bin holding 150 tons, situated below the upper ore bin, from which it is trammed, in side-discharge cars, to the circular waste dump.

The hoisting works consist of a headgear 94 feet high, supporting ore and waste bins (lined with 30-pound "T" rails), crusher, etc. Foundations are six cement piers, 11 feet deep, 4½-foot base and 2½ feet on top, on which rest main sills, 18x24 inches Oregon pine, main framework 18x20, Oregon pine. The hoist was designed by Connors & Grant, built by the Union Iron Works, and consists of two 6-foot reels, with 8-foot friction bands driven by paper frictions 24 inches diameter, 13-inch face, operated by two 10-foot Pelton wheels, each with three nozzles controlled by hydraulic gates. Capacity of hoist at present depth is 750 tons in twenty-four hours, it being designed for future requirements and capable of hoisting from a depth of 5000 feet at a speed of 1000 feet per minute. Water under a pressure of 420 feet is used for hoisting, pumping and for compressor, with steam and necessary engines in reserve in case of failure of supply.

The pump, compressor and boiler house is situated back of the collar of the shaft and extends under the incline of the headgear. Thirty feet in front of the collar of the shaft is a building 30 feet by 120 feet, in which are blacksmith, machine and carpenter shops, with all necessary lathes, planers, drills, presses, etc. Over the shops are two changing rooms for underground men, one for each shift, bosses' room, supply and timekeepers' room. The changing rooms are heated with hot water passing through pipes, on which clothes are dried.

From the crusher the ore passes into the lower ore bins, which hold 150 tons, provided with bottom discharge doors, from which it is trammed in side-discharge cars, each holding one ton, to the ore bins in the mill. These bins hold 600 tons. Here it passes through the 40-stamp mill (run by electric power, with water power in reserve), over vanners and finally into a Gates slime plant. Satisfactory assays of the ore before it enters the mortars are not as yet obtainable. The pulp is assayed when it leaves the plates, when it enters the slime plant, and when it finally passes through the tailings automatic sampler, after leaving the slime plant.

The percentage of recovery is as follows:

By battery amalgamation	.518
Outside plates	.231
Vanners	.147
Settling tanks for overflow, cleanup escapes, float, sulphurets, etc	.012
Slime plant	.038
Total extraction	.946

The above is the average for eighteen months. The following percentage averages are for three years: Per cent of amalgam to 1 ounce of quicksilver fed in mortar, 2.98 ounces; per cent of gold to 1 ounce of quicksilver fed in mortar, 1.41 ounces; milling costs per ton ore crushed, $0.4924.

The mill is of the usual type, Homestake pattern mortars, stamps 850 pounds, 7-inch drop, speed 100, order of drop 1-5-2-4-3. The character of the ore requires fine crushing; 40-mesh screens are used. Run of plates 4x17 feet, 1½ inches to the foot grade. The cleanup pan consists of a large cast iron bowl, revolving twenty times per minute, set on an angle of 45°.

Cannon balls are placed in the bowl and revolve in an opposite direction to the pan, grinding and cleaning thoroughly all amalgam, headings, magnet iron or anything from the mill requiring grinding. A continuous overflow of water washes out all waste material, leaving a product which is easily cleaned up.

From December 31, 1878, to January 1, 1899, ore mined and milled 218,241 tons, at a total expense of $11.15 per ton.

From December 31, 1898, to January 1, 1900, the following results were obtained: Ore mined, 24,682 tons; ore milled, 24,707 tons; development work, 5665 feet; total expense per ton, $7.09. For six months of 1900: Ore mined, 14,784 tons; ore milled, 14,280 tons; development work, 4310 feet; total expense per ton, $5.97.

With improvements now under way at the mill 2700 to 3000 tons of ore will be milled monthly, and development work increased at least 800 feet per month.

The average width of the ledge in the numerous stopes is at present less than 2 feet. By stoping in an average width of 2 feet, increasing tonnage milled and a hoped for reduction in the cost of power, I expect to bring all costs under $5 per ton, including 800 feet of development work per month.

The appearance of the surface of this property has been the subject of much comment. The collar of the shaft is arched with granite. All buildings of the plant are enclosed with No. 26 galvanized iron and built on rock foundation, no timber rests within 4 feet of the ground. The floors of the mill are asphalt, laid on a concrete foundation.

The office is built of stone and contains, besides the usual general and private offices, map, drafting, assay, retort and melting rooms. A portion of the basement is used for a store room, from which supplies are issued.

Adjoining the plant is a natural park, beautiful with lawns, shrubbery and an artificial lake. Cottages have been built for the officials of the company that are suggestive of Burlingame or Tuxedo. The plant and park are surrounded by a high stone wall.

The plant is protected from fire by numerous monitors.

What appears to some as an extravagance is a remunerative investment. The lake is a reservoir that receives the water used for power, from whence it flows to be used at the North Star mines and Allison Ranch mine.

At the collar of the shaft repairs are no longer necessary. In the mill and buildings there are no floors to wear out or timbers to decay; repairs are reduced to a minimum, maintenance and insurance accounts are small, and, above all, the influence of the surroundings invite a high class of labor, and system, order and neatness become a matter of course. A visit to the property by the officials and shareholders is no longer irksome, but more in the nature of a pleasure trip, and personal interest by those financially interested is a spur to the administration of any enterprise.

The oldest continuously worked gold mine in the United States after an active life of nearly fifty years is thus passing from its infancy, its growth no longer checked by lack of means of development. As long as its shareholders will be content to receive a reasonable interest return on their capital and will endeavor persistently to open up reserves in excess of extraction, their property will remain a model for California mining, and a monument when mining in California is no more.

Silver Smelting in Mexico.

NUMBER IV.

The fuel used is Laredo coal. The pots hold 425 bars of furnace bullion, at 96 pounds, and are supposed to turn out twenty tons of improved bullion; but they do not do it without refilling after skimming. The bullion is syphoned off into moulds, arranged in a semicircle around the pots, an arrangement borrowed from desilverizing establishments. The object of remelting the furnace bullion is to get the copper out of it and utilize it in the blast furnace, and also to be obtain a correct sample which is taken out of the swivel pot of the syphon. The continuous recharging of the dross obtained from the pots into the blast furnaces is an absurdity, as in the course of time the furnace bullion becomes so deteriorated that the syphon tap refuses to work. The plan of smelter No. 2 to a liquate its furnace bullion and put the dross through a separate furnace is decidedly preferable.

There are also two specially constructed platform scales in this building on which the bullion is weighed and reweighed. Tracks of 30-inch gauge connect the blast furnaces with the pots, the weighing floor, and the railway cars to be loaded with the bullion. Another track connects the dross dump with the ore shed.

In a place between the refinery and the calciners there is a covered kiln for baking flue dust bricks, which is arranged for burning Laredo coal. Directly behind the blast furnace building and parallel to it, but separated by a space of about 10 feet, is the ore shed in which the lead and silver ore beds are built up. Lengthwise it is divided into three unequal parts. The part nearest the furnace shed contains the hydraulic elevators on which the charges are lifted to the charge floor, and the weighing machines on which the charges are weighed up. The central part is occupied by a gangway for wheelbarrows, and a tramway on which materials are brought in trucks from a distance to the charge scales. The largest third is reserved for ore beds. Each quadrangle or bent formed by posts is called a space, and has a number by which the ore stored in it may be identified. There are usually two or three large lead ore beds, a like number of rich silver ore beds, a supply of roasted matte, flue dust bricks, dross, and barrings, kept in there. All other ores and materials are stored in the yard in the open air and made accessible by laying movable tracks (flying tracks) along the long sides of the beds.

Experience has taught that ores saturated with moisture give better results in the smelting furnace than dried ones, both in regard to tonnage and cleanness of slag. In accordance with this observation the ore beds are thoroughly drenched with water from hydrants placed near them. The ferruginous ores which have usually a clayey gangue retain then regularly about 12% moisture, while the quartzose and limey ones average from 3% to 8%. At some smelters the charge is soaked with water in front of the furnace door for the same reason.

The floor of the ore shed was originally made of wood, but it may be imagined that, with all the shoveling done on it and the action of the water drained from the ore beds, there was no end of repairing. This led to a trial of brick flooring, which proved an entire success. The brick must be hard-burned and laid on a foundation of slag concrete. A square meter of paving, including cement concrete, costs $2.98. Where brick is good and cheap ore floors of that kind can not be recommended too highly. In a good many smelters too much dirt is smelted, which is dug out of the ground on which the ore rests while shoveling it into trucks. Thus it may occur that more ore has been smelted than can be accounted for.

There are five hydraulic lifts or elevators, which receive their water directly from a steam pump. The elevator shafts are connected at the top with the charge floor by short bridges. Four elevators are arranged in pairs, and the fifth stands opposite the two end furnaces. Each pair of elevators serves five furnaces. The fifth is kept in reserve in case furnaces run too fast, or when any furnace is run on a special charge.

In front of the elevators there are three weighing machines of Fairbanks' make, so-called stock or charge scales, with seven beams each. They are set equidistant from each other, and opposite the centers of the elevator shafts. Each weighing machine can accommodate five furnaces, but it was generally so arranged that one machine served five, the second one four, and the third one furnace, which was run on secondary products. The other furnaces usually ran on the same ore charge.

The ores and fluxes were weighed up in this fashion: First, lead ore, which forms the largest part of the charge; then iron ore, then poor silver ore, then rich silver ore, then roasted matte, and, lastly, limestone. The lead ore was brought directly from a bed in the charge barrow, but the other materials were grouped around the scale platform in the order in which they were intended to be weighed up. A charge barrow comfortably holds 500 pounds of charge, and this was called a half charge, two of them being shoveled into the furnace simultaneously from opposite doors. The head weigher of each scale has to keep tally of the charges sent up on the elevator; besides, there is an automatic counter attached to the first ore beam. To prevent the scale platform from getting jammed by fine ore or little pebbles there is a pit under the scale, in which the spilled ore accumulates. This is cleaned out once a week. The scale must be tested for its correctness every day.

The slag added to each charge was brought over to the furnaces from the side facing their working front.

The fuel is weighed up on the charge floor. There are two platform scales for that purpose, one for five furnaces. The fuel is brought up to the charge floor in railway cars on an incline connected with a straight trestle bridge running along the front of the furnace building, and terminating in another incline at the other end. Six standard gauge cars could be placed on this trestle bridge, which afforded more than twenty-four hours' supply. But this arrangement is not to be recommended, on account of the constant danger of a railway accident. Besides, the trestles were of wood, and liable to be set on fire. The surplus of fuel was unloaded on the ground below the incline. The charge floor, having been intended originally for six small furnaces, was too small for the larger ones, and afforded no place for storage of fuel, slag or other necessary material in case of failure of the regular supply. Hence it sometimes happened that a wheelbarrow train had to be organized to bring up fuel on the incline from the stock pile until a switch engine could be procured. This is only one of the many vexations occurring almost daily in a Mexican smelter.

It is known that an admixture of charcoal notably increases the speed with which the charges descend in a furnace when a dense or dirty coke is used, or, in other words, it increases the tonnage, the goal of every smelter. With this idea in mind, mixed fuel was used at the Guggenheim works for several years. The charcoal was made in ovens on the line of the Monterey & Mexican Gulf Railway by an American company, and, unlike the wretched stuff turned out by Mexican coal burners, was of very good quality. But the irregularity of supply, caused by wrangling with the railway officials, and the inflammable nature of the charcoal, finally led to its abandonment, except for blowing-in and domestic purposes. It was delivered at the works for $11.18 per metric ton, which corresponds to $10.14 per 2000-pound ton.

The prediction of some metallurgists that mineral coal would largely supersede charcoal in mixed fuel received no recognition in these works. If coke containing gaseous matter impedes reduction, how much more will this be the case with bituminous coal, not considering the ash, which is always high in the raw material. Anthracite coal is very dense and not porous, requires a blast of high pressure, and splinters, thereby slowing the descent of the charges. Hence this material is also to be rejected.

The only coke made in the country is the San Felipe of the Sabinas coal field, on the line of the Mexican International Railway. It is of such poor quality that it has not found favor with custom smelters, and is only used by copper smelters and lead smelters that do not have to treat purchased ores. An analysis of the Sabinas coke afforded fixed carbon 79, ash 19.2, water 1.5, total 99.7.

It costs delivered at Monterey $10.84 per metric ton, which is equivalent to $9.83 per 2000-pound ton. In order to test quality and prices thoroughly coke was imported in large quantities from Pennsylvania, West Virginia, Indian Territory, Wales and Belgium. European coke had to be left out of the question on account of its price, being higher by $5 a ton than any of the others, and also on account of the long sea voyage. Pennsylvania coke is too dense for rapid work, and objectionable on account of the high ash (12%); Indian Territory coke is too friable. Hence there was only to choose between Alabama and West Virginia. Analyses of these cokes are here appended:

		West Virginia.	
	Alabama.	Pocahontas.	Loup Creek.
Water........	0.23	1 092	....
Volatile matter	0.64	2.150	2.5
Fixed carbon..	90.00	89.078	91.9
Sulphur.......	0.80	0.656	....
Phosphorus....	none	0.006	....
Ash...........	8.00	7.024	5.6
	99.67	100.006	100.0

The average price of all the United States coke laid down at Monterey works was $12.64 per 2000-pound ton.

Better transportation facilities decided in favor of the West Virginia coke. It fills all reasonable requirements in regard to furnace speed, reduction power, and low percentage of ash. Its only drawback is its softness and consequent heavy abrasion in transit, which amounts to at least 7% in weight. The limestone is brought in ox carts from a quarry at Topo Chico, 3 miles distant, and is delivered wherever required at 85 cents a metric ton. As the cart driver unloads this himself, this is cheaper than receiving it by rail, when laborers of the smelter would have to unload it. The lumps are, however, too large for convenient weighing, and have to be broken into pieces not exceeding eight pounds. The stone is then loaded on trucks and trammed to the charge scales. The limestone is of a dark grey color, and is incorrectly called "black marble." It contains from ½% to 1% of silica and from 54% to 55% of calcium oxide. Limestones of such purity are not often available at a smelter. Usually they contain more silica, quite frequently notable quantities of magnesia, alumina and iron, and sometimes even nodules of marcasite. The latter substance greatly interferes with the production of a correct slag if unobserved.

In every smelter run on commercial principles the great problem is to put through the largest possible quantity of that ore from which the greatest profit is derived with the least loss. In a custom smelter this is, of course, the siliceous and sulphide ores, while in smelters attached to one or more mines it is the ore from these mines of which "tonnage" is required.

At the Guggenheim works the average ore charge for the year 1896 consisted of 33% of siliceous and sulphide ores, 30% of lead ore, 32% of argentiferous iron ore and 5% of roasted matte.

The matte is in the proportion in which it was produced. The limestone added as flux amounted to 7.82% of the weight of the ore.

The lead ore beds were made up so that they contained about 27% of lead, and were of a basic character. Since the principal lead ore supply came from the Sierra Mojada (Encantada mine), where the lead contents have dwindled down to 20% and less, it is evident that ores richer in lead had to be put on the beds to attain the desired 27%. The only ore of that kind available in quantity was the ore from the firm's Reforma mine in the State of Coahuila. This ore was, however, quartzose, and contained also barium sulphate. Other rich lead ores could only be picked up in small lots. Whenever the Reforma failed to come in the lead contents would drop at once. In the following are given examples of the composition of some lead ore beds:

	SiO_2.	Fe.	CaO.	Zn.	S.	Pb.	Ag. oz	Moisture.
I...	13.6	21.6	3.3	2.3	1.5	27.0	15.4	12
II...	19.2	19.3	4.2	3.0	3.0	21.1	26.9	12
III...	6.5	28.5	2.0	1.2	1.0	18.7	7.8	12

In some of the ores composing these beds, notably in Encantada, there is also arsenic, originating from arsenate of lead, and sulphate of baryta. The arsenic is only interesting from a commercial point of view, and the sulphate of baryta is present in such small quantities that it does not exercise any influence on the slag.

Bed No. I is of normal composition.

Bed No. II is abnormal in regard to lead and silver, and

Bed No. III is very bad, and would indicate that something unusual had happened.

The basicity of No. III shows at once that a large addition of siliceous ore will be required to satisfy it, which will lower the lead percentage of the furnace charge to the danger point.

The ferruginous ores ran about as follows:

	SiO_2.	Fe.	CaO.	Zn.	S.	Pb.	Ag. oz.	Moisture.
IV.......	5.5	40.5	2.8	2.6	1.2	8.1	2.5	8
V.......	6.6	35.5	3.0	1.5	1.2	9.0	2.3	8

No. IV is from the San Pedro mine, near Monterey.
No. V is from the San Pablo, near Monterey.

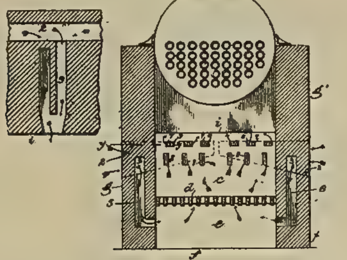
(TO BE CONTINUED.)

Mining and Metallurgical Patents.

Patents Issued August 7, 1900.

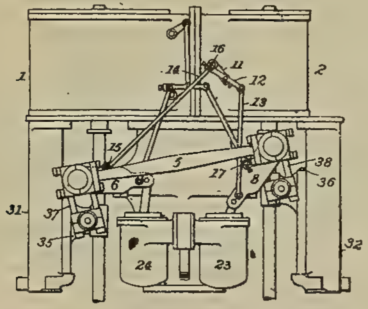
Spec'ally Reported for the MINING AND SCIENTIFIC PRESS.

SMOKE-CONSUMING DEVICE FOR FURNACES.—No. 655,221; G. S. Gallagher, New York.



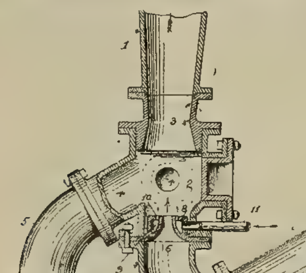
Furnace combination with grate bar and bridge wall, of entrance flues 2 3 from opposite sides through bridge wall, series of parallel double or return flues 7 8 connected at inner ends, air flues 9 parallel with flues 7 and connecting at one end with entrance flues 2 3 and at other end forming a common exit opening with flues 7, and branch flues 5 6 through side walls of furnace and opening beneath grate bars.

PUMPING ENGINE.—No. 655,232; C. L. Heisler, Erie, Pa.



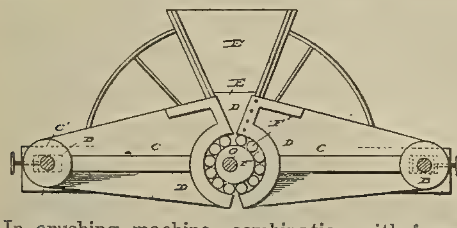
Combination with pair of steam cylinders and their reciprocating piston rods, of compensating mechanism comprising pair of rocker arms each mounted upon fixed pivotal support, connections between rocker arms and respective piston rods, and floating link connecting free ends of rocker arms, they and floating link being so proportioned and pivotal points of rocker arms so located that when either rocker arm and floating link are in common plane, which is at right angles to their planes of movement, remaining rocker arm will be out of said plane.

HYDRAULIC ELEVATOR.—No. 655,615; G. H. Evans, Oroville, Cal., assignor to Risdon Iron and Locomotive Works, San Francisco, Cal.



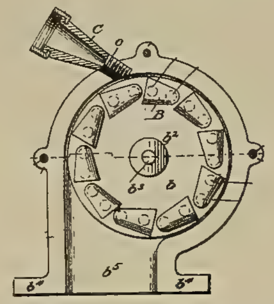
Hydraulic elevator, combination of base chamber or seat having suction-opening, an elevator-pipe connecting with chamber or seat, an ejector-pipe, casing in chamber provided with part constituting nozzle for ejector-pipe which nozzle extends to top of casing and having an annular air-chamber provided with one or more openings through casing-top exterior to nozzle and through which air enters base-chamber or seat, an air-pipe connecting with air-chamber.

ORE CRUSHER.—No. 655,311; T. Smith, Hopewell, N. M.



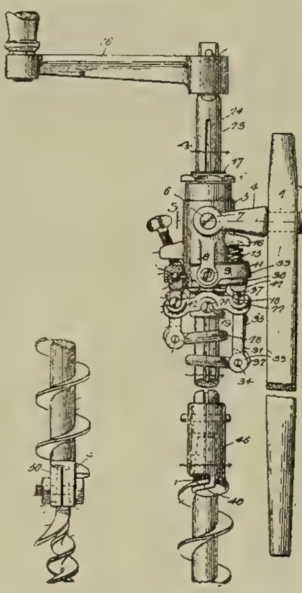
In crushing machine, combination with frame, of crushers pivoted thereto at their outer ends, each having semicircular recess in its inner end, an eccentric within recesses, rollers interposed between eccentric and walls of recesses, shaft secured to eccentric and mounted in longitudinally movable boxes within frame, whereby rocking motion may be imparted to crushers from eccentric.

IMPACT MOTOR.—No. 655,271; W. H. Pfeiffer, York, Pa.



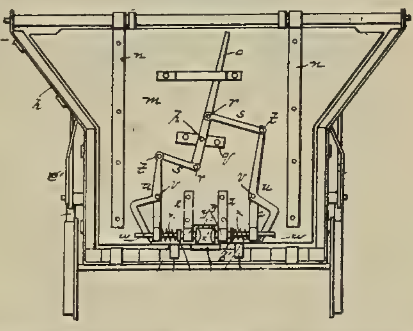
A motor comprising sectional casing partially inclosing double-bucketed turbine wheel, buckets being arranged on opposite sides of disk or plate, constituting body of wheel, buckets on one side of disk discharging into those on opposite side thereof, and at about midway of their length, and vice versa, disk being housed between sections of casing, and buckets working in alined circumferential grooves of like size, formed in inner opposing faces of sections.

MINING DRILL.—No. 655,292; J. Wynne and V. V. Haidacher, Wilkesbarre, Pa.



Drilling machine, combination with support, sleeve revoluble therein, drill shaft adapted to move longitudinally in and rotate with sleeve, of rocker on support, means to cant same, rocker yokes on sleeve, feed rings on drill shaft, and connections between feed ring and canted rocker, engaging and actuated by rocking yokes.

END-GATE FASTENER FOR MINING CARS.—No. 655,505; L. S. Morrow, Smithton, Pa.

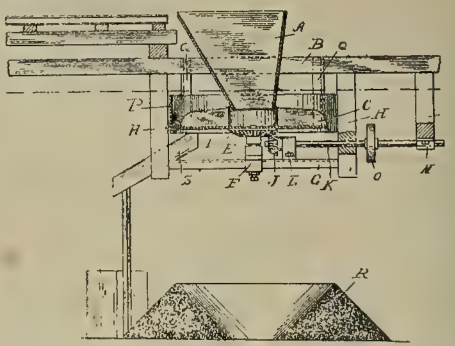


Combination with car, swinging end-gate and stop-bars n′, n′ carried by gate, of pivoted hand locking-lever o, bars s, s, pivoted thereto, pivoted angular levers u, u, having upper ends pivoted to bars s, s, sliding bars x, x having slots in outer ends to receive free ends of angular levers, eye-lug x′ to receive inner ends of bars x, x and springs for holding bars x, x normally in engagement with eye-lug.

PROCESS OF REFINING MINERAL OILS.—No. 655,500; T. Macalpine, London, England.

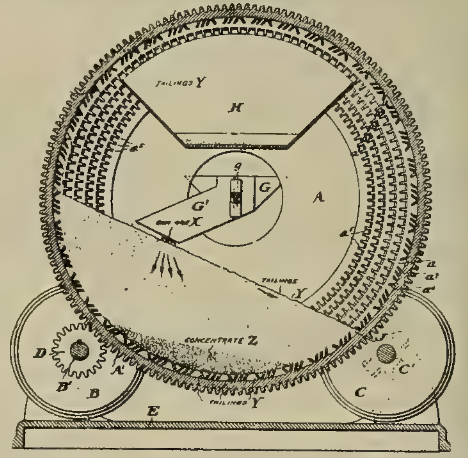
Refining petroleum and mineral oils, which consists in subjecting them to action of compound of acetylene and manganese, with or without addition of other purifying agents, allowing the mixture to settle, with or without agitation, removing oil and distilling it.

ORE MIXER AND SAMPLER.—No. 655,478; J. M. Damm, Durango, Mexico.



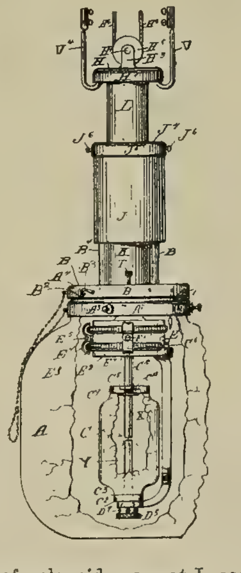
Combination with hopper, of horizontally rotating member below same, comprising central receptacle into which delivery end of hopper projects, and plurality of radial spouts adapted to withdraw from receptacle and distribute same by centrifugal force, member surrounding rotating member of greater diameter than sweep of latter against which ore is adapted to impinge and drop, whereby heap of uniform grade is adapted to be formed, and inclined radial trough mounted below rotating member and extending outwardly from point within sweep thereof and intersecting circle of falling ore, trough being adapted to receive small portion of ore and deliver same at a point beyond edge of main heap.

PROCESS OF CONCENTRATING ORES ANHYDROUSLY.—No. 655,495; S. M. Lissau, Philadelphia, Pa.



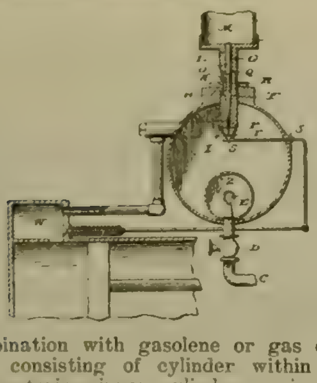
Anhydrously concentrated comminuted material containing precious metal, consisting in continuously agitating mass of material, forming strata of its particles in accordance with specific gravity thereof; retaining concentrated product at bottom of mass; maintaining layer of dry waste material above concentrated product by supplying raw material to mass during its agitation; continuously removing lighter waste material, in dry condition, from upper strata of agitated mass, through latter and beneath concentrated product at bottom thereof; and discharging waste material exterior to mass.

ELECTRIC ARC LAMP.—No. 655,266; J. S. Nowotny, Madisonville, Ohio.



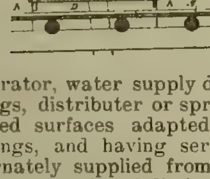
Combination of solenoid magnet I, cap J^4, tube G, frame piece B, interior piston N carrying tube O, embracing slidable carbon holder P and core S, embracing tube O, and tube R, supporting tube O, and set screw for setting tube R at desired place on tube O, core being located relatively to solenoid magnet as shown, and box M, supported by slidable core, and containing means in connection with stationary tube M^3 for releasing its hold upon carbon and regaining it as core shifts, and frame B, supported on tube O, and frame E, E^2, supported by frame B, and carrying tube M^1, and rheostat supported by frame E, and encircling carbon at that point, viz., below core and magnet, and set screw T in frame B above box M, and in path of same.

VAPORIZER FOR GASOLENE ENGINES.—No. 655,407; J. G. MacPherson, Philadelphia, Pa.



In combination with gasolene or gas engine, of vaporizer, consisting of cylinder within cylinder, flame jet entering inner cylinder, spring-actuated gasolene-admitting valve located above inner cylinder in top of outer cylinder, lever fulcrumed upon exterior of outer cylinder and having free end within and one without cylinder, guard or plate carried by lever near free inner end thereof to prevent gasolene from flowing too far upon lever, and means for operating lever to cause its inner end to contact valve to admit gasolene to be vaporized.

CONCENTRATOR.—No. 655,470; W. H. Washburn, Oroville, Wash.



In a concentrator, water supply device having discharge openings, distributer or spreader having oppositely inclined surfaces adapted to reciprocate beneath openings, and having series of divergent channels alternately supplied from water box, distributer also having series of discharge openings at its opposite edges, and gates by which amount of water delivered to the channels is regulated.

Copper Statistics.

The following table gives the production of copper in the United States for the years 1897, 1898, 1899, and shows the stock on January 1, the imports, the exports, the home consumption, and the stock on hand December 31:

	POUNDS OF FINE COPPER		
	1897.	1898.	1899.
Montana	237,158,540	216,979,334	237,953,951
Michigan	145,839,749	156,669,098	155,845,786
Arizona	81,019,922	110,823,864	125,377,758
Other States	33,169,272	44,412,561	52,633,699
Copper in sulphate	4,182,812	7,015,375	9,507,897
Total dom. prod.	501,370,295	535,900,232	581,319,091
Stock January 1	83,600,000	48,882,143	54,361,470
Imports	26,938,254	43,479,288	94,568,050
Total supply	611,908,549	628,261,663	730,248,611
Deduct exports	288,626,240	299,765,054	249,923,941
Deduct consumption	274,400,166	274,135,139	391,602,111
Stock December 31.	48,882,143	54,361,470	88,722,559

It will be seen that the stock of copper January 1, 1899, was 54,361,470 pounds, and the stock on hand December 31, 1899, was 88,722,559 pounds, an increase of over 34,000,000 pounds. This increase was due to the falling off of exports, which were 50,000,000 pounds less in 1899 than in 1898. This decrease was due to the fact that copper, being higher in price than for some years previously, the foreign consumers used up their available stocks, bought at a lower figure, but after January 1, 1900, these stocks being practically exhausted, they commenced placing large orders for copper in the United States markets, which during the past six months have very largely increased the exports of the metal, the copper exports from January 1 to June 30, 1900, being four-fifths of the amount exported during the twelve months ending December 31, 1899. The home consumption of copper in 1899 was over 117,000,000 pounds greater than in 1898.

This table also shows that Montana, Michigan and Arizona produced nearly nine-tenths of the production of the United States, or nearly one-half of the world's production. In comparison with 1897, Montana's increase was less than 1%, Michigan's not quite 7%, and Arizona's over 50%.—Boston News Bureau.

A California Stamp Mill.

TO THE EDITOR:—Please describe a California stamp mill so that one who doesn't know anything about it can get some idea of how it is built and how it works.
Boston, Mass., Aug. 2, 1900. J. D. S.

It would be easier to describe it to one who does know something about it, as any description of it must necessarily be technical. Our Boston correspondent would do well to get some catalogues from our advertisers, which give excellent illustrated descriptions of stamp mill practice.

However, the following is given in answer to the request:

California stamp mills are built in batteries usually of five stamps each, and ordinarily at first the mill consists of one battery only, but is so arranged that additional batteries may be placed in position when the mine is found to warrant the expenditure. The price of the mill is estimated at so much per stamp, usually costing about $1000 per stamp about the time the mill is ready to begin crushing ore (though there is a difference in these things. On page 188 is described a new Arizona stamp mill—a 40-stamp mill—that has cost $150,000. Our Boston inquirer might read that article in connection with this.)

The weight of the stamps runs from 650 to 1200 pounds each. A medium-weight stamp, about 750 pounds, is most commonly used and is suitable for crushing ordinary ore. The estimate of cost includes the boilers, engines, amalgamating plates and all else that is necessary to handle free-milling ore.

Each battery consists of an integral cast iron mortar having a rectangular bed, within which dies are arranged. Each die consists of a square base, having upon its top a cylindrical projection which is just the size of the stamp and arranged to receive the blow from its respective stamp. A layer of sand or ore is placed upon the bottom of the mortar before the dies are placed in position, to form a cushion to prevent the blows from the stamp breaking the mortar. The mortar is cast with a heavy frame above it, and in this frame are provided guideways in which play the stems of the stamps; above this frame is another wooden frame, in which play the upper ends of the stems. Between the two frames is arranged the cam shaft, which is provided with one cam for each stamp. The cams are shaped like a heavy, strong sickle and are from 8 to 14 inches in length. The handle end is provided with an opening through which the cam shaft passes, and a key secures it rigidly in place. The stamp stems are round shafts of iron, and in a battery of 750-pound stamps the stems are about 3¼ inches in diameter. To the lower end of the stem is keyed a cast base, having a socket in which fits the stem of the stamp shoe, which is from 6 to 10 inches in diameter and about 1 foot in length when new. This shoe is also keyed in the socket so it can be easily removed when necessary. Upon each stamp stem above the cam shaft and in the path of its respective cam is keyed a collar called a tappet, and at each revolution of the cam shaft each cam engages with its respective tappet and lifts the stamp until the cam passes from under the tappet and lets the stamp drop. The cams are arranged spirally around the shaft, so that the stamps are raised and dropped in regular succession, and not all at once.

The rear of the mortar is closed by a thick, wooden plank, which is wedged tightly in grooves in the mortar, while the front is closed by means of a screen of wire cloth or of slotted sheet metal. These screens are of different degrees of fineness, running from 40 to 100 openings to the inch, and the fineness of the screen depends upon the character of the ore. When this gold is coarse a 40-mesh screen will answer, but if the gold is fine a 60 or 80-mesh screen will be required. Very fine gold may require a 120-mesh screen, but this is unusual. The screens are fastened on frames which fit into grooves in the mortar box, and are wedged firmly in place by iron wedges. Strips of blanket are tacked along the edges of the frame, so that when in place the joints will be water tight, and all the matter which escapes from the mortar box will have to pass through the screen.

The drop of the stamps—that is, the distance they fall—is regulated by adjusting the tappets of the stamp stems. A 7½-inch drop is enough to crush ordinary quartz, but hard quartz sometimes takes a 9-inch drop or more. Each stamp is arranged to drop from fifty to ninety times per minute, dependent upon the distance it falls. If the drop is 9 inches and the speed ninety times per minute, the cam will usually catch the tappet before the shoe hits the die, and of course the ore will not be crushed if this is done, the cam receiving the full force of the blow.

The ore is placed in a large hopper, which has its lower end closed by one side of a large horizontally arranged iron plate, which is connected by means of cog wheels; a ratchet and an arm with a plunger which extends upwards far enough to be struck by a tappet on one of the central stamp stems. This plunger can be regulated so that the tappet will only strike when the stamp has sufficient ore beneath it to keep it from pounding iron, as it is termed, when the shoe hits upon the die itself. When the tappet hits the plunger plate it is rotated an inch or two and the ore is carried against a scraper, which causes it to fall into a mortar box; when too much ore gets beneath the stamp the tappet does not strike the plunger and no more ore is fed to the stamps until enough has been crushed and washed from the mortar to allow the tappet to again strike the plunger.

In front of the mortar is arranged the apron and amalgamating plate, upon which is discharged all the crushed ore which passes through the screen. Amalgamating plates are also arranged in the battery. They are of copper and plated with silver. Below the apron is arranged a long sluice box, which sometimes has its bottom covered with amalgamating plates, over which the ore all passes on its way to the slime pond. If the ore is hard to work, it is common to run it through mullers or large cast iron basins, each having a rotary grinder therein. When everything is ready the mill is started. Nearly all the free gold is amalgamated by the quicksilver on the plates in the battery. Each stamp should crush about one ton of ore in eight hours.

Geo. W. Pennington.

In last Saturday's issue appeared a brief biography of Mr. Geo. W. Pennington, who died at his residence in San Francisco, Cal., on the 8th inst. Herewith is a good portrait of this pioneer steel manufacturer, a man of untiring industry and sterling character, who for half a century had been prominent in the progressive industry with which he was identified, and who aided in the upbuilding of the commonwealth.

Quantitative Test for Molybdenum.

TO THE EDITOR:—Please publish through "Concentrates" a quantitative test for molybdenum.
Walla Walla, Wash., Aug. 1.

Correct reply is too detailed for answer in "Concentrates."

To estimate molybdenum quantitatively it must be obtained as a neutral molybdate, which is then precipitated with a neutral solution of mercurous nitrate. The yellow precipitate which falls down is washed with a solution of mercurous nitrate, dried, and then either heated in a stream of hydrogen, when molybdenum dioxide is formed, or it is ignited with a weighed quantity of anhydrous lead oxide until all the mercury is driven off. The increase of weight of the residue gives, then, the amount of trioxide present. To determine the amount of molybdenum available in the ore molybdenite, about 1 g. mineral is digested with 25 c.c. concentrated nitric acid for two hours in an Erlenmeyer flask, in order to convert the mylybdenum into molybdic acid. The latter is dissolved in ammonia and filtered off. The residue is treated a second time with nitric acid and ammonia. The combined filtrate is then acidified with nitric acid and evaporated to dryness. The molybdic acid is separated from the dry ammonium nitrate by leaching with 50% alcohol, which dissolves only the ammonium nitrate. The molybdic acid is then collected upon a weighed filter, or, better, is dissolved in normal ammonia and the excess of alkali titrated with acid. Molybdenum may be estimated indirectly by adding an excess of lead acetate to a solution of alkali molybdate, filtering off the lead molybdate and determining the amount of lead in the filtrate, by any trustworthy volumetric method of determining lead.

Schindler describes in the Journal of the American Chemical Society, November, 1895, a method whereby lead acetate is added to an acidified solution of a molybdate until the latter ceases to give any coloration on a test plate with tannin. Brearly has modified this method: Add lead acetate and use the tannin reaction as long as available. Pour a little of the hot solution through a ribbed paper, test the filtrate first with lead acetate and, if necessary, with sodium molybdate. Generally the first test will show that some molybdenum is still unprecipitated, and the intensity of the cloudiness indicates, approximately, the amount. The one or other reagent is added as required, and the solution tested in this way until with absolute certainty neither sodium molybdate nor lead acetate is present in other than negligible quantities. As the solution is passed through the same filter until the end is reached, there is no loss through absorption of the paper. Large amounts of metallic salts do not interfere.

Stamp Mill of Octave G. M. Co, Weaver, Ariz.

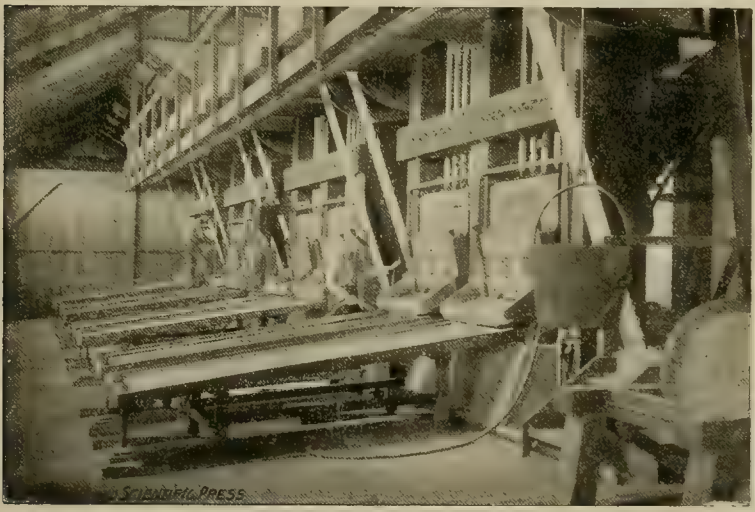
Written for the MINING AND SCIENTIFIC PRESS by D. E. BIGELOW.

The Union Iron Works of San Francisco have just completed a 40-stamp mill for the Octave G. M. Co., near Weaver, Ariz. It is more than usually complete in every detail, and, representing modern construction in plants of its class, is of more than passing interest.

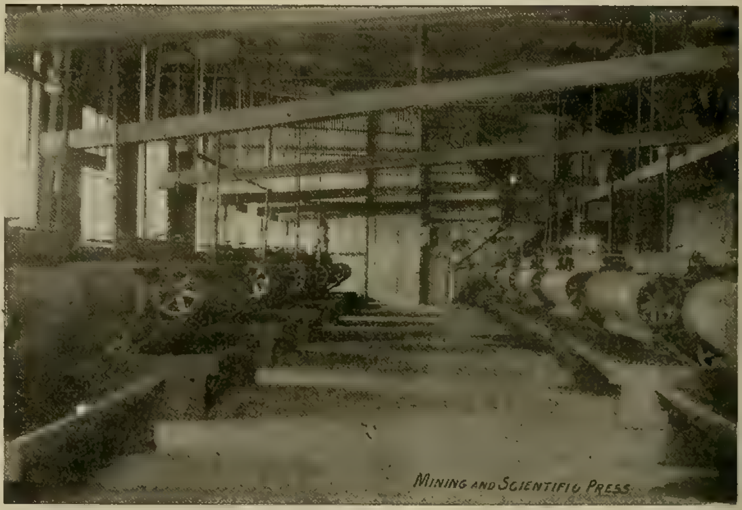
40-Stamp Mill, Octave G. M. Co., Weaver, Arizona.

This picture was taken by moonlight. 1¼ hours exposure, from 2 to 3:15 A. M., July 12, 1900. It is a good example of moonlight photography, and shows the clearness of the Arizona sky.

175-Ton Cyanide Plant, Octave G. M. Co., Weaver, Arizona.



Octave Battery Room, Weaver, Arizona.



Octave Mill Concentrator Room, Weaver, Arizona.

Octave Mill Concrete Mortar Blocks, Weaver, Arizona.

Octave Mill Concrete Mortar Blocks, Weaver, Arizona.

The cost of the entire plant, including crushers, 40-stamp mill, concentrators, steam power, electric light, 175-ton cyanide plant, return pumping plant, machine shop and assay office, was about $150,000. It was designed and built under contract by the Union Iron Works and turned over in running order after trial run of ten days.

The property was known as the old Rumer mine and had been worked for several years in a small way until two years ago. The property was examined and reported upon by D. J. Jones, and, upon his recommendation, was purchased by the Octave G. M. Co. and active development work commenced.

The mine is situated about 11 miles east of Congress, Ariz. The veins in this belt all strike east and west and dip to the north about 25°. The Octave vein matter is firm, white quartz, containing sulphurets of lead, iron and zinc. The walls are clearly defined, there being a little gouge on both sides. The formation is decomposed granite and diorite.

The ore is hauled in two-ton cars by a mule over the trestle to the crusher building, about 200 feet from the mouth of the tunnel. There are four grizzlies and two 10x16-inch jaw crushers, so arranged as to provide storage for about forty tons of ore above crushers and 500 tons below—all of which is distributed by gravity through steel lined chutes into the mill bins proper, which have additional capacity of 700 tons. The crushers are driven by a special steam engine located below.

The batteries are of the back-knee type—each 5-stamp battery being driven independently by belt from line shaft below the feeder floor. Other new features are cast iron sectional stamp guides, iron frame hanging ore feeders, solid concrete mortar blocks, movable apron plates and sand bucket running on trolley along front of batteries to clean-up room. The clean-up rig is treated as an important adjunct. The room is 24x30 feet, forming an extension to the battery room; in it are located an amalgam barrel, a brick retort and melting furnace, work benches, wash trays, amalgam strainers and safes.

The floor is cement concrete, laid with slope form all sides to a sump in the center, from which lost quicksilver and amalgam are easily recovered.

The concentrator room also has a cement floor, with the open tailing sluices molded in solid cement. The floor slopes from all sides to the sluices, and all leakage is washed down with the tailings through an iron pipe to the settling tanks, from which the water is pumped back to the battery supply tank above the mill.

The tailings are all treated by the cyanide process, with some interesting modifications from the usual practice. This will be the subject of a later article.

The mill is driven by steam power generated in a battery of three 70 H. P. boilers, with independent settings, allowing for one boiler to be constantly in reserve.

The fuel at present is coal; it is hauled from the railroad and dumped from wagons into bunkers having 250 tons capacity, discharging by gravity to fire room.

The engine room, located between boiler room and mill, has a cement floor, with walls and ceiling double-boarded, with tarred paper between, protecting the machinery from dust and diminishing the noise.

A compound Corliss engine drives the mill, being coupled direct to battery line shaft. In the engine room is also located an electric generator of 500-light capacity, driven by an automatic compound engine, furnishing lights for mill, mine and offices and power for circulating pumps at cyanide plant. The engine room is nicely finished, all the interior being painted white, and, with marble switchboard, ornamental gauge panel, oil stands, pictures, etc., marks quite an advance over the ordinary mill engine room.

One of the most important features in connection with the plant is the machine shop, occupying a special building 24x80 feet, containing lathe, dull press, emery grinders, bolt cutter, forges, etc., and complete stock of iron, pipe and fittings, as required for general repair work about the mine and mill.

It is not often that a mine is so thoroughly equipped in the beginning; smaller plants are usually erected, and are added to from time to time; but the Octave people have recognized the economy of making their improvements first—the development of the mine having fully warranted the expenditure.

New Discharging Device for Transfer Coal Barge.

The steel hull of the old U. S. monitor Comanche is now being used by the Pacific Coast Company in San Francisco bay as a transfer coal barge. After being sold by the Government the vessel was dismantled and the machinery entirely removed. It now has a carrying capacity of 1200 tons of coal, is 190 feet long, 36 feet beam and has 20 feet depth of hold. The hull is of ½-inch steel, with bulkheads fore and aft of the coal space. The deck was removed, leaving only the cross-tie braces. On deck, at the stern, is located a 40 H. P. vertical boiler and the unloading machinery.

General View of Barge, Showing Grab Bucket About to be Dropped.

Grab Bucket and Trolley.

The device for discharging was designed by the California Wire Works, San Francisco, and consists of a 2240-pound grab-bucket, operated by means of a movable "trolley" running on a track cable supported by wooden structures at either end of the barge.

The track cable is made of plow steel 2¼ inches in diameter, being built up of seven strands of seven wires each, one strand of which is substituted for the usual hemp center. It is supported by grooved cast iron saddles bolted to wooden posts at bow and stern of the barge. These posts, 133 feet apart and 42 feet high, are built of 10x14-inch timbers, braced with 10x10-inch timbers, and are secured by four 1¼-inch and two 1⅝-inch rod-steel back stays, which are fastened to straps riveted to the hull. The ends of the track cable are each attached to two 1½x4-inch back stays by means of a thimble, spliced into the end of the rope, and a turnbuckle by which the required tension is maintained.

On the track rope runs the trolley, the frame of which is made of ⅜-inch steel plates. This is supported by two 14-inch track sheaves above, and maintained in position by two 10-inch guide sheaves below the track cable. It is moved fore and aft by means of an endless wire rope ¾ inch in diameter passing back and forth over head sheaves near the tops of the supporting posts to a grooved drum on the hoisting engine. In the lower portion of the trolley are two sheaves 18 inches in diameter. Over one of these passes the rope for closing and hoisting the bucket, and over the other passes the rope for opening and lowering the bucket; thence both ropes pass over head sheaves in the stern post to their respective drums on the hoisting engine. These ropes are ¾-inch crucible cast steel, composed of six strands of nineteen wires each about a hemp center. The power operating this device for raising, conveying and dumping the bucket consists of a 90 H. P. triple-drum, link-motion, double-cylinder 10x12-inch engine located at the stern. One man operating this engine can discharge into the hopper amidships two loads a minute.

From the hopper the coal gravitates through chutes to elevating buckets on either port or starboard side. These buckets, which are of the same capacity as the grab-bucket, travel in vertical guides to a maximum height of 50 feet.

When loading, at the bottom of the guides, these buckets rest upon scales, where the weight is taken.

After receiving its load the bucket (which is of the side-dumping type) is raised by an auxiliary engine located under the hopper and dumped automatically by movable trips into a chute stationed at the desired height. This chute, 24 feet long, extends over the side of the barge at an angle of 40°, and can deliver coal into a vessel or bunker at a maximum difference in deck levels of 30 feet.

Grease on Quicksilver.

Written by W. S. WELTON

One of the most potent enemies to amalgamation is fatty or resinous substances. Probably there are few more expert washers of gold than the South American miners, and they are so fully aware of the bad effects of grease in the catching of gold that they are exceedingly jealous of trusting their batea to the hands of a stranger. The South American miner hides his batea in the thatch of his house for fear that his wife or children may get it, and carefully washes his own hands with sharp river sand before he commences work, for fear of the smallest quantity of grease interfering with his operations.

Strangers, on seeing auriferous sands panned for the first time, can hardly ever resist the temptation to pick out with their fingers the colors or specks of gold as soon as they appear, and so soon as they do this many of the specks of gold, and even a portion of the black sand accompanying these, will rise to the surface of the water and continue floating upon it until the miner, with some difficulty, causes these particles to fall by spraying water upon them with as much force as possible. The above effects are apparently caused by a minute portion of grease from the fingers becoming attached to the particles of gold and sand. The disastrous effects which may be produced in the amalgamation of gold and silver by a minute portion of oil, petroleum, grease or resin in the water are remarkable. These substances appear to be specially attracted to gold and mercury, and for this reason at hydraulic mines it has been found necessary to prohibit the washing of clothes in the ditches, or the washing of plates after the men's dinners, in any of the streams dumping into the ditches or sluices. When the surface of the gravel banks has been previously occupied by camps or dwelling houses, the mercury in the sluices becomes sickened by the grease resulting from the surface soil upon washing such portions of the bank. The continual wearing away of the blocks and linings of the sluices sets free a considerable portion of gum or resin, which adheres to the gold and mercury, and is detrimental to amalgamation.

Mercury contaminated with grease or resin becomes too sluggish to run. Comparatively large grains of gold will float upon its surface without being amalgamated. Its brightness is changed to a dull, leaden color, and it will flour easily. The distillation will not purify mercury or grease or resin, as these substances pass over in retorting and condense again. Under these circumstances the writer has found great benefit from frequently washing the mercury in a strong solution of potash obtained by leaching wood ashes; the flouring and sickening are thus overcome, and the yield of silver or gold much increased.

Recent Additions to the Exhibits of the California State Mining Bureau.

Uranium ocher, Rock Creek, Colo.; John H. Andrew.

Jamesonite, variety "feather ore." Sulph. antimonide of lead, from the Manhattan quicksilver mine, Napa county, Cal.; R. B. Knox.

Native silver, a beautiful arborescent specimen from Silver Islet, Lake Superior, Canada; F. N. Gibbs, M. E.

Coarse placer gold from the Santa Ana mountains, Orange county, Cal.; W. L. Watts.

Cubrical placer gold from the Wandi diggings inland from Port Darwin, North Australia; Bertram Hunt.

Gold quartz, rich in free gold, from Downing's mine, Ash creek, Siskiyou county; J. Downing.

Cinnabar in calcite, showing crystals of calcite stained red by cinnabar. From the recently opened quicksilver mines at Terlingua, Brewster county, Texas; Walter P. Jenney, M. E. An illustrated description appeared in the issue of July 21st.

Auriferous clays, Pioneer mine, Bodie, Mono county, Cal.; Hugh Gorman.

Scheelite (tungstate of calcium), from Scott Bar, Siskiyou county, Cal.; Martin Andrews.

Molybdenite, from the mines of the Castle Hill Co., Whatcom county, Wash.; A. M. Dewey.

Joseite, a rare seleno-telluride of bismuth, Brazil; W. H. Kobbe.

Augite crystals from St. Paul's island, Alaska. Collected by Prof. Geo. Davidson and presented by W. H. Kobbe.

Chloropal, Silver Peak, Esmeralda county, Nev.; H. W. Turner.

Margarite, Gold Cliff mine, Angels, Calaveras county, Cal.

Cobaltite from a copper mine in Lewis district, Mariposa county, Cal.; Dr. G. F. G. Morgan.

Aragonite from a deposit recently cut in an old quicksilver mine near San Jose, Cal.; A. G. Col.

Kobellite, an ore of bismuth from Washington; A. H. Halloran and W. H. Kobbe.

Pisanite, a sulphate of copper and iron, Gonzales, Monterey county, Cal.; J. C. Lazier.

Placer gold, Snow Bros, hydraulic mine, Newtown, El Dorado county, Cal.; H. Snow.

And numerous other specimens of gold quartz, copper ores, iron ores, etc.

In addition to the foregoing there has been recently installed in the museum of the bureau a life-size full-length portrait of the noted prospector, Ed. Schefflin, discoverer of Tombstone, Ariz., and other rich mining districts; also his pick, shovel, hammer, etc., and cabinet of specimens collected by him, all of which are loaned to the bureau by Mrs. Schefflin.

◆

THE Dead Sea, which for thousands of years has been a forsaken solitude in the midst of a desert, on whose waves no rudder has been seen for centuries, is to have a line of motor boats. The first little steamer, built at one of the Hamburg docks, is 100 feet long, and began the journey to Palestine on June 16.

◆

THE ninth annual convention of the California State Miners' Association will be held in San Francisco on Nov. 19th, 1900.

The Bell Gyrating Disc Engine.

Written for the MINING AND SCIENTIFIC PRESS.

Ever since the steam engine came into general use, it has been the aim of steam engine builders to construct an engine capable of high speed without the attendant vibration caused by the reciprocating type, and to that end numerous types of rotary engines have been built. But, while this class of machine may have been satisfactory in that respect, their excessive consumption of steam has, up to the present, prohibited their use on a commercial scale.

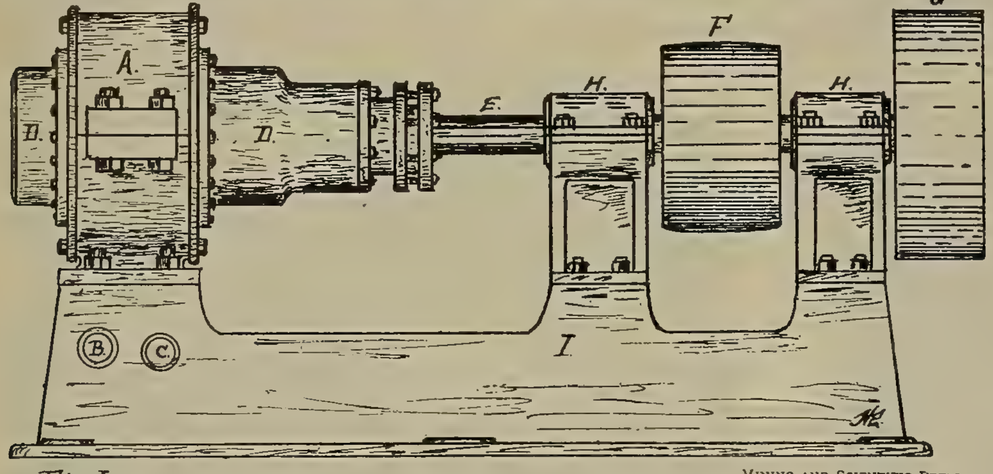


Fig. I.

MINING AND SCIENTIFIC PRESS

The Bell gyrating disc engine, herein described, is manufactured by McFarlane & Co., Denver, Colo. It has all the advantages sought for in a rotary, and, it is claimed, has none of its failings, but at the same time embodies the available good points of the reciprocating piston engine, inasmuch as the steam acts on its piston with a direct and positive pressure, susceptible to steam cut-off and the use of it expansively.

This is a distinct departure from all forms of the reciprocating piston engines and might be termed an engine with a continuous stroke. This fact, together with its few moving parts and simplicity, causes it to be considered by its manufacturers as an ideal machine wherever steam or compressed air can be utilized.

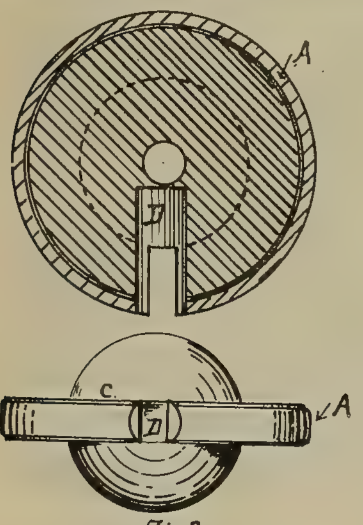
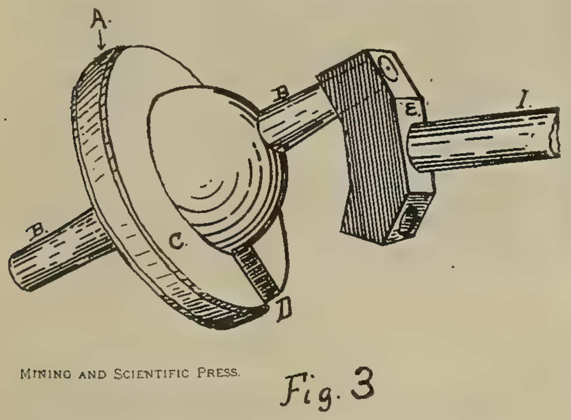


Fig 2.

MINING AND SCIENTIFIC PRESS



MINING AND SCIENTIFIC PRESS. *Fig. 3*

To better explain the workings of this engine, it will be necessary to refer to the accompanying illustrations. In Fig. 1 the engine is shown complete, ready for the admission of steam. A is the steam cylinder, containing a gyrating disc which will be referred to later on. B, C are steam and exhaust pipes, respectively. D, D are bonnets bolted to the cylinder, and in which the crank pins gyrate and the crank rotates, transmitting its motion to the engine shaft E. F is the driving pulley, G is the fly wheel, H, H are the journal boxes and I is the base on which the engine rests.

The novel feature in this engine is the gyrating piston. It is a metal disc whose diameter corresponds to the diameter of the cylinder and determines the size of the engine.

The disc is made with a sphere in its center, as shown in the illustration at C (Fig. 2), the sphere and disc being in one piece. The outer edge of the disc is recessed to receive a spring packing ring A, whose duty is identical with the spring ring of any reciprocating piston engine. At D the disc is bored from its periphery to the face of the sphere to receive the brass bushing D, turned to a working fit and slotted to receive the diaphragm mentioned later on. B is the crank pin and is driven tightly into the disc and sphere.

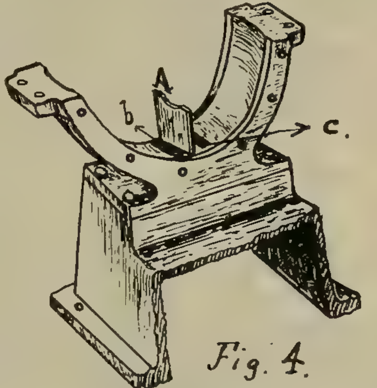


Fig. 4.

MINING AND SCIENTIFIC PRESS.

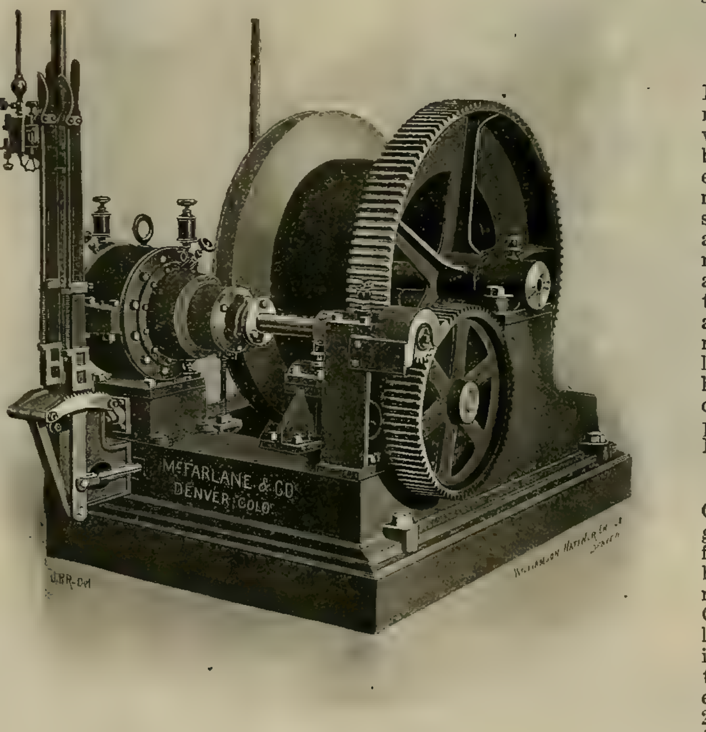


Fig. 6.

Fig. 3 shows the disc C and the crank E in position, but with the cylinder entirely removed. The crank is keyed to the main shaft I and is bored to receive the crank pin B.

Fig. 4 shows the lower half of the steam cylinder with the diaphragm A in place. This diaphragm, in conjunction with the disc, divides the cylinder into two parts, one part containing live steam and the other the exhaust steam, besides preventing the disc from rotating around its axis. D and C are steam and exhaust ports, respectively.

Fig. 5 shows the cylinder heads A, A, diaphram b, disc e and crank f in place, the top and bottom parts of the cylinder and bonnets being removed.

The cylinder heads are cone-shaped on their inner face and so constructed that the disc lies against one head on one side at c and against the other on its opposite side at d, making two lines of contact between the disc and cylinder heads diametrically opposite each other and on opposite sides of the disc. The cylinder heads are each provided with a socket which acts as bearings for the sphere.

The motion of the crank pin may be illustrated by the movement of the forearm in describing a circle with the hand, while keeping the wrist rigid and the elbow at rest and with index finger in the crank pin journal. Thus, it will be seen that while the crank pin gyrates, it does not rotate on its axis, but transmits a rotary motion to the shaft through the crank.

The nominal speed of this engine is 1000 revolutions per minute. Its weight per given horse power is considerably less than that of the reciprocating engine. The manufacturers say that it has no dead center and is instantly reversible, which would make it an ideal engine for a hoister. There are no valves to set or get out of order. In a hoister the steam and reverse levers are embodied in one. There is no claim of originality, except in the new application of an old principle. McFarlane & Co., of Denver, Colo., who make it, say that it will lift, when applied to a hoister, a greater load at equal speed than any hoister on the market of equal weight.

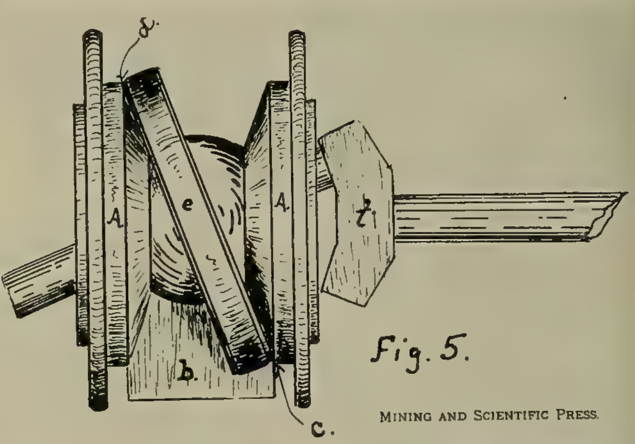


Fig. 5.

MINING AND SCIENTIFIC PRESS.

Figure 6 illustrates the engine as applied to a hoister.

◆

As Judged in New York.

The MINING AND SCIENTIFIC PRESS of San Francisco, Cal., recently closed its eightieth volume. This is one of the very best, if not the best, of our exchanges. It seems almost a mystery how a paper with such expensive and various accomplishments in the line of news gathering, illustrations, and discursions into the scientific field, can be maintained at the point of its establishment. Evidently it is published in a land of plenty, and has a good sized and liberal constituency to back it.—Copper, Zinc and Lead Review, New York City.

◆

THE Bay Counties Power Co. is a California corporation generating electric power from the Yuba river, and building parallel lines from its main generating station to Oakland, 140 miles, via Woodland to Benicia, there crossing the straits. Two steel towers are being built, one on either shore, the tallest to be 230 feet. Each line is projected to carry 9000 H. P. The company has three generating plants and has about 450 miles line—one to Sacramento 60 miles long, another to Oroville, 30 miles long, and another 30-mile cable to Marysville; E. J. de Sabla Jr. is president and C. A. Grow secretary.

MINING SUMMARY.

ALASKA.

A company has been formed at Dawson to buy machinery at Nome; to send a representative to Nome and wherever he finds any stranded miners to pay their fare back home for their machinery. Late arrivals from Nome have reported that thousands of tons of valuable machinery are lying on the beach covered by the high tides and being covered by the drifting sands. This machinery was taken to Nome to work the beach and cost thousands of dollars. Those who took this machinery to Nome did not doubt that the gold was there, and their only doubt was as to whether the machinery would have large enough capacity. Thousands of feet of hydraulic hose are lying on the beach at Nome. This hose was manufactured to run out into the surf, and, by attaching an engine, to suck the sand inward. Nearly every arrival had some scheme to get the gold that was in keeping with their imaginary powers. The steam boilers that are on the Nome beach and other machinery of that description will find a ready market along the Yukon, and the thousands of feet of hose will be used as pipe line to get water to the Anvil and other creek claims.

F. C. Hammond has contracts with the Westinghouse Electric Co. for an electric power plant to transmit power from Sheep creek under the channel to the Ready Bullion and Mexican on the other shore. The Alaska Water Power Co. is credited with having a contract from the Alaska-Treadwell Co. for the use of 850 H. P. throughout the year as a minimum amount, water to be taken from the creek at 700 feet above tide water; the complete installation is to cost $40,000. It is calculated that at the contract price the Treadwell group will annually save $20,000.

ARIZONA.

GILA COUNTY.

The Old Dominion and the United Globe mines and smelters are working.

The Copper Hill, adjoining the United Globe, is shipping ore; the manager is J. Windmiller.

The Kingston mine is being operated by Rolling, Rogers & Star.

MARICOPA COUNTY.

At Phœnix the Eclipse Copper M. Co. was incorporated on the 15th: capitalization, $1,000,000; temporary directors—W. R. McCormick, G. E. Dunbar, Kalamazoo, Mich.; W. J. McKay, Chicago, Ill.; T. B. Mills, E. V. Long, Las Vegas, N. M.; principal office at Phœnix.

MOJAVE COUNTY.

A shipment of ten tons of ore from the Home Pastime mine at Mineral Park to Kingman gave returns of 500 ounces silver to the ton. The mine belongs to Mrs. M. E. Prisk of Chloride.

Kingman Miner: The Sheeptrail mill has made a clean-up of a run of 20½ days of the 20-stamp mill, working half time, resulting in a bar of gold, $30,000. The mill has a daily capacity of sixty tons; the teams employed can haul but thirty tons daily.——Metcalfe & Tyrrell have opened a body of lead ore in the Great Eastern mine, in the Wallapai mountains.——The Oro Plata mine shows ore in the face of the north drift that runs 90 ounces silver and 2½ ounces gold to the ton.——E. F. Thompson has leased the Lone Star mine for a year. The Star has been a producer of silver-gold ore.

PIMA COUNTY.

S. C. Neilsen has leased the Altar group of thirteen mines with a bond in the interest of the Ray Copper Co. A thirty-ton water-jacket smelter is in charge of G. Campbell. Ninety men are employed in the mine and smelter.

Tucson reports a 3-foot vein of gold ore discovered in Old Baldy, 30 miles south of there.

From Helvetia is reported a body of sulphide copper ore. Manager Seager says it is 40 feet in width. The Helvetia Co. projects a railroad to connect with the S. P. at Vails station, 18 miles away.

SANTA CRUZ COUNTY.

Near Patagonia sixty men are at work in the old Mowry mine, superintended by E. E. Wilson.

Near Washington the Duquesne G. M. Co. has a shaft down 640 feet. Paying ore is developed, but pending selection of process of treatment nothing is being done.

The Pride of the West M. Co., operating in Washington, have a magnetic process of treating their ores. Forty tons of ore are run through the mill daily, eleven tons of concentrates shipped to Silver City, the lead to El Paso. A 60-ton smelter is building. Emersen Gee is Supt. Washington is about 30 miles from Patagonia and has an altitude of 6000 feet.

CALIFORNIA.

The executive committee of the California Miners' Association met in San Francisco on the 13th to discuss the injunction suit of the Anti-Debris Association of Sutter County against the Polar Star hydraulic mine in Placer county. W. Nichols, the owner of the Polar Star mine, said his permit was in due form and he wanted the executive committee to employ counsel to assist his attorneys in fighting the Sutter County Association's injunction. A committee was appointed to inquire into the facts of the case and engage counsel to assist Mr. Nichols if it thought proper.

A resolution was ordered sent to the Secretary of the Interior calling his attention to the importance of systematic measurements of the flow of the Sacramento, Stanislaus, Tuolumne, San Joaquin, Kings, Salinas, Yuba and Bear rivers, Cache and Stony creeks and other streams of central and northern California, and requesting, in directing the work of the Geological Survey, that he have consideration given to the needs of the localities named.

A donation of $150 was ordered given to the Native Sons' celebration. It was decided to hold the annual convention of the association in San Francisco Nov. 19th.

AMADOR COUNTY.

The Wataga G. M. Co. has organized to develop an ancient river channel near Volcano.

The East shaft of the Kennedy mine has reached a depth of 1500 feet. An average of 85 feet a month is made.

The Modoc mine, near Volcano, is to be tunneled. T. Schenck has charge of the work.

In the Lincoln at Sutter Creek crosscutting on the 1200-foot level goes on.

At the Defender mine, near West Point, C. H. Norton is working the tailings over a canvas plant.

BUTTE COUNTY.

J. R. Watson, Jr., of Oakland, succeeds Supt. Archibald at the Golden Trout mine, Enterprise. It is the stated intention to put up a 60-stamp mill, erect hoisting and chlorination works.

About thirty-five men are employed on the ditch and tunnel, being constructed to carry water from Cherokee to the Banner mine. D. W. Smith has charge.

CALAVERAS COUNTY.

The Mutual M. & M. Co., Boston, which has a bond on the Waters mine, near Copperopolis, has made another payment of $1000.

J. E. Burton has sold his interest in the Green Mountain mine to Tarbell & Amendt for $10,000.

In Angels at the Oriole mine a strike is reported on the north drift of the 400. Sinking is in progress at the Angels mine. The Mutual M. Co. has made a third payment of $1000. The mine is now worked down to the water. The work of unwatering the Tulloch mine is finished.

Including the workmen upon the dam the Melones Co. at Robinsons have about 125 men on the pay roll.

Prospect: Timbering is resumed at the Ford mine.——The Union mine at Copperopolis has men developing.——Shafts are being sunk on the south extension of the Royal at Hodson.——The 40-stamp mill of the Royal Company at Hodson is in operation.——The McSorley gravel mine at Camanche has resumed.——About 100 men are employed at the copper mines at Campo Seco.——Womble Bros. have leased the mill belonging to the Empire Company and will work ore from the Mountain King mine, near Hodson.——On Hog hill, near Telegraph City, the old Napoleon copper claim is being opened up by the Williams Bros.——At the Lloyd mine, at Central Hill, men are sinking the 200-foot shaft to strike the ledge.

DEL NORTE COUNTY.

B. A. Cardwell, Supt. of Monkey Creek placer mines, is piping preliminary to running when rain sets in.

Fifty men are at work on the Big Flat mining ditch.

EL DORADO COUNTY.

The Tin Cup mine is sold by W. H. Martin to Hayward & Lane for $15,000.

Crocker & Robert, operating the Lilly Emma copper mine near Pilot Hill, have sent 180 pounds of ore to the State Mining Bureau.

FRESNO COUNTY.

Several oil companies have contracted with the Union Oil Co. whereby that company by running a special line into the territory will take all the oil produced at going figures up to 1000 barrels a day.

The Copper King manager on the 19th ult. cabled the London office: July 4—Cablegram from mine manager: "Have opened up a fine body of ore in level No. 3; am driving level No. 4 and level No. 5 in order to prove whether it is persistent in depth; will duly advise you by cable as regards developments." July 12—Cablegram from the general manager, dated July 11: "Ore body cut in level No. 3 is opening up splendidly, and every indication of cutting it in level No. 4 and level No. 5; will cable assays this week. Have cut the high-grade ore body in level No. 4 and driven on it 21 feet. The average width is 12 feet; the average value is over 9½% copper."

INYO COUNTY.

At Castle Peak mine Supt. Kermeen has the assay office finished; the damage to the cyanide works by the fire has been repaired; about fifty men are employed.

The Independent states that the Brown Monster mine, southeast of Independence, has been bonded to Eastern men.

KERN COUNTY.

The electric road between Kern and Bakersfield will be in operation Sept. 20th.

The Grace Oil Co. has a gusher in well No. 3. After penetrating 8 feet of clay over the fifth oil sand, oil flowed.

The Sacramento Oil Co., in Kern field, has four finished wells. The only one on the pump is yielding 100 barrels.

In the case of Kern county vs. Recorder C. A. Lee the Supreme Court of California has rendered a decision sustaining the finding of the Superior Court, in favor of the county and against the recorder. This is to recover money retained by Lee as fees for recording mining location notices. The recorder claimed that under the law and the Supreme Court's decisions he was not compelled to record such notices, and that therefore the fees belonged to him and not to the county. The Supreme Court rules that, while its decisions were in accordance with the law at the time they were given, the statutes have since been changed and the decisions are not applicable. Accordingly the recorder must pay such fees over as county money.

Mining Review: At the Red Dog mill, Johannesburg, a run on thirty-five tons of ore from the Santa Ana mine, in the Stringer district, netted the leasers something like $1300—the result of a month's work by two men.

LAKE COUNTY.

The recent sale of the Sulphur Banks quicksilver mine has led to the formation of the Empire Con. Q. M. Co., under the laws of New Jersey, to control that and three other properties, two of them being in Colusa county; capital stock, $5,000,000. The properties taken into the company are: Sulphur Banks Q. M. Co., Lake county; Abbott Q. M. Co., Lake county; Empire Q. M. Co., Colusa county; Central Q. M. Co., Colusa county.

LOS ANGELES COUNTY.

The Central Oil Co. of the Whittier field reports a monthly production of 11,500 barrels oil.

MADERA COUNTY.

(Special Correspondence). — The new stamp mill of the Magnet M. & M. Co. is completed and will start Sept. 1st.

A contract has been let to drift north and south from the main shaft of the Standard mine at the 400 level.

Development work and extraction of ore is going on at the Mud Springs.

Legal complications have temporarily closed down the Lily.

Work is being pushed both in the mine and mill at the Waterloo.

The old Last Chance mill is a thing of the past, having been completely destroyed in the late forest fire.

Gold, Aug. 14.

MARIPOSA COUNTY.

At Coulterville the Merced G. M. Co. employs about fifty men on the Mary Harrison mine. At the Murphy mine fourteen men are employed, and at White Gulch, 5 miles south of Coulterville, about thirty; at Kinsley, 16 miles east of Coulterville, about forty; at Pine Tree, sixteen; at Josephine, fifteen; at Princeton, thirty; at Mariposa, forty. Shovelers, car men and blacksmith helpers are paid $2.50 per diem, miners $3, machine men $3.25, blacksmiths $3.50 and $4, foremen $3 and engineers $3.50.

NEVADA COUNTY.

The Tilley G. & S. M. Co. has incorporated at $31,250; principal place of business, Nevada City.

At the Franklin mine, Willow Valley, the pipe line being constructed will furnish a pressure of 462 feet. The old shaft will be pumped out and sinking resumed.

The Merrifield shaft is being sunk to the 900 level. At the 700 a drift has been started.

The shaft of the Federal Loan has been pumped clear to the depth of 450 feet. Five stamps of the mill have been started.

At the Providence mine development work goes on under the direction of P. Tautphaus.

At the Tulle Bell mine, on Cincinnati Hill, the new hoisting works are completed, and the new two-compartment shaft is being sunk.

The new 20-stamp mill at the Coe mine has started and will be run by electricity. O. A. Turner is Supt.

Haskins & Eldridge will open the Franklin mine in Willow valley. The pipe line will give a pressure of 462 feet. At the Texas Supt. Davis is sinking to a depth of 500 feet. The Merrifield shaft is going down to the 900-foot level. On the 700 level a drift has been started. The Federal Loan leasers are operating five stamps of the mill. The shaft has been unwatered to 450 feet. Supt. Harmon of the Gaston Ridge mine will put in ten new stamps, thirty stamps in all.

PLACER COUNTY.

The South Yuba Co. is building a new reservoir at Soda Springs station; height of dam, 27 feet; storage capacity, 150,000 inches of water, which is equal to a flow of 1000 inches per day for 150 days; thirty-eight shovelers and twenty-three men with teams are employed.

The Hidden Treasure mine employs 170 men. The station in the white channel has been moved to a point 1000 feet up the channel. The blue or lower channel has been opened up for a distance of 600 feet. The channel is 250 feet in width. With the present machinery the company is able to daily take out 250 cars of blue gravel.

On the Middle Fork of the American river the Cash Rock Co. intends to put in machinery and drill through the gravel beds.

SAN BENITO COUNTY.

C. J. Tallon projects oil operations near Hollister.

SAN BERNARDINO COUNTY.

Mining Review: The recently located placers between Barstow and Copper City report considerable gold being taken out by the dry washers. Hundreds of claims have been staked out. Water at a depth of 70 feet is selling at 75 cents a barrel.

SANTA BARBARA COUNTY.

The Santa Barbara & Naples O. & L. Co. is putting down a test well at Naples, has struck oil at a depth of 620 feet, producing a barrel a day.

SISKIYOU COUNTY.

The plant of the Portland Gold Extracting Co., that has been operating at Rollin, was sold at auction last week to cover bills of attachments amounting to about $1700.

STANISLAUS COUNTY.

Modesto will try oil for fuel at its central lighting and pumping station, the oil to cost delivered at the station $1.42 per barrel of forty-two gallons. The parties selling the oil claim that in making steam, three barrels of oil are equal to one ton of good coal; that is, where a good quality of coal exceeds $4.26 per ton, oil is the cheaper fuel.

TRINITY COUNTY.

The La Grange Hydraulic G. M. Co.'s property comprises about 3200 acres. The canal from Rush creek, 14½ miles, has five tunnels, aggregating 2118 feet in length, grade ¾ to 1 inch to the rod, timbered almost their entire length; about seven-eighths of the ditch is in rock; they are 7 feet on top, 4½ at the bottom, 4 deep, grade 14½ feet to the mile, and carry 3000 miner's inches, or 60 cubic feet, per second. The main canal is 14½ miles in length, capacity 4000 inches; upper Loveridge ditch, 4 miles, capacity 1500 inches; lower Loveridge ditch, 1¾ miles, capacity 600 inches, with five of minor importance, making the aggregate about 23 miles, capacity 7000 inches. The waters are taken from Rush, West Weaver and other creeks. To increase the volume of water, Rush creek and Stuart's Fork are connected by tunnel through the mountain, 9000 feet in length, 5x7 feet diameter, passing under the comb of the mountain at a depth of over 3000 feet. At the top of Table mountain, a reservoir is supplied by the canal system, from which pipes radiate to the various giants, 15, 18 and 22 inches in diameter, and under various heads. The mine has a top sluice 108 feet long, 6 feet wide, 3 feet deep, grade of 8 inches to 12 feet, paved with block riffles 16x16½, 11x13, 13x13, followed by ground sluices 100 feet long; below are forty-three boxes, 12 feet each, paved with block and stone riffles. At the end of the main sluice is a chute with right and left undercurrent, one 18x38, the other 24x46, paved with block riffles; grade of upper sluice, 8 to 12 inches to the box of 12 feet.

TUOLUMNE COUNTY.

Boston reports that all but about 3000 shares out of the 130,000 of old Santa Ysabel G. M. Co.'s stock has now been turned in and paid the $1 per share called for. A new superintendent has been practically decided upon. The new stock certificates will be ready to issue Sept. 1.

Near Jamestown the Kanaka mines' compressor is to be repaired. The Longfellow mine has its new pumping plant in operation. The Yosemite G. M. Co. is washing gravel. The Little Wonder is shut down.

The Eagle-Shawmut M. Co. will lay 9000 feet of iron pipe from the Blue Gulch reservoir to the mine; at the reservoir the pipe line will be 30 inches, decreasing to 20 inches. Supt. Spatz of the Poison Oak mine will put in a hoist and 5-stamp mill.

The Hudson mine, Bald mountain, is to be unwatered.

The Confidence M. Co. has laid off about fifty men, pending completion of the work on the incline shaft, to be retimbered from the surface to the 350 level, during which time the mill will be closed down. At the Dreisam mine the shaft is down 360 feet.

VENTURA COUNTY.

The Ocean View O. & M. Co. have struck oil at 200 feet and again at 500 feet on Rincon creek.

The oil and mineral rights in Senator Bard's 6000-acre Ojai ranch have been transferred to Los Angeles men.

YUBA COUNTY.

The Golden Trout mine, near Strawberry Valley, talks of a new 40-stamp mill. At New York Flat a mill is to be erected on the Miller property. A. F. Roberts of New York Flat also talks of a mill.

COLORADO.

BOULDER COUNTY.

At Eldora the Mogul tunnel indicates rich ore in the Village Belle drift, 18 inches wide, of roscolite quartz and sylvanite.

Supt. Denison of the Gold Nugget has driven a tunnel 200 feet, from a point 400 feet below the old workings, and has 2 feet of smelting ore. The new mill will have a capacity of sixty tons per day and is expected to be in operation October 15.

G. Leal is running the mill at Sunnyside on ore from the Pennsylvania mine which averages $400 per week besides the expenses.

The B. & M. at Ward has ore in all the levels, enough in sight to keep up an output of a carload of twenty tons per day.

The Utica at Ward is repairing the workings and employing a small force. When the repairs are completed the former production will be resumed.

CHAFFEE COUNTY.

The Madonna mine at Monarch is in charge of M. McGovern of Leadville, who is taking out ore which yields 16 ounces silver, 52% lead, and 2 ounces gold.

CLEAR CREEK COUNTY.

The Yankee Hill Con. M. Co. will develop the Alice mine on Yankee hill to the depth of 500 feet. The shaft will be 4½x9 feet in the clear, two compartments.

Idado Springs concentrating mills are treating considerable ore from Gilpin county.

The Yankee Hill Con. M. Co. will develop its Alice mine on Fall river and sink 500 feet. The shaft will be 4½x9 feet in the clear.

Georgetown Courier: The Alice M. Co. has granted an option for the sale of the property to F. Carpenter; consideration, $500,000.——The Lone Tree at Freeland is developing smelting ore worth $40 a ton, in addition to 12 inches milling ore.——To the electrical machinery to be installed by the Lamartine mine the power will be furnished by the United Light & Power Co. of Georgetown, whose new plant is nearly completed. The line is already constructed between the power company's plant and the Lamartine mine. The Lamartine will be the first mine in the county to be thus equipped.——The Brazil mine at Freeland is being worked by Okerstrom & Co. They have a streak of smelting ore 15 inches in width that carries gold and silver values averaging about $100 a ton.——The Bullion King M. & M. Co. has been organized with $1,000,000 to purchase the Bullion King; it adjoins the Stanley mine, south side of Clear creek. A hoisting plant has been installed.

The Kokomo mine is being operated by Burton & Co. of Idaho Springs. There are twenty men employed. The ore is hauled by wagon to Missouri Flats, loaded into the Gilpin tramway cars and hauled to Blackhawk, reloaded on cars and hauled to Dumont, where the operators have a mill.

Electrical machinery will be put in at the Lamartine mine; the U. L. & P. Co. of Georgetown will furnish the power. The Lamartine mine will be the first mine in Clear Creek county to be thus equipped.

The completion of a new dam has enabled the Mixell mill to resume operations.

EL PASO COUNTY.

When the smelter now being erected at Colorado City by the Standard Reduction Co. is finished the ore-treating capacity of Colorado City is expected to be in the neighborhood of 30,000 tons per month.

The new Portland chlorination mill, to be built at Colorado City at a cost of $300,000, will be constructed entirely of steel. It is expected that the mill will be completed and running by April, 1901. The mill will be automatic from the time the ore is received from the tracks of the Cripple Creek Short Line, which will skirt the mill on the north side, until the treatment is completed on the other side of the mill.

FREMONT COUNTY.

North of Florence the Dorcas M. & M. Co. is building a 100-ton chlorination mill arranged to work on the gravity principle. Pulleys are used except in the largest buildings, the ore sliding from one floor to another, and dropping the tailings down the hill. An engine pumps the water from a reservoir in the bed of the Arkansas; capacity 50,000 gallons. The north side of the mill will be 150 feet long, besides the dust and bag rooms.

GILPIN COUNTY.

The new mill at Blackhawk has forty stamps running on ores from the Gregory and Ridgewood properties.

In the 600 east level of the Ridgewood mine there is now 3 feet of ore. An assay on the smelting ore gave 92 ounces gold and 14 ounces silver.

GUNNISON COUNTY.

At Crested Butte the local mine during the month of July produced: coal, 26,072 tons; coke, 6585 tons.

Wm. O'Brien has taken charge of the Good Hope mine at Vulcan.

HINSDALE COUNTY.

Times: Near Lake City Pierce & Kilvert are building a dam on Henson creek for power to run the drills in the 5200-foot tunnel under Schafer basin.——The Mineral Flower M. Co., capital stock $300,000, is incorporated to operate in Hinsdale county.

LAKE COUNTY.

Leadville has fifty producing mines, which are shipping to the smelters 2500 tons a day of ore, the gross value of which is $50,000, says the Herald. There are fifteen shafts being sunk in various portions of the district, which will cost not less than a half-million of dollars. Three large smelters are in operation, with a capacity of over 1500 tons daily, but the camp supplies large quantities of raw material to the majority of the furnaces of the West.

Leadville Miner: Negotiations for the possession of the Resurrection G. M. Co., Evans, are at an end, E. Smith having notified A. Gorham that the property was not for sale.——The Penrose shaft of the Leadville Home M. Co. has been sunk 40 feet. General Manager Bohn and Supt. Nimon have machinery to handle the expected heavier flow of water.——At the Bon Air shaft large bodies of good grade iron ore are exposed and taken directly from the bins to the cars.——The ore hauling business in Leadville since the advent of mineral belt lines to the mines is on the decline. Owners of teams are going into outside camps with their stock.

LARIMER COUNTY.

The B. & C. C. M. Co. is working three shifts on the Empire mine in Howe's gulch, 7 miles west of Fort Collins, and has its shaft down 200 feet. The vein is 7 feet wide.

At Manhattan, J. H. Whedbee, manager Missouri M. & M. Co., is doing development work on the Emily mine.

PITKIN COUNTY.

The properties of the Percy Con. M. Co. and the Castle Creek T. & P. Co. brought $100,000 at sheriff's sale last week. They were bought by G. S. Newman.

The Argentum–Juniata M. Co. is shipping ore from the seventh level which goes 800 ounces of silver to the ton.

Aspen Tribune: The pumps on the Argentum-Juniata, which have been submerged at the seventh level, will be pulled and put on the Mollie Gibson mine on the thirteenth level, and a sinker placed on the A. J. mine. The water will then be handled by the Mollie.

SAN JUAN COUNTY.

Near Silverton, a 3200-foot tramway line will be put in, connecting the American tunnel in Bonita gulch with the Gold King mill.

SAN MIGUEL COUNTY.

In Telluride district, the Palmyra property, owned by the Four Metals Co., is weekly shipping six cars of ore.

The Keystone placer cleaned up $600, locally stated to represent the sluicing of 1200 yards, worth 50 cents a yard. A shaft was sunk to bedrock and the gravel raised to the sluice level by a hydraulic pump.

At the Butterfly mill, Ophir Loop, a recent cleanup gave 125½ ounces, valued at $1900.

The Bessie shows increase in the ore valuation of the Baldy and Little Sioux veins. The last cleanup gave 65 pounds.

In the La Sal country, the uranium plant at Cashin is to be rebuilt.

Work is to be resumed on the Silver Pick property on Mt. Wilson. Supt. Nason will also push operations on the Tam O'Shanter.

Near Ophir the Alta mine is averaging six cars a week.

Two cars of narrow-gauge rail are at the Deadwood; the timbering is finished and the tunnel is being widened.

Roscoelite, a green vanadium mineral, is announced by F. L. Ransome as occurring as an impregnation in the lower bed of the La Plata sandstone at Placerville, associated with carnotite. The Georgetown Courier says the mineral was previously found in Magnolia district, Boulder county, where it occurs as a thin earthy incrustation on calaverite.

The cyanide plant below the Suffolk mine is sold to E. W. Bennett, who will increase its capacity. The assay averages $6 per ton.

The Journal says for the first week in August the ore and concentrates shipped from the Telluride station aggregated forty-nine cars. Ophir Loop is reported shipping about twenty-five cars a week.

Manager Sayre of the Butterfly-Terrible has shipped another gold brick to Denver, weighing 125½ ounces, value $1900. The property of the Butterfly-Terrible is shipping fifty tons a day.

TELLER COUNTY.

(Special Correspondence).—The Granite mine, on Battle mountain, belongs to the Smith-Moffat interests and has been considerable of a shipper from the sixth and seventh levels. Within the past few months the shaft has been sunk to 1000 feet depth, where a station 10x50 feet and 18 feet high has been cut. From the shaft at this depth it will require a 250-foot crosscut to reach the ore body. The large electric hoist put in here last year has been discarded and a first-motion steam hoist will replace it. The shaft house is also being enlarged and the management hopes to be shipping from the tenth level within sixty days. C. H. Cannam is in charge of the work.

The new equipment at the Ajax, including new boilers and hoist, is operating satisfactorily. The intention is to put in automatic stokers here. The Ajax shaft, now at 600 feet, will be sunk to 1000 feet depth.

The Mary McKinney's shipments now run about 80 tons per day, the ore coming from all the levels from 50 feet down to the 400 level. One-half the ore runs an average of one and one-quarter ounces gold and the other half will average as high as three ounces. Most of this ore goes to the smelters, whose buyers are in the market for all ore they can get that runs as high as one ounce gold to the ton. While mine operators cannot be induced to talk freely as to present smelter rates, it is evident they are getting a much more favorable rate than the smelters were willing to make three or four months ago. Relations of the mines with the cyanide and chlorination mills, as to rates, do not seem to be entirely satisfactory, though the increasing demands for ore on the part of the mills and smelters are certain to bring about an adjustment. It is believed the district is in position to furnish a tremendous tonnage of milling ore and this will be done as soon as rates shall be adjusted on a mutually satisfactory basis.

The Nugget shaft is being operated by the Nugget Co. They appear to have the extension of the well-known Jack Pot vein, from which thirty tons of three and one-half-ounce ore are being shipped per week. The Smith lease on part of the Nugget grounds is shipping forty to fifty tons per day of ore, said to average $70 per ton, from a vein running parallel to the Jack Pot.

The Jack Pot group belongs to the Woods combination, who have a three-years lease on the Morning Glory shaft of the Work, which adjoins the Jack Pot. The production of the latter will be hoisted through the Morning Glory shaft.

At the Jennie Sample, on Raven, an air compressor is being put in. A station is being cut at 500 feet depth. Considerable ore has been shipped from this mine which averaged five ounces gold.

The Elkton is spending a large sum on improvements. The shaft is being made three-compartment from the surface to the fourth level. In sinking from the 400 to the 800 level the three-compartment size was made and present work is to make the upper section of the shaft conform in size to the lower section. At the 800-foot station a Prescott 800-foot, straight-lift pump is being put in place. Its capacity will be 1000 gallons per minute. Material for a 55-foot steel gallows-frame has been ordered, which will soon replace the wood frame now in use. Its structure will be such as to make the ore landing 25-feet above the collar of the shaft. An ore house is in course of erection, which will afford facilities for handling 150 to 200 tons per day. A first-motion hoist, 20x48, double reel, capable of hoisting from 2000 feet depth, is being put in. The Elkton is shipping now from 1000 to 1200 tons of ore per month, which averages $100 per ton, all of which goes to the smelter and comes from the fifth and sixth levels. As soon as the new pump is ready for work the ore body will be tapped at the seventh and eighth levels.

The works of the Eagle Ore Sampling Co. started up on the 9th inst.

Victor, Aug. 10.

During July the Elkton mine is credited with having shipped 1000 tons of ore yielding $125,000. The station in the eighth level at a depth of 800 feet is cut and a pump in place. Work will begin on the crosscut from the Elkton shaft to the Elkton vein, 40 feet distant. When the dyke carrying this vein is broken into there will be a flow of water, which it is designed to handle with the 1000-gallon-a-minute pump at the eighth level.

The Gold Belt M. & I. Co. has sold the St. Patrick G. M. Syndicate the St. Patrick claim, in the limits of the city of Victor, for $300,000.

The shaft on the Coriolanus mine at Victor is down 250 feet. The mine is shipping from its workings on the north end of the property ore that runs two ounces to the ton.

The report of the Portland mine for the calendar year 1899 shows receipts for the year from the mine $1,960,487; from rents, $11,891, a total of $1,972,378; payments on ore mined and mine equipment accounts were $835,235; general and other expenses, $266,236; total, $1,101,471; net profit, $870,907. During the year the mine produced 38,548 tons, containing 97,428 ounces gold and 6701 ounces silver; gross value, $1,951,219, or $50.62 per ton. Treatment charges were $311,908, or $8.09 per ton; freight, $103,026, $2.67 per ton: total, $414,934, or $10.76 per ton; net value, $1,536,285, $39.86 per ton. During the first six months average number gallons water pumped 50,000,000 per month, and for the year 37,000,000 gallons per month, at a monthly cost of $6500. Amount of development work done during the past year, 21,062 feet.

The Anaconda Co. will sink the winze in the tunnel level 500 feet. The tunnel is in 4500 feet and has 2 miles of laterals running off from it.

The Isabella will again ship ore; it has been closed down since last February.

IDAHO.

BLAINE COUNTY.

Hailey Times: Owners of the Jumbo and Golden Star groups on the Gold Belt, and of the Liberal and Maggie May groups in Little Smoky, have men at work and intend to build a mill at the Golden Star and another at the Jumbo.

CUSTER COUNTY.

Smith & Roberts have finished cleaning up, taking out $9000. Had the water lasted for another month the output would have been nearly double.

ELMORE COUNTY.

The Homestake mine at Neal, owned by C. Balbach, reports a strike in the Blacksmith tunnel of valuable ore.

IDAHO COUNTY.

Warren reports a strike in the Little Giant mine, owned and worked by G. Riebold. The vein is peculiar from the fact that it offsets from its incline by dropping down every 30 feet for a distance of a few feet, and has worked on that theory from the time the first offset was encountered. It is now down 300 feet. J. J. Bennett is Supt.

F. E. Johnesse, Supt. Idaho E. & C. Co., has an average of 7% copper in the Blue Jacket, located between the Little Salmon and Snake rivers.

The road into Buffalo Hump has been completed for wagons between the terminus of the Northern Pacific at Stites and Callender, the syndicate's new townsite at the Hump, by way of Elk City. The distance from Stites to the Big Buffalo mine is 70 miles. The Big Buffalo expects to have all its machinery in operation by October 1st.

ONEIDA COUNTY.

Thirty-five miles below American falls, near Keach island, the dredge of H. S. Abbott & Co. is handling 700 cubic yards per day. It is a bucket dredge; cost $16,000. Six miles up the river from the Abbott dredge the Yale M. Co. is putting in a dredge to cost $40,000 and to have a daily capacity of 800 cubic yards, under the direction of Geo. Burroughs.

SHOSHONE COUNTY.

T. H. Simmonds has been engaged as foreman at the Bunker Hill & Sullivan mine at Wardner, succeeding J. W. Roundy.

Kellogg has a new concentrator, 24x40 feet, for working the tailings of the Empire State mill.

Wesley Everett, Supt. Leslie M. Co., has an ore shoot 7 feet wide carrying silver, gold and copper. The larger part of the value is in silver, in which assays average twelve ounces.

WASHINGTON COUNTY.

At Ruthburg, on the Lookout claim, owned by Alers and Mossman (the old Belmont property), development is going on. Supt. Raymond is on the ledge in the Abbie. A contract for 150 feet of tunnel has been let on the What Cheer property, under the superintendence of H. M. St. Cyr.

Ford Bros. of Colorado have bought the Placer Basin group of E. M. Barton.

The Gold Coin M. Co., H. Salzer Supt., has twenty men north of Weiser for the installation of a cyanide plant near Black lake.

MONTANA.

CASCADE COUNTY.

The Broadwater mine near Neihart is shipping ore regularly. Besides the force employed at wages, there are fifty men operating leases in various parts of the mine. The mine is blocked out into sections of 50 feet each, running up from one level to another, and the leasing is by sections. Chutes of ore assaying from 400 to 1000 ounces of silver per ton have been uncovered.

DEER LODGE COUNTY.

Forest fires are burning timber belonging to the Big Blackfoot M. Co. near Sunset. The company sent 200 men to fight it.

FLATHEAD COUNTY.

Near Libby Manager Beager of the American-Kootenai M. Co. expects to have a new stamp mill in operation Oct. 1st.

The last two cars of concentrates from the Snowshoe mine have been shipped to Great Falls, the mill is shut down, and there are no concentrates at the mine. Nobody is at the mine but the watchman.

At Sylvanite the Keystone Con. M. Co. has acquired a controlling interest in the Yankee Girl and Julinetta. This gives the company nine claims in a compact body. It has two stamp mills at Sylvanite, one for the Keystone and one on the Gold Flint, thirty stamps in all. These mills will be torn down and a new one of 100 stamps will be built on the Yakt river. J. A. Finch is general manager.

JEFFERSON COUNTY.

Basin hears that Jefferson county is to have a smelting plant to treat the zinc ores of the State by the Sadtler process, near Boulder.

LEWIS AND CLARKE COUNTY.

From Marysville the Helena Independent is told that the report of the shut down of the Drum Lummon mine was exaggerated. It was the mill that shut down and a few miners who were getting out ore for the mill. The prospect work goes on more actively than before the mill shut down, and the force employed in doing this work has been increased.

The North Star mine is being developed through the 400-foot level of the Drum Lummon, and five teams are taking this ore to the Bald Mountain mill.

J. H. Longmaid of the Belmont mine at Marysville says that work has been commenced sinking the shaft from the mill tunnel level. The mill at the Belmont is running; 150 men are employed in the mine and mill.

MADISON COUNTY.

W. K. Edwards is Supt. McVey M. & M. Co., at Sand creek, near Pony, the high-grade ores netting $40 on the market, the low-grade being handled by a stamp mill.

Dr. Fletcher has completed three cyanide tanks at his plant on Mill creek.

R. W. Noble will retimber the Noble shaft at Nobleville.

At Red Bluff the Red Chief mine will put up a thirty-ton concentrator.

SILVER BOW COUNTY.

A chattel mortgage for $21,000 from O. B. Peck to F. Farrel of Ansonia, Conn., is filed on a 10-stamp ore battery and machinery on the Centennial mill site. Mr. Peck is an inventor and the mill referred to proposed to treat low-grade ores.

Supt. Buzzo at the Alice M. Co., Walkerville, has eighty men at work, some of them being lessees. The property is producing 600 tons per month, the ores carrying from 18 to 100 ounces silver and 75 cents to $10 gold. Supt. Buzzo is hopeful of several new processes for successfully treating zinc ores; one by B. B. Sadtler, who lines the retorts with a chemical combination that resists the action of the iron in melting for ninety days, and who expects to utilize zinc ores carrying 10% to 15% of iron. Heretofore the presence of 2% of iron has proved a serious objection in zinc ores in the United States, but in Europe zinc ores have been treated carrying 10% of iron, due to cheaper labor and different processes. A company is being organized to work under that process, its works to be located near Basin. Another process is being developed for leaching out the zinc, leaving the iron and silica containing the metallic values for treatment.

Plans and specifications have been drawn for the reconstruction of the Parrot mining plant. The hoist is to be replaced with a modern steel gallows-frame. The boilers were found uninjured, but everything else was completely destroyed. The fire did not get into the shaft.

NEVADA.

EUREKA COUNTY.

Sentinel: The following figures taken from the books of the county assessor show the number of properties in operation at the present time in the vicinity of Eureka, together with the names of their superintendents and the gross value of their output for the six months ending June 30, 1900:

Altoona, A. Fraser	$ 179 58
Cyanide, A. Fraser	7,076 00
Diamond and Excelsior, C. Read	40,466 09
Eureka Con., H. C. McTerney	18,812 75
Eureka tunnel, J. Pardy	3,427 52
Fraser & Moline, A. Fraser	989 28
Helen, M. Farlinger	407 79
Jackson, W. J. Hooper	6,883 94
Laurel and Hidden Jewel, J. McNoughton	683 97
Richmond, R. K. Morrison	9,477 65
Ruby & Dunderberg, R. K. Morrison	4,665 19
Tenabo M. & M. Co., S. Wenban	73,841 02
Rocco-Homestake, H. Jackson	28,000 93

ESMERALDA COUNTY.

The Huntoon mine, 40 miles south of Hawthorne, is reported bonded for $12,000.

LANDER COUNTY.

Thirteen miners have come from Eureka, Utah, to Ione, Nev., to work for the Midas M. Co.

LINCOLN COUNTY.

It is said that good reliable miners can find work at DeLamar.

Near El Dorado canyon the Southwestern M. Co., which owns seventeen claims, is excavating for a 20-stamp mill in addition to the present fifteen stamps. They have finished cyaniding the tailings that had accumulated. The cyanide plant was under the management of Mr. Van der Cook and a saving of 95% gold and 75% silver was made. An illustrated technical description of the operation of the plant appeared in the issue of Feb. 17, 1900. The ores are either shipped to Manvel, 40 miles, or taken to the river for treatment, where water can be obtained. The miners get their supplies from Searchlight, 18 miles distant, packed in on burros.

The Horseshoe mill at Fay started on the 20th.

The Consolidated Freiburg Mines has incorporated, G. E. West secretary.

STOREY COUNTY.

J. Fisher, the Six-mile canyon millman, will move his cyanide plant from the canyon to the tailings pile north of the Sierra Nevada mine waste dump. He figures he will make a saving of 60 cents per ton—the cost of hauling them by team to the present site of the cyanide plant. As the pile is estimated to contain 18,000 tons of tailings, the removal of the plant to the pile would effect a total saving of $10,800; the cost of moving the plant will be $800. The plant has a capacity of twenty tons per day.

WASHOE COUNTY.

J. R. DeLamar is locally credited with having inspected the Wedekind mine, near Reno, and pronouncing it a mineral spring deposit, analogous to the formation at Steamboat Springs. The mine is producing a carload of ore per month, averaging $200 per ton.

At Olinghouse the Ora mill is running on forty tons of ore that should net $5000. W. C. Williams, on his Cabin claim, has 16 inches of ore that shows wire gold. A pound of it was selected and $15 gold mortared out.

WHITE PINE COUNTY.

At Osceola the tungsten mine, owned by Gaby & Buntin, is being worked steadily. The output goes to New York, where it is treated and where it brings the producers $250 per ton. A concentrator is being put in.

NEW MEXICO.

BERNALILLO COUNTY.

The Cochiti has reduced its working force owing to mechanical improvements. The mill is treating 10,000 tons of ore per month. A contract for delivering ore from the mine to the ore bins has been let at 11 cents per ton.

GRANT COUNTY.

The Orion M. Co. at Shakespeare is driving development work.

The Pinos Altos G. M. Co. have advanced the wages of their engineers to $3.50 for eight hours' work.

At Pinos Altos Dimmick Bros. are pushing development on their Silver Cell group. On the 250-foot level they are raising on a stope and taking out fine ore, which will average 2000 ounces in silver. A concentrating plant for handling the lower grade product will be installed.

Dimmick Bros., while operating the Silver Cell at Pinos Altos, are prosecuting development work on the Mangus, Black Terrier, Wedge, Keystone, Climax and Silver Belle claims. A concentrating plant for handling the lower grade product is contracted for.

Mogollon district is reported more prosperous than at any time since 1893.

SANTA FE COUNTY.

R. B. Willison, near Galistoe, says he has developed a bed of mother-of-pearl.

The American Turquoise Co. at Cerrillos is reported to have made the richest strike in the history of the work at a depth of 300 feet.

SIERRA COUNTY.

The Lime Hill at Chloride has telluride gold ore.

C. H. Codding has men at work on the Hoosier Boy near Chloride.

The Sinnamahoning G. & C. M. Co. are pushing work on their Chance mine with two shifts. At the depth of 260 feet they have copper-gold ore, of which a car shipment has been sent to the El Paso smelter.

The Philadelphia M. & M. Co.'s new mill at Andrews is running full time.

SOCORRO COUNTY.

The Little Fannie at Mogollon is employing twenty-five men in development work.

The B. O. B. and the Last Chance mills have started.

TAOS COUNTY.

The New Mexico G. & C. Co. are putting a 16,000-pound boiler and hoister on their gold-copper property west of Tres Piedras.

OREGON.

BAKER COUNTY.

Sumpter reports a strike on the Concord group assaying high in gold and silver.

At Cable Cove considerable development work is being done under the direction of W. H. Jackson, former Supt. of the Golconda.

Near Sumpter the Mammoth has an incline shaft 265 feet deep. H. S. McCallum is manager.

F. J. Perkins, manager Gem mine, near Sparta, has the shaft down 460 feet.

The Climax mine is being developed.

DOUGLAS COUNTY.

Supt. R. A. Jones of the Gold Bug mine, near Glendale, says he is employing thirty men, working night and day. They have about a year and a half's work for their 5-stamp mill now in sight and are doing development work; have just completed surveying a new 1600-foot tunnel in the south side of the mountain; they are working 413 feet below the surface.

Supt. Jones of the Gold Bug mine, Mt. Reuben district, says the company is employing thirty men; they have a 5-stamp mill operating and are working 413 feet below the surface.

HARNEY COUNTY.

One hundred and twenty-five miles south from Burns, near the Nevada line, is the plant of the Rose Valley Borax Co. The borate is scraped from the earth, refined, and hauled to Winnemucca, Nev., and shipped from there. The company owns two wagon trains, consisting of three wagons each, coupled together, each drawn by twelve mules, each train making two trips a month. They carry 40,000 pounds of borax to Winnemucca each trip and bring back supplies for the country at large. The distance from the mines to Winnemucca is 125 miles.

JOSEPHINE COUNTY.

Wimer Bros.' mines in Waldo district are reported sold to Waln, Draper, et al., for $40,000. The property consists of 400 acres of ground, equipped with ditches, flumes and mining appliances.

J. S. Howard, engineer High Line Ditch Co., says the strike by J. C. Nye at Gall's creek is notable. Nye bought the prospect for $600 and sold a half interest for $9000 cash, and since that time $50,000 has been taken out.

LANE COUNTY.

A carload of machinery is at Springfield for the Blasier mine in the Blue River district.

UNION COUNTY.

The Monumental mine, 8 miles from Granite, will resume under the management of C. S. Miller.

SOUTH DAKOTA.

PENNINGTON COUNTY.

At Keystone the Holy Terror Co. has opened ore on the 700 and 800-foot levels and are milling it in their Keystone mill. The company will put in a plant for reduction of concentrates. The Elizabeth M. Co., owning the Bismarck mine, are developing their ground.

UTAH.

BEAVER COUNTY.

Manager Lewis of the Imperial M. Co. has assay certificates claiming 24.7% copper, $5.20 in gold and 8 ounces silver per ton from samples in the main crosscut off the main tunnel.

JUAB COUNTY.

Miner: At Eureka the Bullion-Beck has paid the Almo M. Co. $25,000 for the Almo group of five claims.

The report of the Centennial-Eureka M. Co. for the first six months of 1900 shows the gross earnings to be $722,655.54; of this $230,782.96 was derived from the sale of 384,638.27 ounces of silver, $302,377.50 from the sale of 14,628.81 ounces of gold and $189,495.08 from the sale of 1,148,455 pounds of copper.

SALT LAKE COUNTY.

At Bingham, the U. S. Co. has reduced rates at its boarding houses from $1 to 80 cents per day.

At Bingham, the $50,000 payment on the Dalton & Lark purchase by P. T. Farnsworth and his associates is satisfactorily arranged for, a total applied to the deal of $71,000, leaving a balance of about $300,000. Payment under the contract matures in September, when $125,000 becomes due.

TOOELE COUNTY.

Concerning the application of heat in the treatment of the Mercur tailings, Manager Cohen tells the Tribune that it would require nothing more than calcination, and that with the apparatus already in possession of the consolidated company, the expense of installing the plant would be practically nothing. He has already begun on the experiments, and with their completion will begin to prepare for the active leaching of the tailings.

UTAH COUNTY.

Manager Campbell of the Mayflower, 18 miles west of Lehi, has samples of ore that show 32% lead, 15 ounces silver and 66 cents in gold.

WASHINGTON.

FERRY COUNTY.

Sec'y Aitcheson of the Reservation M. & M. Co. tells the Spokesman-Review that the road to Grand Forks, 15 miles, is so that a four-horse team can handle five tons in a load. The new working shaft is down 175 feet, and is advancing about 40 feet a month. The compressor has not been started up; mining is being done with hand drills.

J. H. Gallagher, general manager American M. & D. Co., Curlew, will put a 12 H. P. hoist on the Drummers' group. He says the ore "assays 2% copper, 6% lead and the balance in silver," and that he has arranged to put up a forty-ton smelter. The company is employing fifty-four men.

The Republic, Quilp, Lone Pine and Tom Thumb mines are reported about to be united under one management. W. Miller of New York and C. J. McCuag of Montreal are credited with intention to form the combination.

C. McCuiag says that he has a syndicate ready to build a railroad from Republic to Grand Forks, B. C.

OKANOGAN COUNTY.

In the Methow district in the Eureka the ore from the surface down 100 feet was in a chimney; little of value outside of it. At 100 feet the chimney ended and prospecting was begun to find its continuation. A drift was run and a winze sunk, and another chimney of different ore, but of equal richness and greater size, was found some distance to one side and below the other one. Work in this second chimney shows it to measure 33 feet one way.

At Loomis the Palmer Mountain tunnel is in 3475 feet. Its ultimate length will be 8400 feet and depth 4000 feet vertical.

The Golden Zone M. Co. has 3000 feet of tunnels.

The Black Bear, down to the 250-foot level, is reported producing $7000 monthly with five stamps.

Winthrop reports a clean-up of the 5-stamp mill of the Mammoth, on Slate creek, Methow district, giving returns equal to $300 per day.

The mill of the Eureka, on Slate creek, is running. The plates look well for the length of the run. The gravity tramway from the mine to the mill, 2000 feet up a steep incline, is being operated.

STEVENS COUNTY.

A contract has been let to increase the capacity of the Northport smelter, associated with the Le Roi mines, from 750 to 1100 tons a day.

WYOMING.

CARBON COUNTY.

(Special Correspondence). — Keener Bros., having three claims near this place, have discovered a ledge of copper glance, 20 inches wide, which ran 54% copper. The ledge was on the surface, and sinking is in progress to determine the extent of the ore.

Battle Lake, Aug. 9.

At Battle Lake district, in the property of the Evening Star M. Co., ore is being taken out that averages 35% copper.

Reports from the Ferris-Haggarty copper mine, Battle Lake district, are to the effect that it will be transferred to Manhattan Investment Co. of Denver at an alleged price of $2,000,000.

FREMONT COUNTY.

At South Pass, the Carrisa M. Co. has a 10-stamp mill.

The Mary Ellen mine is being developed by the South Pass M. & M. Co. J. P.

Ibson, manager; M. Lewellyn, foreman.

The Garfield is being worked by Waugh Bros.; C. E. Ross, manager.

FOREIGN.

BRITISH COLUMBIA.

The Lillooet Prospector says in Bridge River district five arrastras are running in a radius of half a mile, all turning out gold and averaging from $75 to $100 per day.

At Nelson the Hall Mines smelter resumed this week.

A. H. Bromley brought to Victoria the first gold brick from the product of the Atlin quartz ledges—twenty-eight ounces, taken from the plates of the Nimrod Co.'s machinery in its 5-stamp mill at Atlin, said to be the most northerly in the mining world.

It is locally reported that the C. P. Railroad Co. will sell the smelter at Trail to the British-American Corporation of London, which owns mines at Rossland. The smelter was built by F. A. Heinze of Butte, Mont., in 1895, and by him sold to the Canadian Pacific Railroad Co. for $500,000.

Placer mining operations at Wreck bay, Vancouver Island, are of increasing magnitude. The large flume running 6 miles inland from the beach is about completed; modern machines for the washing of the gold from the sand are being put in. The ton or yard of beach land that is run through the machines now operated return on an average $4 gold. Forty men are employed on the flume. The bay is exposed to every blast, and, as the big seas roll in, parts of the embankments are carried seaward, and then the deposits are swept shoreward, this reactionary process accounting, it is thought, for the prevalence of the gold on the beach.

V. R. Pierson reports placer gold on the west coast of Vancouver island, 12 miles south of the Helga mining properties. He says there is a 3-mile stretch of beach at the point indicated where the gold is of all sizes, from half a pea down to mere atoms. The formation of the ground is, first, 18 inches of sand and gravel; then 30 inches of gray and black sand carrying placer gold; then 12 inches of clay; then 18 inches more of pay streak, richer than the first encountered; then the clay hard pan.

Ashcroft, Cariboo, reports that R. H. Campbell of California has broken through into gravel at the Horsefly. The work has been pushed on a three-compartment shaft 5x15 feet. At 490 feet last season bedrock was reached, but it was found to be pitching off and smooth, it holding no gravel. Mr. Campbell put in heavier machinery and sunk 60 feet in bedrock, then started to drift across the channel. At 300 feet, not having struck the channel, he made an upraise of 15 feet, and is now stated to have broken through into gravel.

MEXICO.

At Tizucutlan the Aurora mine, owned by St. Louis men, is managed by M. Barron. The product is copper, with gold and silver. Power is partly supplied from a stream of water which has a fall of 1000 meters and from which the electric plant is operated. The company is working about 1000 men.

The concentrator and smelter at the Nacosari mines, Copper Queen Co., Nacosari, Sonora, will begin treating ore Nov. 1.

The Herald says some of the ore shipped from the Candelaria mine, in the Sabinal district, Chihuahua, runs 2000 ounces of silver to the ton.

At Minas Prietas the Creston-Colorada M. Co. is negotiating with the proprietors of the Fortuna, adjacent to the Creston mine, for a working bond upon the latter property.

W. Perry of Sidney, Ohio, has bought some abandoned silver mines in Tasco and proposes to resume work thereon.

KOREA.

In Ting Yan, the northern province, a cyanide plant to treat the tailings from the mills at the mines will go from San Francisco this month for the Oriental M. Co., limited, which has a concession of 1000 square miles of territory in the district for their operation. They are the Chitabalbie, Tobowie and Cook San Down, operated by three stamp mills, aggregating eighty stamps. The ore is a free milling and concentrating quartz, and 65% of the values are saved on the plates. The three mines employ 3000 natives and 200 American miners.

Recently Declared Mining Dividends.

Gold Belt M. I. Co., Colorado, $112,500, 9 cents a share on 1,250,000 shares	Aug. 15
Quincy C. M. Co., Michigan, $4 per share, $400,000	Aug. 15
Arizona C. M. Co., Arizona, 84 cents per share, $132,943	Sept. 30

Personal.

J. W. Boles succeeds Secretary Hiller at the Cherokee M. Co., Cherokee, Cal.

H. T. Power has returned to Placer county, Cal., from an extended Eastern trip.

Henry Moore has been appointed Supt. Mazeppa, mine Tuolumne county, Cal.

B. Hermann, U. S. General Land Commissioner, is expected in San Francisco next week.

C. E. DeForrest succeeds Supt. Edlin at the War Eagle Consolidated, Quartzburg, Idaho.

V. V. Clark succeeds E. McNab in charge of the cyanide plant at the Albemarle mill, Bland, N. M.

General Manager Anderson of the Gold & Silver Extraction Co. of America will return from Europe to Denver, Colo., this month.

C. M. Fassett of Spokane, Wash., leaves San Francisco on the 21st to oversee the installation of a cyanide plant in Ting Yan, the northern province of Korea.

Charles D. Lane has returned to San Francisco from Nome, where he put in a $150,000 plant to work the creek instead of the beach. He believes his venture will prove remunerative.

Geo. F. Ismon will succeed Frank L. Brown in the San Francisco office of the American Steel & Wire Co. Mr. Walker has returned to San Francisco from Portland, Or., and will assist Mr. Ismon.

Ex-Senator Warner Miller of New York, who has a bond on a Shasta county, Cal., property, says: "There is a noticeable gain in the popularity of Western mining securities in the East. With the introduction of scientific and business methods in the conduct of mining enterprises and the improvements in the methods of treatment, mining has been made a business as much as a speculation. It is beginning to be recognized that a mining enterprise is made successful by putting men of scientific training and the widest possible experience at the head of operations and business men of capacity at the business end. There is, in consequence, a strong movement towards mining as a business."

Commercial Paragraphs.

Two large shipments of Cross oil filters were made by the Burt Mfg. Co. of Akron, Ohio, to France during the month of July, as the direct result of their exhibit at the Paris Exposition.

The Gates Iron Works have the contract to equip and erect a 150-ton cyanide plant at the Annie Laurie mine, near Marysvale, Utah. J. M. Callow of Salt Lake City represents the Gates people in this matter.

W. H. Emanuel shipped last week to the Bassick mine, at Silver Cliff, Custer City, Colo., a 14 and 24x22-inch cross-compound air compressor, with air and steam high and low-pressure cylinders, having Meyer adjustable cut-off. The capacity of compressor is 1200 cubic feet of air per minute.

United States Consul Hughes writes from Coburg: "In these times, when coal is hard to obtain, our American turbine-wheel houses ought to give special attention to supplying southern Germany with improved machinery for utilizing the water power which is now running to waste, especially in Thuringia. They should send salesmen who can speak German and know how to operate the machines. The only water-wheel known here is the old-fashioned one."

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s Scientific Press U. S. and Foreign Patent Agency, the following are worthy of special mention:

Bottle Faucet Attachment.—No. 655,345. Aug. 7, 1900. H. A. Knight, Alameda, Cal. The object of this invention is to provide for the more perfect charging of carbonic acid gas and the like into bottles containing liquids, whereby the latter are made effervescent, and a means for withdrawing the contents of the bottle in small quantities as needed without injuriously reducing the quantity or pressure of gas in the remaining liquid, the whole designed to operate without the removal of the stopper and connected parts. It consists of a tubular screw-threaded stopper fitting corresponding threads in the neck of the bottle, having a flange and washer to form a joint, and a tubular extension above and below the stopper. A cap is provided with a stopper to fit this extension having a central and packed valve stem, and a valve at its lower end closable upon a seat within the stopper. The cap also forms an exterior screw-threaded sleeve fitting upon the outside of the stopper extension, and an inwardly open spring-pressed valve is provided for charging the bottle, this valve having a stem extending through the stopper, and the cap upon the upper end with admission channels formed through it.

Method of Making Superphosphates.—No. 655,458. Aug. 7, 1900. Heinrich Saxl, San Francisco, Cal., one-half assigned to A. A. Adler, of same place. This invention is designed to provide a concentrated easily soluble phosphoric acid, and to produce superphosphates rich in fertilizing material. It consists in first producing normal superphosphates by subjecting the phosphate of lime containing the material to the action of sulphuric acid, then mixing the mass with water, separating out the liquid and evaporating it, then mixing with the product the second body of phosphate-containing material, withdrawing the resultant mass and separating the liquid therefrom.

Grain Drill Attachments.—No. 655,334. Aug. 7, 1900. Wm. Falconer, Selma, Cal. This invention relates to an attachment for grain drills of that class in which the grain is delivered from a reservoir or feed box through tubes and shoes at the lower ends, these shoes forming drills to receive the grain, and the object is to provide a supplemental attachment by which the pressure upon the heel of the shoe can be regulated so as to insure the drill being made of sufficient depth in hard or lumpy ground, and to prevent it from going too deep where the ground is soft and sandy. The front ends of the shoes have elastic connections and supports; standards are flexibly connected with each shoe at the point in the rear of the forward connections and extending upwardly from their point of attachment. A fixed bar having holes through which the standards are slidable acts to limit the movement of the standards by reason of pins or stops which are adjustably fixed to the standards to contact with the bar. Spiral springs surround the standards, the ends pressing respectively against the bar and against the adjustable stops so that pressure is exerted to force the heels of the shoes into the ground, while other pins or stops fixed to the standard above the bar limit the depth to which the shoes are forced in the ground when the latter is soft.

Axle Lubricator. — No. 655,347. Aug. 7, 1900. J. E. Ludwig, San Francisco, Cal. This device is designed for the lubrication of vehicle axles without the removing of the wheels, and is particularly adapted for heavily loaded vehicles, such as large wagons loaded with freight which is to be carried for a number of days before reaching its destination. It consists of a lubricant reservoir, with means for connecting it with the outer end of the axle to be lubricated, and means for forming a tight joint therewith. With this is a device by which the lubricant may be forced into the space between the axle and axle-box, this device being in the form of a plunger or piston movable in the lubricant-containing cylinder, so that when the piston is forced inwardly, the lubricant will be passed through the connecting passage and into the space between the axle-box and the axle in sufficient quantities for the purpose.

Hop Bleaching and Drying Kiln.—No. 655,330. Aug. 7, 1900. J. & A. B. C. Dowdell, St. Helena, Cal. This invention is designed to bleach and dry hops. It consists of a room or compartment having a foraminous floor adapted to support the hops to be dried, and in conjunction with this of a covering which may be drawn over the surface of the hops to confine and prevent the heat and moisture from escaping therefrom during the process of bleaching. The sulphur fumes are produced in any suitable manner and delivered from below so as to rise into the hops, and are there retained by the superposed covering until the bleaching is perfected. The covering is then withdrawn, and heat being applied the drying will be completed in the usual manner. In this manner the hops are very perfectly bleached with a minimum expenditure of time and material.

Concentrator.—No. 655,470. Aug. 7, 1900. W. H. Washburn, of Oroville Wash., one-half assigned to J. B. Washburn, Baker City, Or. This invention is an improvement in concentrators of that class of the endless traveling and shaking belt type. It consists of a water supply device with discharge openings, a distributer or spreader having oppositely inclined surface adapted to reciprocate beneath these openings and having a series of divergent channels alternately supplied from the water-box. The distributer has also a series of discharge openings at opposite edges and gates by which the amount of water delivered to the channels is regulated.

List of U. S. Patents for Pacific Coast Inventors.

REPORTED BY DEWEY, STRONG & CO.,
PIONEER PATENT SOLICITORS
FOR PACIFIC COAST.

FOR THE WEEK ENDING AUGUST 7, 1900.

655,539.—Pick Point—J. Aegerter, S. F.
655,430.—Refining Asphalt—A. F. L. Bell, Carpenteria, Cal.
655,598.—Spring Seat—W. Bochert, Carson, Nev.
655,676.—Conveyor—J. A. Brown, Portland, Or.
655,196.—Serving Apparatus—W. C. Church, Portland, Or.
655,200.—Cow Milker—W. A. Condron, Marshfield, Or.
655,206.—Truss Pad—A. J. Davidson, Douglas City, Cal.
655,330.—Hop Kiln—J. & A. B. C. Dowdell, St. Helena, Cal.
655,615.—Hydraulic Elevator—G. H. Evans, Oroville, Cal.
655,334.—Grain Drill—W. Falconer, Selma, Cal.
655,651.—Multiplex Telephony—E. A. Faller, S. F.
655,335.—Motor Starter—E. M. Fraser, S. F.
655,336.—Controller—E. M. Fraser, S. F.
655,218.—Excavator—D. W. R. French, Westport, Wash.
655,345.—Bottle Faucet—H. A. Knight, Alameda, Cal.
655,630.—Drag Saw Guide—E. F. Lafayette, Sedro, Wash.
655,347.—Axle Lubricator—J. E. Ludwig, S. F.
655,502.—Picture Frame—A. F. Messinger, Phœnix, Ariz.
655,374.—Gate—J. N. Salmon, Lathrop, Cal.
655,458.—Making Superphosphates—H. Saxl, S. F.
655,375.—Orchard Plow—T. Scanlon, Fresno, Cal.
655,418.—Furnace—R. Schorr, S. F.
655,464.—Fuel Feeder—F. N. Spear, Los Angeles, Cal.
655,382.—Window Lock—W. H. Talbot, S. F.
655,531.—Fastening Cords—O. Wallman, Spokane, Wash.
655,470.—Concentrator—W. H. Washburn, Oroville, Or.
33,046.—Design—Lydia A. Craven, Spokane, Wash.

Latest Market Reports.

San Francisco, Aug. 16, 1900.

SILVER—Per oz., Troy: London, 28⅛d (standard ounce, 925 fine); New York, bar silver, 61c (1000 fine); San Francisco, 61c; Mexican dollars, 49c.

The following table shows the stocks of gold and silver money in the aggregate in the countries now represented in China by troops or warships:

Country.	Stock of gold.	Stock of silver.
United States	$945,800,000	$329,700,000
Great Britain	462,300,000	111,900,000
France	810,600,000	420,100,000
Germany	672,800,000	208,200,000
Russia	740,400,000	5,400,000
Italy	98,000,000	43,900,000
Austria	221,400,000	147,300,000
China	....	....
Japan	54,000,000	29,000,000

COPPER.—New York: Lake, 1 to 3 casks, 16.75 cash; carload lots, 16.50; Electrolytic, 1 to 3 casks, 16.62½; carload lots, 16.37½; Casting, 1 to 3 casks, 16.50; carload lots, 16.30. San Francisco: 17. Mill copper plates, 20c; bars, 22@23c.

Under date of Aug. 2, Jas. Lewis & Son of Liverpool report:

The great developments now taking place in England in the application of electric traction and power; the additional telegraph cables about to be laid (including the Pacific cable of 8800 miles, estimated to require some 4000 tons of copper); the large quantities of copper used for ammunition; and the additional 5000 tons required for the manufacture of sulphate of copper during the next six months; will necessitate a great increase in the consumption of copper in this country for the rest of this year.

As the stocks held in the United States are much less now than a year ago, and shipments from thence during the second half of this year promise to be much less than during the first half, the increase in the production of the United States of 8% and in the total supplies to Europe and the United States of 7½%, which so far has taken place, appears insufficient to supply the probable increase in the consumption.

LEAD.—New York, $4.25; Salt Lake City, $4.00; St. Louis, $4.20; San Francisco $5.00, carload lots; 5½c 1000 to 4000 lbs.; pipe 6¾, sheet 7½, bar 6c. London, £18 = 3.91c per ℔.

The new prices of the American Smelting & Refining Co., 50-ton lots, are as follows:

Delivered.	Desilverized.	Corroding.
St. Louis	$4 20	$4 30
Chicago	4 20	4 30
Cincinnati	4 25	4 35
Pittsburg	4 30	4 40
Philadelphia	4 30	4 40
New York	4 25	4 35
Boston	4 32½	4 42½

On carload lots 5c. per 100 ℔s. higher.

The American Smelting & Refining Co. has issued a circular announcing that it has arranged with the principal lead producers of the country to pay a flat rate of $4 per 100 pounds, without the usual 12½% reduction, and to maintain that price for the remainder of the year, taking whatever steps are necessary in the way of exporting lead, etc., to maintain the price. This proposition was submitted to the company by the leading producers, as it was realized that unless some action of this kind was taken lead would inevitably fall to the export price of about $3.60 per 100 pounds.

SPELTER. — New York, $4.22½; St. Louis, $4.15; San Francisco, ton lots, 5½c; 100-lb lots, 5¾c.

ANTIMONY.—New York, Cookson's, 10½c; Hallett's, 9½c; San Francisco, 1000-lb lots, 12c; 300 to 500 lbs., 13@14c; 100-lb lots, 15@18c.

IRON.—Pittsburg, Bessemer pig, $17; gray forge, $15; San Francisco, bar, per lb., 2¾c. in small quantities.

STEEL.—Bessemer billets, Pittsburg, $18.00; bars, 1.20; tank plate, 1.00; San Francisco, bar, 7c to 12c per lb.

QUICKSILVER. — New York, $50.00; large lots: London, £9 5s; San Francisco, local, $48@48.50 ℔ flask of 76½ ℔s.; Export, about $45.

The entire quicksilver situation seems anomalous and unsettled. Underproduction is asserted, higher prices are predicted, yet the market sags.

MAGNESIUM.—New York, $3.00 ℔ ℔.; San Francisco, $4.00.

ZINC.—San Francisco, 5½c; slab, 6c; bar, 7¾c.

SOLDER. — Half-and-half, 100-℔. lots, 21½c; San Francisco, Plumbers', 100-℔. lots, 18¼c.

BABBITT METAL.— San Francisco, No. 1, 10c.

TIN.—New York, pig, $31.75; San Francisco, ton lots, 33¾c; 1000 ℔s., 34¼c; 500 ℔s., 34¼c; less, 35c; bar tin, ℔ ℔, 39c.

ASSAY LITHARGE.—San Francisco, 10c ℔ ℔, small lots.

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 30c to 35c.

PLATINUM.— San Francisco, crude, $17 ℔ oz.; New York, $18.25; manufactured, $19.50@22.00.

BISMUTH.—New York, ℔ ℔., $1.60 50-℔ lots; San Francisco, $2.50 to $2.75 ℔ lots.

NICKEL.—New York, 50@60c ℔ ℔.

TUNGSTEN.—New York, ℔ ℔., 95c; San Francisco, $1.15.

FERRO-TUNGSTEN. — New York, 37%, 35c; San Francisco, 65c (60%).

FERRO-MANGANESE. — Pittsburg, 80%, domestic, $85, large lots.

CHEMICALS.—Cyanide of potassium, 98%-99%, jobbing, 32½@34½c ℔ ℔.; carloads, 31@32c; in 10-℔. tins, 40c; sulphuric acid, 66% B, 2c ℔ ℔.; soda ash, $1.60 ℔ 100 ℔s. 58%; hyposulphite of soda, 2¾@3c ℔ ℔.; blue vitriol, 5½@6c ℔ ℔.; borax, concentrated, 7@8c ℔ ℔.; chlorate of potash, 12@13c; roll sulphur, 6c; alum, $1.90@2.00; flour sulphur, French, 2¼@2½c; California refined, 1¾@2c; nitric acid, in carboys, 8c ℔ ℔.; caustic soda, in drums, 3@4c ℔ ℔.; Cal. s. soda, bbls., $1.00; sks, 95c ℔ 100 ℔s.; chloride of lime, spot, $2.35@2.50; nitrate of potash, in kegs, 8c; caustic potash, 10c in 40-℔. tins.

OILS.—Linseed, pure, boiled, bbl., 79c; cs., 84c; raw, bbl., 77c; cs., 82c. Deodorized Stove Gasoline, bulk, 16c; do., cs., 22c; 86° Gasoline, bulk, 21c; do., cs., 27c; 63° Naphtha or Benzine, deodorized, in bulk, per gal., 15½c; do., in cs., 21½c; Lard Oil, Extra Winter Strained, bbl., 60c; cs., 65c; No. 1 bbl., 49½c; cs., 54½c; Neatsfoot Oil, coopers' bbls., 60c; extra bbls., 55c; cs., 60c; No. 1 bbl., 52½c; cs., 57½c.

POWDER.—F. o. b. San Francisco: No. 1. 70% nitro-glycerine, per ℔., in carload lots, 15¼c; less than one ton, 17¼c. No. 1*, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1** 50%, carload lots, 11¾c; less than one ton, 13¾c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9½c; less than one ton, 11½c. No. 2** 30% carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9, in lots not less than 1000.

FUSE.—Triple tape, $3.60 per 1000 feet; double tape, $3.00; single tape, $2.65; Hemp, $2.10; Cement No. 2, $3.00; Cement No. 1, $2.65, in lots of 3000 feet and up.

PHOSPHORUS. — F. o. b. New York or Philadelphia, 45@50c ℔ ℔.

CANDLES.—Granite 6s, 16 oz., 40s., 12¼c ℔ set; 14 oz., 40s., 11¼c.

COAL. — San Francisco, coast, yard prices: Wellington, $9; Seattle, $7.00; Coos Bay, $5.50; Southfield, $9.00. Cargo lots, Eastern and foreign: Wallsend, $8.00; Brymbo, $7.50; Pennsylvania, hd., $14.00; Scotch, $8; Cumberland, $12; Cannel, $9.50; Welsh Anthracite, $12.00; Rock Springs, $8.50; Colorado Anthracite, $14.50. Coke, $16 per ton in bulk; $18 in sacks.

San Francisco Stock Board Sales.

SAN FRANCISCO, Aug. 16, 1900.

9:30 A. M. SESSION.

100 Alpha.......08c	400 Crown P't...15c
300 Belcher.....16c	600 Justice......06c
100 .... 15c	50 Mexican.....27c
500 Bullion......05c	200 Potosi.......15c
200 Challenge...23c	100 Silver Hill..56c
200 ....22c	400 ....55c
200 Chollar.....19c	100 Union.......21c
200 C. C. & V..$1 40	600 Y. Jacket...31c

2:30 P. M. SESSION.

100 Ophir.......57c	200 Bullion......14c
300 Chollar.....17c	200 Caledonia....62c
100 Potosi.......14c	400 Silver Hill...51c
300 Crown P't...16c	300 ....50c
100 Y Jacket....31c	

WANTED.

A Rich Placer proposition, adapted to working by Railroad Steam Shovel, or Dry Land Excavator. Description, with price and terms, to receive attention must be accompanied by reliable reports and references.

Address: EDWARD N. BREITUNG,
MARQUETTE, MICH.

Quicksilver
——FOR SALE BY——
The Eureka Company,
OF SAN FRANCISCO.
ROOM 1, - - 320 SANSOME STREET,
SAN FRANCISCO.

Quicksilver
For Sale in Lots to Suit.
REDINGTON & COMPANY, Wholesale Druggists, 23-25-27 Second Street, San Francisco.

WANTED.

WANTED.
An all around Millman and Amalgamator, who also understands the handling and working of mill machinery. State wages and experience. Gold Hill Quartz Mining Co., Gold Hill, Oregon.

WANTED.—A COMPETENT AND RELIABLE man to take charge of a gold quartz mine and stamp mill in Sinaloa, Mexico. Must understand assaying and have business qualifications References as to ability and honesty required. Address C. L. Merry, Pres. H G. M. Co., Kansas City, Mo.

WANTED.—A CHEMIST AND ASSAYER FULLY conversant with the latest and most economical methods of cyaniding; also an Assistant Assayer and Chemist. State salary expected and forward testimonials. Address "Extraction," care of Mining and Scientific Press.

TO MINING EXPERTS.
WANTED.—A proposition containing magnetic pyrites (Fe_7 S_8 to Fe_{11} to S_{12}).
Address THOS. L. NEAL, Attorney, Lankershim Block, Los Angeles, Cal.

WANTED.
An Ore Tramway—Bucket or Jig Back—Cable and Terminals.
Must be in perfect order for use in central Arizona. Length 1700 feet. Grade 24%. Daily capacity 80 to 100 tons. Address "TRAMWAY," 406 Rookery Building, Chicago.

REFRACTORY ORES
WANTED.
1000 TONS or more which will assay $75 00 Gold per ton and over, delivered free of charge at San Francisco, Cal. Correspondence solicited.
C. J. TALLON,
308 MARKET STREET, SAN FRANCISCO, CAL.

SPIRAL SAND PUMPS.
For Pumping Sand, Slimes, Tailings and Crushed Ores.
The Cheapest and Most Durable Pump on the Market. Manufactured by J. H. Frenier & Son.
Represented by M. S. HAUSER,
12 Front Street,............San Francisco, Cal.

DEWEY, STRONG & CO.,
PATENT AGENTS, 330 Market St., S. F., Cal.

SITUATIONS WANTED.

A1 ASSAYER desires position Will go anywhere. Finest of references. Thoroughly competent Address Assayer, Box A. Mining and Scientific Press.

WANTED—SITUATION BY A COMPETENT and experienced millman on concentrators or battery frame. Highest references. Address L. W., 509 Kearny street, room 2, first floor, San Francisco, Cal

WANTED—POSITION AS ASSAYER OR millman in cyanide plant Several years' experience, and understands the handling of machinery. Can also serve as bookkeeper. Best of references. Address M. S. A., care of this office.

WANTED.—SITUATION AS MANAGER OF producing or developing property. Twelve years' experience in gold mining and milling, copper mining and smelting. Address C. H., care of Mining and Scientific Press.

FOR SALE.

FOR SALE --Ten mines, forming a group (gold and silver), with mill site and water power, Acuitapilco Mining District. Ore assaying from 80 ozs. to 100 ozs. to the ton; gold, ½ oz. Address to LIC. ELIAS GALINDO, P. O. Box 26, Tepic, Mexico.

FOR SALE --- Developed Zinc-Lead-Silver Property. Texas.
Two trunk lines. 700 acres. 8100 feet on vein. Splendid concentrating proposition. 1500 feet development. Mine average: Zinc, 17.66%; lead, 9.57%; silver, 7.35 ozs.; gold, .04 ozs. Price, $30,000. Principals only. H. E. RUNKLE, El Paso, Texas.

Second-Hand
Mining Machinery and Supplies
OF ALL KINDS.
Send for Catalogue.
THE S. H. SUPPLY CO.
22nd and Larimer Sts., DENVER, COLO.

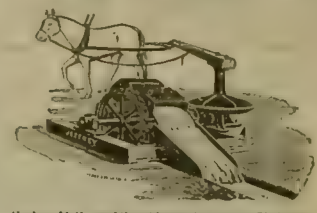
Hydraulic Pipe FOR SALE CHEAP.
1500 feet of 10⅝-inch Casing weighing 27 lbs. to the foot, with Flanges, or Screws and Sockets; in lots to suit. Immediate delivery. Correspondence solicited.
C. J. TALLON,
308 Market Street,........San Francisco, Cal

ASSAY OFFICE
FOR SALE.
An old established and completely equipped Assay Office and Chemical Laboratory, doing a good business in Denver, Colo.; power plant with crushing and grinding apparatus in connection. Good business reasons for selling. Bargain if sold at once. Address Q 641, Mining and Scientific Press.

FOR SALE.
BIG COPPER MINE
In Shasta county. A south extension of Iron mountain. Croppings 700 feet wide; 600 to 800 feet of backs. Four miles from Sacramento river and railroad. Address C. D., this office.

FRED C. MILES,
CISCO, PLACER CO., CAL.
COPPER AND GOLD PROSPECTS.
A GOING GOLD PROPERTY.

WATER ELEVATORS.

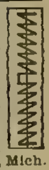


Submit Specifications for Our Prices.
Plans and Estimates Cheerfully Furnished.
We manufacture: Chains (All Styles), Elevator Buckets, Sprocket Wheels, Spiral Conveyors, Dredges, Sand Handling Machinery, Water Elevators, Dump Cars, Skip Cars, Clay Screens, Columbian Separators (for Treating Cement, Cement Clinkers, Marble, Quartz, Ores, etc), Coal Screens, Coal and Coke Crushers, Coal Washers, Cable Conveyors.
For Catalogue, Address
THE JEFFREY MFG. CO., Columbus, Ohio.
Western Branch, Equitable Bdg., Denver, Colo

THE ERICSSON SWEDISH
TELEPHONES
HAVE BEEN IN USE OVER 20 YEARS.
THEY ALWAYS TALK. GIVE THEM A CHANCE TO TALK TO YOU.
CATALOGUES FREE.
ERICSSON TELEPHONE CO.
20 WARREN ST. NEW YORK, N.Y.

Notice the Shape of
GLOBE BOX---THE BEST BABBITT.

J. M. HAYDEN & CO.
GRAND RAPIDS MICH.
THE BEST BABBITT.



Send for trial order, Ladle free.
The Globe wire lace makes the smoothest joint, runs the stillest and lasts the longest of any lacing. Sent on approval. Write us for booklet with instructions, etc. J. M. HAYDEN & Co., 58 Pearl St., Grand Rapids, Mich.

EFFECTING ECONOMY IN
Steam and Power Plants
IS MY BUSINESS.
DOES IT INTEREST YOU?
Howard H. Fielding,
1328 Seventeenth St., DENVER, COLO.

WE BUY very rich Ores, Dental Scraps, Tellurium Ores, Mill Wastes, Jewelers' Sweeps, Gold Retorts, Old Iron Retorts, Base Amalgam, Quicksilver, Amalgamated Plates, Gold and Silver, Old Slags.
A. M. DONALDSON & CO.,
ASSAYERS AND WASTE PRODUCT SMELTERS,
1661 Larimer St., Denver, Colo
Donaldson's Assayers' Slag Hammer { 1 lb......$1.10 / 1 lb. 3 oz. $1.25

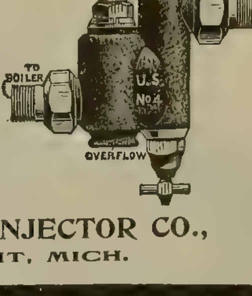
BENJAMIN T. LLOYD,
STOCKS, BONDS AND MINES.
Have immediate customers for well-developed Gold and Copper Properties.
P. O. Box 608, SALT LAKE CITY, UTAH.

MILL PLANS.
Cyanide, Concentration, Smelting, Sampling.
F. D. BAKER, Mech. Eng., DENVER.

Hot Water
Fed to your boiler is more economical than cold, and the hotter the feed water the greater the economy.
How hot will your Injector handle it?

THE U. S.
INJECTOR

Makes a point right here. It handles hotter water than any other Injector made.
It also has a wider range, a very important feature sometimes.
In fact, there's a number of good strong points about the U. S. that are only known to those who use them.
Our little "ENGINEER'S RED BOOK" tells about them and also about 500 other things an engineer ought to know. It's a vest pocket reference book. Write for one.



AMERICAN INJECTOR CO.,
DETROIT, MICH.

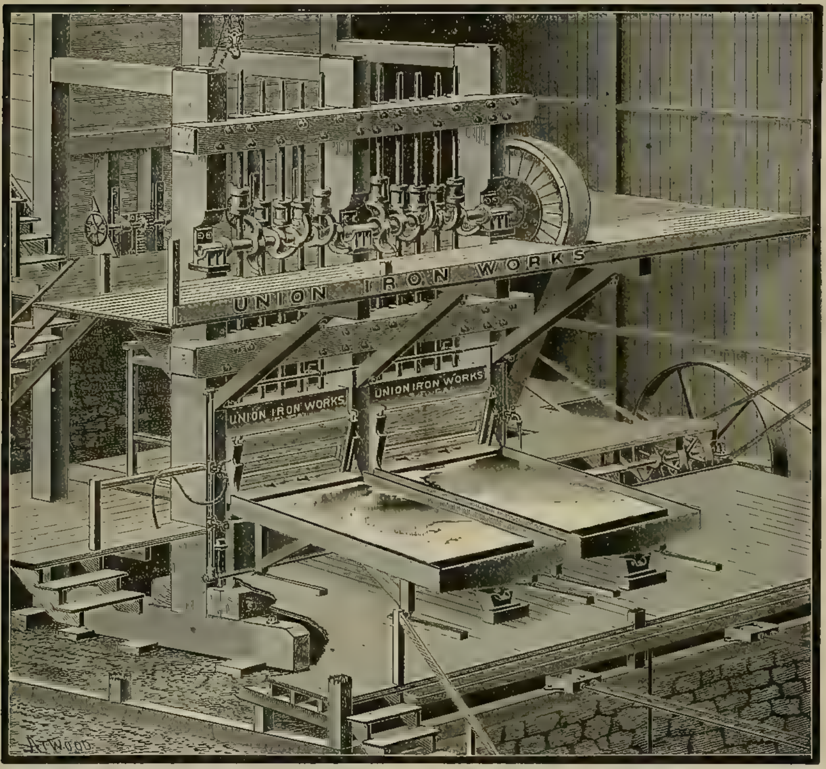
P. T. TAYLOR & CO.,
525 MISSION ST., SAN FRANCISCO, CAL.
GEAR WHEELS, GEAR CUTTING,
ALL DESCRIPTIONS UP TO 50 INCHES.
GEARS FOR AUTOMOBILES A SPECIALTY.
FULL INFORMATION BY MAIL.

UNION IRON WORKS,

★ ★ 222 Market Street, San Francisco, Cal. ★ ★

BUILD THIS

MODERN TEN-STAMP BATTERY.

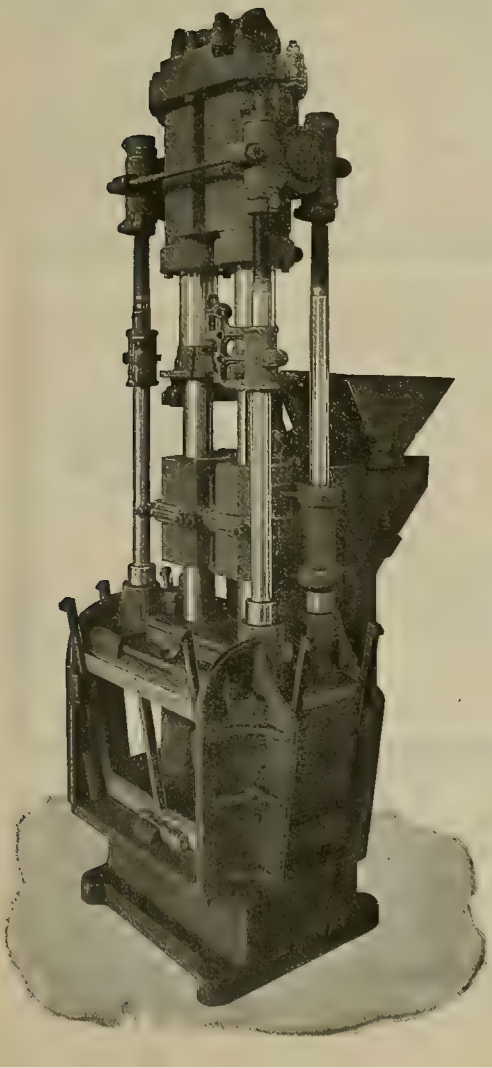


Copyrighted.

The illustration shows the details of a modern 10-stamp battery of the back-knee type, driven by belt and tightener from a shaft located upon the battery frame sills below the mortars and plainly illustrates not only the battery and its various parts, but also shows the ore-bin gate, feeders, copper apron plates and water piping, all in their relative positions.

SEND FOR CATALOGUE No. 5

CATES IRON WORKS.



THE TREMAIN STEAM STAMP MILL

has made many fortunes for its owners. It costs but little money. Can be transported anywhere.

A Money Maker in Nicaragua.

MURRA GOLD MINING COMPANY, NICARAGUA, C. A.
NICARAGUA, June 20, 1899.

GATES IRON WORKS, CHICAGO.—GENTLEMEN:

After an experience covering a period of three years with both the first and improved "Tremain Steam Stamp Mill," in every particular I have found it perfection—a money maker, and just the thing for a small capital, while companies organized on a large scale would do well to look into its merits.

I find no difficulty in crushing eight tons of ore per day and running on hard ore. This mill should be a winner.

Very truly yours,
[SIGNED] L. W. ADAMS,
General Manager Murra Gold Mining Co.

Eight Years in Operation Without a Cent for Repairs.

GOLDEN P. O., JOSEPHINE CO., COLO., December 23, 1899.

GATES IRON WORKS, CHICAGO.—GENTLEMEN:

Our Tremain Mill is giving us good results, and although being in operation since 1892 has not cost us $1 for repairs, and to-day is making 180 drops per minute with 95 lbs. steam pressure.

The ore we are working at present is soft and we mill in 24 hours, using No. 10 slot screen, 15 tons.

Yours truly,
M. C. DAVIS,
Superintendent Sarah Belle Mines.

Running Under Compressed Air in West Australia.

293 ST. GEORGE'S TERRACE, PERTH, W. A., February 6, 1900.

F. R. PERROT, ESQ., AGENT OF GATES IRON WORKS, PERTH, WEST AUSTRALIA.

DEAR SIR: In reply to your enquiry as to the working of the Tremain Mill on the Burbanks Grand Junction, I would state that at the start we worked this from the boiler supplied by the Gates Iron Works Company, but owing to certain irregularities of the running, which were in a measure due to the intermittent supply of ore and the short time that we were able to run it per day, I finally laid on air piping from my air compressor, a quarter of a mile distant, and used the boiler as an air receiver, with the result that I got an absolutely constant run, which, I believe, averaged about 105 drops per minute, and this was kept up with great regularity and showed a much better return in the treatment of the ore. The usual air pressure in this case was 80 lbs., whereas under steam we were not so satisfied with the result as worked at 100 lbs. By this we were also saved in cost the charges of stoker, fuel and water, and it was worked with much greater cleanliness, and during the whole time the mill was running—which was several months—it never froze up on us or showed any signs of trouble in that direction.

The mill is now temporarily stopped, but when it is again started I shall most decidedly continue the use of compressed air.

Yours faithfully,
[SIGNED] GEO. HEWER.

Send for Catalogue No. 8.

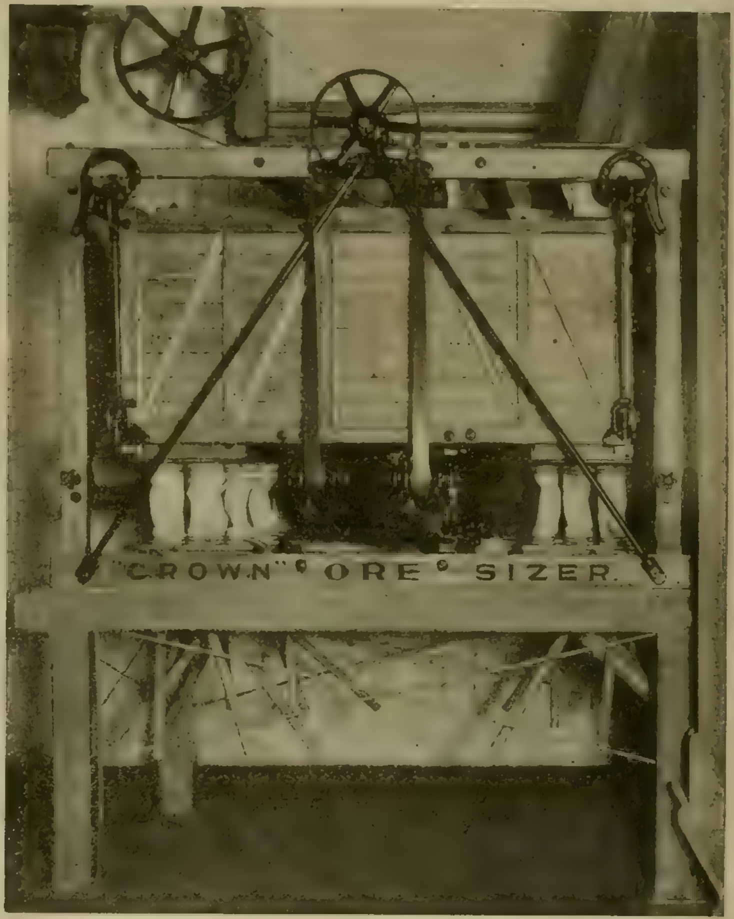
San Francisco Agents:
AMERICAN M'F'R'S ASSOCIATION,
20 & 22 Fremont St.

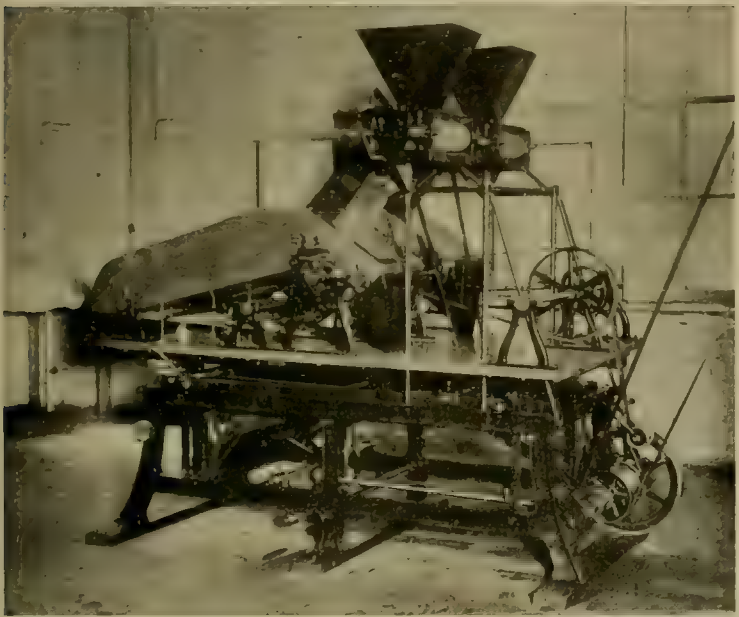
MAIN OFFICE AND WORKS:
650 ELSTON AVENUE,
CHICAGO.

CROWN GOLD MILLING CO.

Manufacturers of the "CROWN" CONCENTRATOR and CROWN ORE SIZER. A dry process of sizing and concentrating ore, sand or gravel. Designed to accord fully with the laws of specific gravity, and especially adapted to refractory ore or localities where there is no water.

The chief claims for the Crown Concentrator are that it occupies less floor space and has nearly four times the capacity of any wet concentrator; that it will concentrate ores containing base and refractory metals that ordinarily slime and carry off values; that it effects a saving of values far above the ordinary methods of concentration.





Works, 23 Stevenson St. Office, 230 Post St. SAN FRANCISCO, CAL.

THE MINE AND SMELTER SUPPLY CO.,

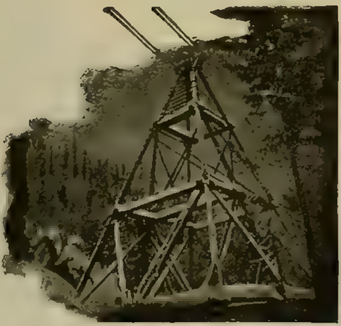
DENVER, - - COLORADO.

Mining and Milling Machinery and Supplies.

We beg to call your attention to

THE FINLAYSON PATENT WIRE ROPE TRAMWAY—

the latest and best system of double-rope automatic aerial tramway in the market. If interested in the most economical system of transporting ores from mine to mill and to shipping stations, send for our special tramway catalogue.

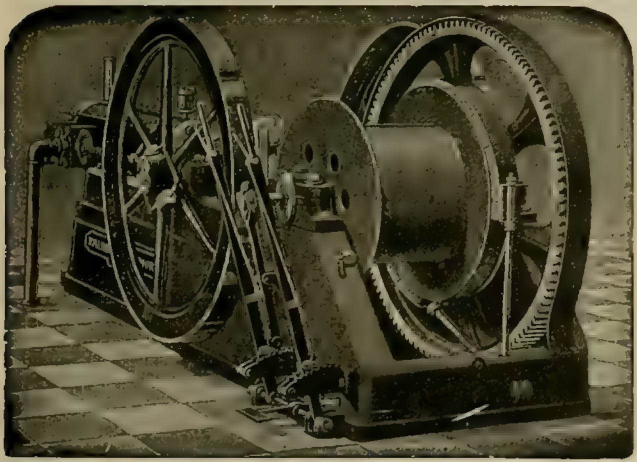


We carry a complete stock of Machinery and Supplies for immediate delivery.

Send for our special catalogues on Mining Machinery, Milling Machinery, Wilfley Concentrators, Tramways, Power Transmission Machinery, Machine Tools, Etc.

THE MINE AND SMELTER SUPPLY CO.,......................Denver, Colorado
THE MINE AND SMELTER SUPPLY CO.,................Salt Lake City, Utah
THE MEXICO MINE AND SMELTER SUPPLY CO.,
No. 16 San Francisco St., City of Mexico.

BOILERS, ENGINES, STEAM HOISTERS, ELECTRIC HOISTERS, ROLLS, CRUSHERS, WILFLEY TABLES, CARS, CAGES, ORE BUCKETS, RAIL, PIPE, FITTINGS, BELTING, ETC., ETC.



FAIRBANKS-MORSE GASOLINE-DISTILLATE GEARED HOISTER.

An efficient and reliable combination of a Fairbanks-Morse Gasoline-Distillate Engine on the same base with a Friction Hoist. Modern and up to date. We publish a special catalogue describing our Hoister which we gladly mail prospective purchasers.

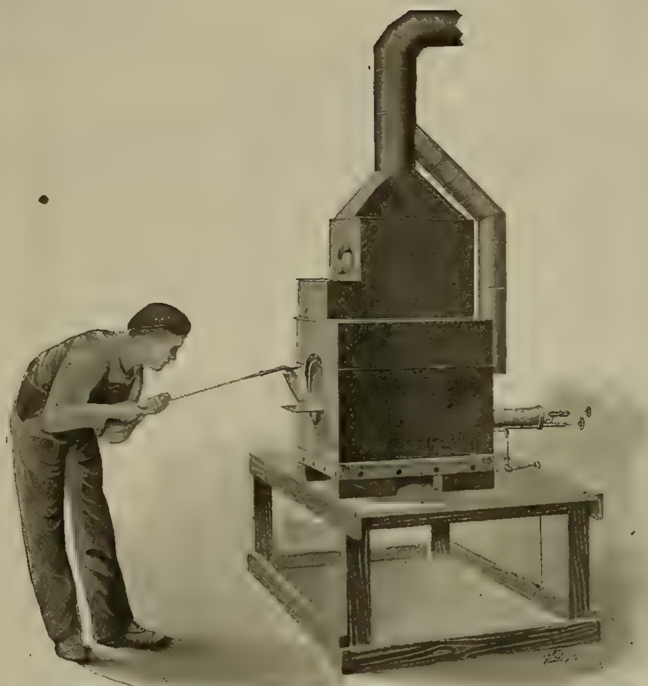
FAIRBANKS-MORSE GASOLINE-DISTILLATE ENGINES.

ALL SIZES UP TO AND INCLUDING 54 HORSE POWER.
For Pumping, Milling, Lighting, Air Compressors, Etc.

FOR CATALOGUES AND FULL INFORMATION, ADDRESS

FAIRBANKS, MORSE & CO.,

310 MARKET ST., SAN FRANCISCO, CAL.
201 N. LOS ANGELES ST., LOS ANGELES, CAL.
FIRST AND STARK STS. PORTLAND, OGN.
1600 SEVENTEENTH ST., DENVER, COL.
FRANKLIN AND MONROE STS., CHICAGO, ILL.



NO TROUBLE TO OPERATE--A BOY COULD RUN IT.

TO ASSAYERS:

This is our DOUBLE MUFFLE FURNACE, No. 37. The lower muffle is 10x16x6 inches, and will hold eight 20-gramme crucibles. The upper muffle is 6x12x4 inches.

One Cary burner, size 2 1-4 inches, heats both muffles simultaneously.

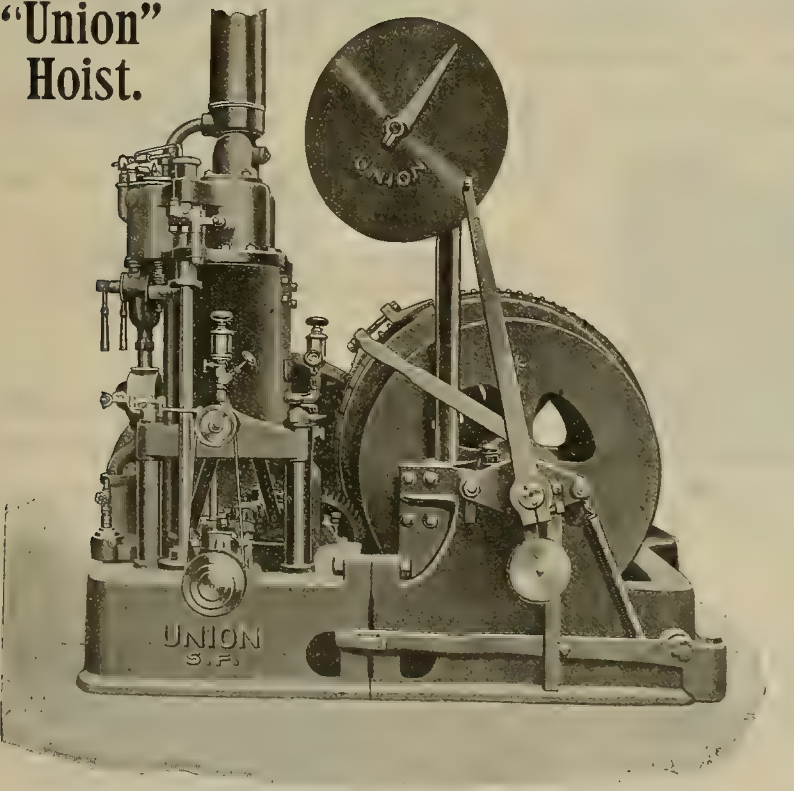
Starting with a cold furnace and burner, the first batch of eight crucibles can be poured in less than one hour from time of lighting match, and same cupelled in one hour and a half.

When furnace has become thoroughly heated, melts may be made every twenty minutes and cupellations every twenty-five minutes.

Further particulars on request to

F. W. BRAUN & CO.,
Modern Appliances for Assayers,
LOS ANGELES, CAL.

"Union" Hoist.

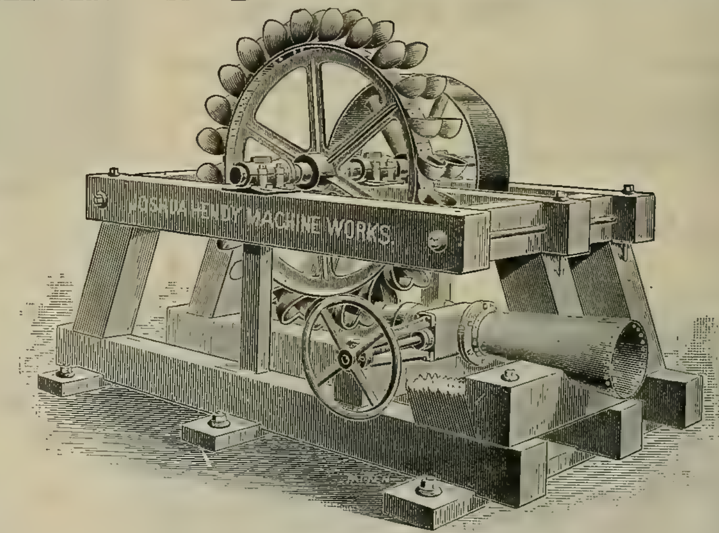


The above illustrates the 25 H. P. double cylinder, single drum "Union" hoist, with all the latest improvements.

THE UNION GAS ENGINE CO.
—BUILD THE—
"Union" Gas Engines,
Which use either MANUFACTURED or NATURAL GAS, ORDINARY STOVE GASOLINE (NAPHTHA or BENZINE), DISTILLATE or KEROSENE.
STATIONARY ENGINES for All Kinds of Work in Sizes from 3 to 300 h. p in actual use.
"UNION" COMBINED HOISTS in Sizes from 2 to 130 h. p. in actual use.
"UNION" COMBINED COMPRESSORS—20, 30, 40 h. p.
HOISTS and COMPRESSORS Can Be Built in Larger Sizes to Order.
"UNION" MARINE ENGINES, 4 to 200 h. p., of Single, Double and Four-Cylinder Types.
FIFTEEN YEARS' EXPERIENCE Building Gas and Oil Engines.
"UNION" ENGINES Are In Use All Over the United States.
"UNION" ENGINES Are Simple, Durable and Economical.
Office, 248 First Street. Works, Corner First and Clementina Streets. SAN FRANCISCO, CAL.

Joshua Hendy Machine Works,
San Francisco, Cal.
Office and Salesroom..........38 to 44 Fremont Street.
Works..........Cors. Bay, Kearny and Francisco Streets.

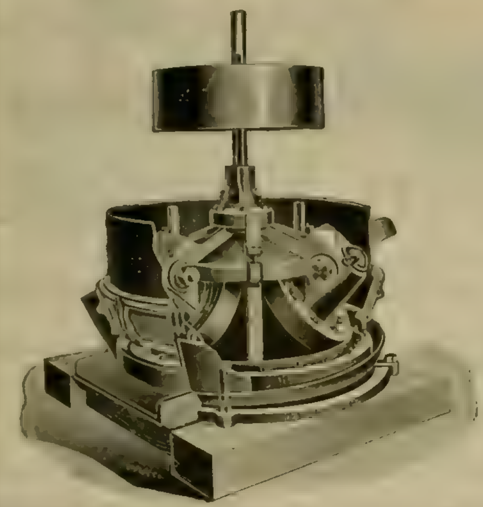
MINING AND MILLING MACHINERY.



WATER WHEELS.

Stamp Mills!

"Hercules" Ore Crushers;
"Challenge" Ore Feeders;
"Triumph" Ore Concentrators;
"Hendy-Norbom" Ore Concentrators;
Boilers, Engines and Pumps;
"Triple Discharge" Two Stamp Mills;
Hydraulic Mining Machinery;
Hoisting, Pumping and Irrigating Plants;
Tangential Impact Water Wheels.



THE GRIFFIN
THREE ROLLER
ORE MILL.

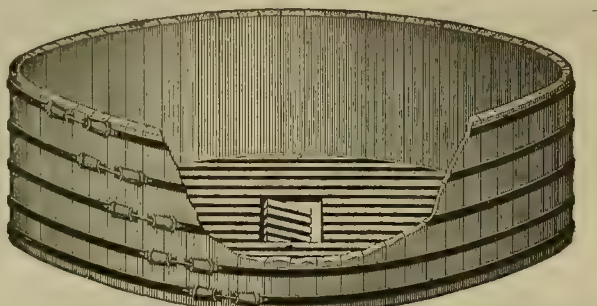
The Griffin Three Roller Ore Mill is a simp.y constructed Mill, suitable for working all kinds of ores that require uniformly fine crushing by the wet process. This Mill is a modification of the well-known Chilian Mill, but the rollers run upon a crushing ring or die, which is inclined inwardly at an angle of about 30 degrees, the rollers themselves also being inclined to the central shaft of the Mill, thus utilizing the centrifugal force, as well as the weight of the rollers themselves as a crushing agent. The Griffin Three Roller Ore Mill is therefore a Mill of great strength, and has few wearing parts. We construct these Mills with extreme care, using only the best of raw materials, which are most carefully worked by men who are specialists as mill builders. We sell the Griffin Ore Mill on its determined merits, and will gladly supply full information regarding it to any one.

SEND FOR FREE ILLUSTRATED AND DESCRIPTIVE CATALOGUE TO

Bradley Pulverizer Co., Boston, Mass.

CYANIDE TANKS! MINING

LEACHING TANKS,
SOLUTION "
SUMP "
WATER "
EXTRACTION BOXES.



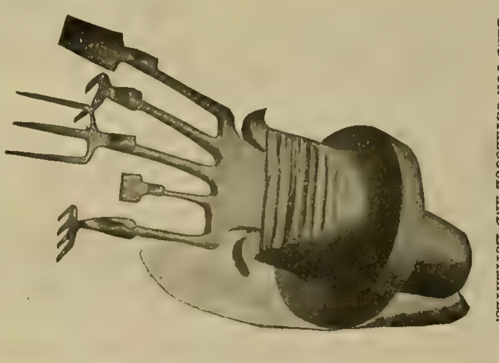
Estimates Furnished
for
Complete
Cyanide Plants.

SEND FOR ILLUSTRATED CATALOGUE OF CYANIDE TANKS AND FIXTURES, MAILED FREE.

Pacific Tank Co., Manufacturers, 35 Beale St., San Francisco, Cal. 348 EAST SECOND STREET, Los Angeles, Cal.

JOHN A. ROEBLING'S SONS Co.
IRON & STEEL
WIRE ROPE
TELEGRAPH WIRE
COPPER WIRE
Works at Trenton, N.J.
WAREHOUSES,
117 LIBERTY ST., NEW YORK.
25 FREMONT ST., SAN FRANCISCO.
173 LAKE ST., CHICAGO, ILL.
INSULATED ELECTRIC WIRES.
MAGNET WIRE
&

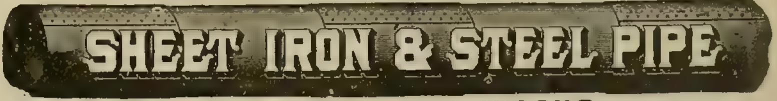
MINING CARS of every description.
PORTABLE RAILWAYS, Rolling Stock, Railway Outfits for Mines of every description. Export Work a specialty.
ARTHUR KOPPEL, 66 Broad St., N. Y. City.
SEND FOR CATALOGUE AND ESTIMATES.



SHOES and DIES
of SUPERIOR quality and at prices 20 to 30% lower than any other maker.
FURNISHED BY
ARTHUR KOPPEL, 66 Broad St., N. Y. City.
WRITE FOR PARTICULARS.

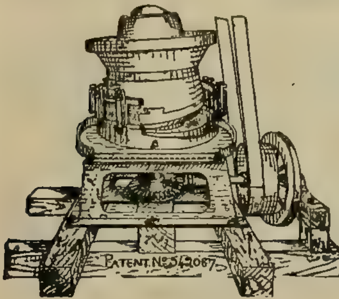
Pacific Coast Agents, Baker & Hamilton, San Francisco and Sacramento.

FRANCIS SMITH & CO.,
—MANUFACTURERS OF—



FOR TOWN WATER WORKS.
Hydraulic, Irrigation and Power Plants, Well Pipe, Etc., all sizes.
46 FREMONT STREET, - - - - SAN FRANCISCO, CAL.

Iron cut, punched and formed, for making pipe on ground where required. All kinds of Tools supplied for making Pipe. Estimates given when required. Are prepared for coating all sizes of Pipes with Asphaltum.

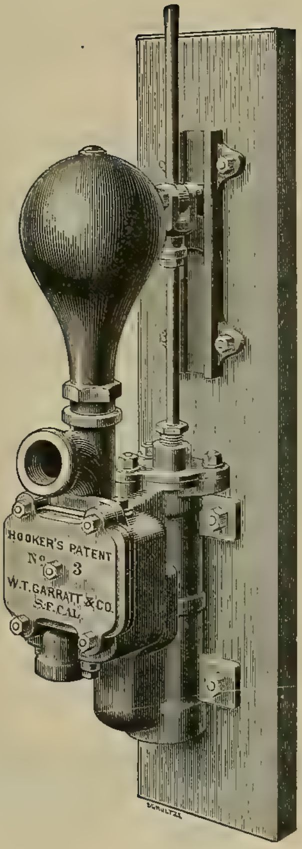


THE "LIGHTNER" QUARTZ MILL.

W. H. Birch & Co.
No. 127 to 135 First St., San Francisco, Cal.
— BUILDERS OF —
LIGHTNER QUARTZ MILLS.
No. 1 works 3 tons per day with 1½ H. P.
No. 2 " 4 to 7 " " " 2½ "
No. 3 " 10 to 15 " " " 3½ "
LARGER MILLS BUILT. SEND FOR CIRCULAR.
"Birch" Two-Stamp Mills, McGlew Concentrators, And All Kinds of Mining Machinery.

GENERAL PHOTO-ENGRAVING CO.
[SUCCESSORS TO DEWEY ENGRAVING CO.]
FINE ZINCOGRAPHS, HALF-TONES, AND DESIGNING.
ENGRAVINGS OF MACHINERY OUR SPECIALTY.
SEND FOR SAMPLES AND PRICES.
TELEPHONE BLACK 1466.
NO. 536 CLAY STREET, SAN FRANCISCO, CAL

A GOOD SINKER.


HOOKER'S PATENT
No 3
W.T.GARRATT & CO.
S.F.CAL.

The Hooker Double Acting Pump.

Well built, simple, durable, efficient.

All working parts easy of access.

Duplicate parts in stock.

We furnish these pumps with suction pipes, hose and strainers complete. Estimates on application.

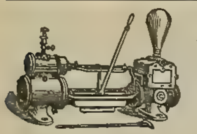
Can furnish up to number three with double brake for hand power.

Just the pump for a small mine. Larger sizes, larger capacities.

Our 1899 catalogue tells about over fifty different kinds of pumps. Sent on application.

W. T. GARRATT & CO.,

Cor. Fremont and Natoma Sts.,
SAN FRANCISCO, CAL.



SOLE AGENCY
Worthington Steam Pumps and Water Meters.

Pumping Plants of any Capacity.

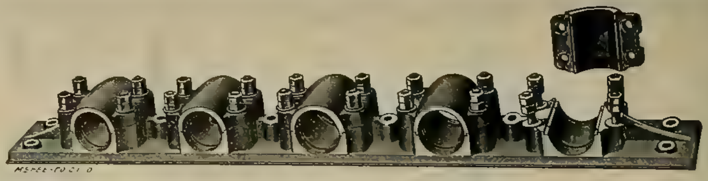
TATUM & BOWEN,
34-36 Fremont Street, San Francisco, Cal. 29-35 First Street, Portland, Or.
MACHINERY—ALL KINDS

Are You Confronted With a Difficult Ore-Separating Problem?

THE WETHERILL MAGNETIC SEPARATING PROCESS
may prove the solution. Apply to Wetherill Separating Company, 52 Broadway, N. Y.

STRICTLY **C. P. ACIDS** and **C. P. AMMONIA**

MANUFACTURED BY
The Western Chemical Co.,
DENVER, COLO.
For Laboratory Use and Fine Chemical Work
PURITY GUARANTEED.
Also COMMERCIAL ACIDS.



Globe Battery Stem Guide.

PATENTED AUGUST 24, 1897.

RIGID. SIMPLE. DURABLE. EFFICIENT. ECONOMICAL.

Effect a Saving in Friction Losses. No Trouble to Install.
No Alterations of Mill Necessary. No Keys or Wedges to Adjust.

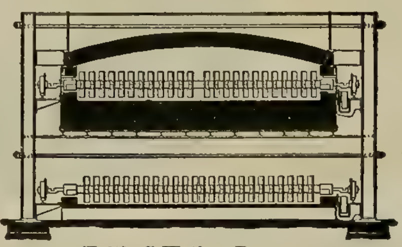
MANUFACTURED ONLY BY

GLOBE IRON WORKS, STOCKTON, CAL., U. S. A.
Manufacturers of All Classes of Mining Machinery. Estimates Furnished.

ROASTING FURNACES.

WE MANUFACTURE TWO TYPES:

THE WETHEY MULTIPLE DECK and
HOLTHOFF-WETHEY STRAIGHT LINE.



Holthoff-Wethey Furnace.

THESE FURNACES ARE BUILT FROM ORIGINAL DESIGNS EMBODYING MANY NEW FEATURES IN THE CONSTRUCTION OF ORE ROASTING FURNACES, AND DO NOT IMITATE ANY OF THE OLD AND FAULTY MODELS.

THESE FURNACES ARE FULLY COVERED BY PATENTS WHICH WE CONTROL AND WILL PROTECT ALL USERS AGAINST CLAIMS FOR INFRINGEMENT.

MINING MACHINERY
—AND—
REYNOLDS CORLISS ENGINES.

WE INVITE CORRESPONDENCE.

THE EDWARD P. ALLIS COMPANY,
MILWAUKEE, WIS.

CARY SPRING WORKS,
240 & 242 WEST 29th STREET, NEW YORK, U. S. A.
Telephone, 3346—38th St.

WIRE SPRINGS
OF EVERY DESCRIPTION.

MANUFACTURERS OF
All kinds of ROUND AND FLAT WIRE, TEMPERED AND UNTEMPERED.
SPRINGS
For Machinery, Rolling Shutters, Motors Etc.

MUSIC BOX AND FINE SPRINGS OUR SPECIALTY.

New Process of Copper Extraction.
CHEAP, CLEAN AND EFFECTIVE.

THE GARDINER LEACHING PROCESS
FOR COPPER ORES.

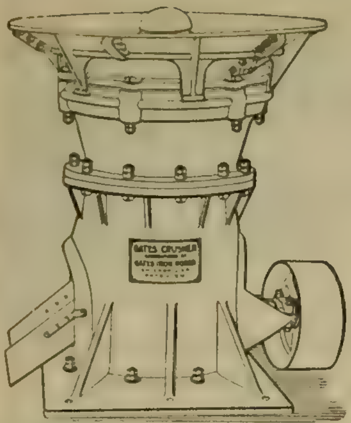
TESTS MADE ON ANY QUANTITY OF ORES AT REASONABLE RATES.
FULL PARTICULARS ON APPLICATION.
THE AMERICAN COPPER MINING & EXTRACTION CO., DENVER, COLO.

SMOOTH-ON CASTINGS.
TRADE MARK

An iron cement for repairing leaks or fractures in steam or hydraulic work. When hard it will withstand a red heat, steam, water or oil, and expands and contracts with heat and cold the same as iron, insuring a tight joint at all temperatures. Difficult flange connections can easily be made with Smooth-On, as it adapts itself to the flanged faces whether parallel or not. Connections are easily taken apart. Unequaled for boiler patching, and repairing blemishes in iron castings. Write for catalogue and prices. Sole proprietors and manufacturers: Smooth-On Mfg. Co., Jersey City, N. J., U. S. A.

MESSRS. MADISON, BRUCE & SELLERS,
34-36 STEUART ST., SAN FRANCISCO, CAL......................AGENTS FOR PACIFIC COAST.

CATES IRON WORKS.



The Original GYRATORY BREAKER.

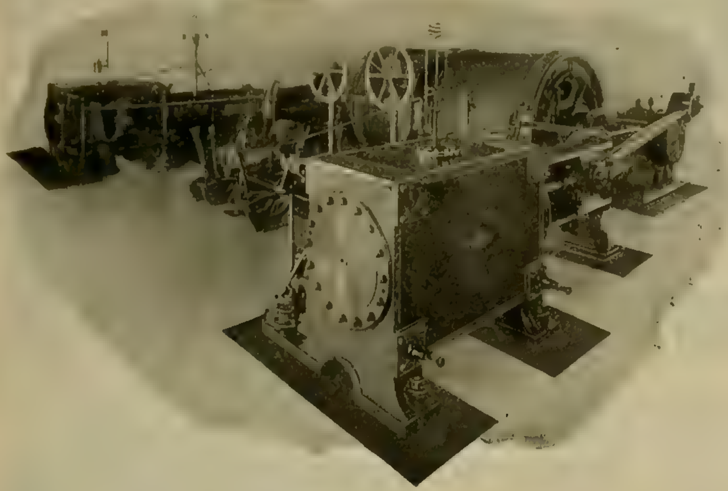
It is ADJUSTABLE, and INDESTRUCTIBLE.

THERE ARE 4,000 OF THEM IN USE.

The South African Mines Have Purchased 200.

. . We build a FINE CRUSHER that is a wonder. . We know how to design this class of machinery. . . . There are others who think they know how to make a Gyratory Crusher; they are simply poor imitators of The Only Great Gates Rock and Ore Breaker. .

Address for Catalogue No. 1, Dept. UU, 650 Elston Ave., CHICAGO.



HIGH CLASS FIRST MOTION

HOISTING ENGINES

Especially Designed

For Heavy Duty and Deep Mine Work.

Built with CORLISS OR SLIDE VALVE ENGINES
and for either ROUND OR FLAT ROPE.

Our line of Hoisting Machinery is the most complete carried by any one concern in the United States. Write us of your wants.

THE HENDRIE & BOLTHOFF M'F'G & SUPPLY CO.,
No. 35. DENVER, - - - - - - COLORADO.

Westinghouse Electric
& Manufacturing Co.

All Principal Cities in U. S. and Canada.
BUILDERS OF
Pittsburg, Pa.

Generators and Motors

For the operation of Mining Machinery.

Westinghouse Apparatus operates in all principal mines of the great Cripple Creek District.

66e

AARON'S ASSAYING, PART I.

FOURTH EDITION.

Revised, Rewritten, New, Improved.

This practical treatise on assaying has long been the favorite among practical men. The new edition, just out, is up to date. Price $1, postpaid anywhere.

Book Dept., Mining and Scientific Press,
330 MARKET ST., SAN FRANCISCO, CAL.

THE BUCYRUS COMPANY,

DESIGNERS AND BUILDERS OF
DREDGES, STEAM SHOVELS, EXCAVATING MACHINERY, WRECKING CARS, LOCOMOTIVE CRANES, PILE DRIVERS, CENTRIFUGAL PUMPS, WITH SIMPLE, COMPOUND OR TRIPLE EXPANSION ENGINES,
MACHINERY FOR PLACER MINING.
SOUTH MILWAUKEE, WISCONSIN.

MINE BELL SIGNALS. Adopted, Used and in Force in Accordance with Law.

We print in legal size, 12x36 inches, the Mine Bell Signals and Rules provided for in the Voorhies Act passed by the California Legislature. The law is entitled "An Act to Establish a Uniform System of Bell Signals to Be Used in All Mines Operated in the State of California, for the Protection of Miners." We furnish these Signals and Rules, printed on cloth so as to withstand dampness. 50 Cents a Copy.

MINING AND SCIENTIFIC PRESS, 330 Market St., San Francisco, Cal.

LARGE VARIETY.

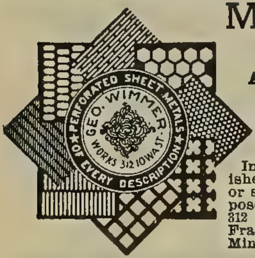
Perforated Metal

THE ROBERT AITCHISON PERFORATED METAL C°
303-305 DEARBORN ST. CHICAGO ILLS.

SUPERIOR WORK.

QUARTZ SCREENS

A specialty. Round, slot or burred slot holes. Genuine Russia Iron, Homogeneous Steel, Cast Steel or American planished Iron, Zinc, Copper or Brass Screens for all purposes. CALIFORNIA PERFORATING SCREEN Co., 145 and 147 Beale St., S. F.



Mining Screens

A SPECIALTY.

Diagonal Slot,
Straight "
Burred "
Round Holes.

In American planished or Russian iron or steel for all purposes. GEO. WIMMER, 312 Iowa Street, San Francisco. Telephone Mint 1332.

—EASTERN PRICES BEATEN.—

SAN FRANCISCO
Pioneer Screen Works,
JOHN W. QUICK, Prop.

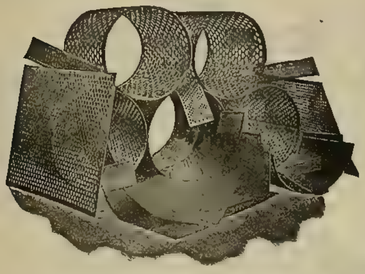
Improved Facilities! Finest Work! Lowest Prices!

Perforated Sheet Metals, Steel, Russia Iron, American Planish, Zinc, Copper and Brass Screens for All Uses.

MINING SCREENS A SPECIALTY.

221 and 223 First Street, San Francisco, Cal.

For Best Satisfaction
and Lowest Prices
—IN—
PERFORATED METALS
—AND—

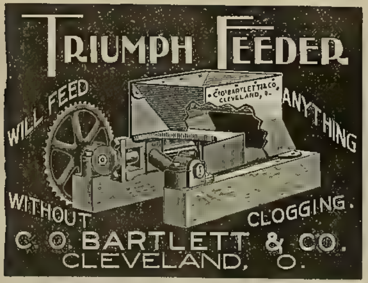


MINING SCREENS

PLACE YOUR ORDERS WITH

Fraser & Chalmers,
CHICAGO, ILL., U. S. A.

SEND FOR SAMPLES, MENTIONING THIS PAPER.


TRIUMPH FEEDER
WILL FEED ANYTHING
WITHOUT CLOGGING.
C. O. BARTLETT & CO.
CLEVELAND, O.
C. O. BARTLETT & CO. CLEVELAND, O.

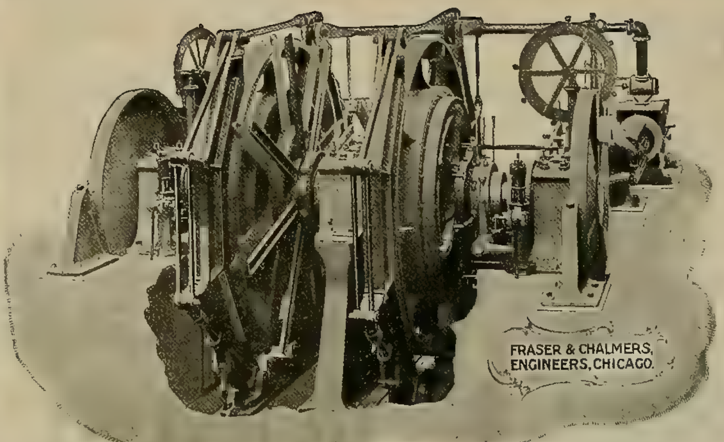
PRICE, $50.00.

MICHIGAN COLLEGE OF MINES.

An Engineering School with unique location, giving it unusual facilities. Distinctive methods of instruction. Special courses. For catalogue giving occupation of graduates, address

F. W. McNAIR, President, Houghton, Mich.

HOISTING ENGINES IN GREAT VARIETY ARE DESCRIBED IN FRASER & CHALMERS



NEW EDITION
CATALOGUE NO. 2.

When you are thinking about putting in a new hoist
Get their catalogue,
Get their quotations,
Give them a fair opportunity to supply you with a fine machine.

Fraser & Chalmers,
Chicago, Ill.

Webber Patent Compression Grip

IS USED ONLY ON THE PATENT

Bleichert Wire Rope Tramway,

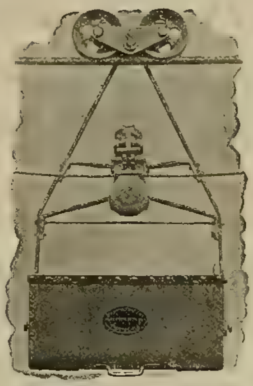
And Others Manufactured by the

TRENTON IRON COMPANY,

TRENTON, N. J.

ENGINEERS AND CONTRACTORS, and Sole Licensees in North America for the Bleichert System.

Also, Wire Rope Equipments for Surface and Underground Haulage, Transmission of Power, Etc.



No lugs or knots of any kind required on the traction rope, giving longer service, and saving in repairs....

Illustrated book upon application.

For Particulars, Address...

NEWTON M. BELL, Agent, 308 Market Street, San Francisco.

A full stock of the Trenton Iron Co.'s Wire Ropes, made from "SPECIAL" Crucible and Plough Steel, carried in San Francisco.

HARD ☘ TOUGH

TAYLOR IRON AND STEEL COMPANY,

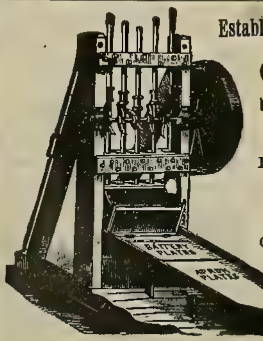
HIGH BRIDGE, NEW JERSEY, U. S. A.

Sole Licensees in America under the HADFIELD System and Patents for **MANGANESE STEEL,**

Best Metal Known for Roll Shells, Stamp Shoes and Dies, Crusher Plates and Side Liners, Toggles and Toggle Bearings, Gyratory Cones and Concaves, or Liners, Mine Car Wheels, Coal Crushing Rolls, Etc.

PACIFIC COAST PARTIES INTERESTED PLEASE ADDRESS PARKE & LACY CO., SAN FRANCISCO, CAL.

WRITE FOR INFORMATION AND PRICES.



Established 1865. **NOTICE TO GOLD MINERS.** Incorporated 1890.

Silver-Plated Copper Amalgamated Plates

FOR SAVING GOLD

IN QUARTZ, GRAVEL OR BEACH MINING. MADE OF BEST SOFT LAKE SUPERIOR COPPER.

AT REDUCED PRICES.

Our Plates are guaranteed, and by actual experience are proved, the best in weight of Silver and durability. Old Mining plates replated, bought, or gold separated. THOUSANDS OF ORDERS FILLED.

SAN FRANCISCO NOVELTY AND PLATING WORKS,

☞SEND FOR CIRCULARS. Telephone Main 976. **68, 70, 72, 74 and 76 FIRST STREET, COR. MISSION, SAN FRANCISCO, CAL.**

THE IDEAL CONVEYOR BELT

Is the one that will carry stone, ore, coal, wet or dry material, holding buckets firmly and securely; will stand all kinds of exposure, and resist the heaviest strains during a long period of service. This is what the **LEVIATHAN BELT** has done, and we quote the following from a letter from the New York Steam Co.:

"We have used Leviathan Belting for four years, up to 24-inch by 8-ply, elevating and conveying coal. Some of the Belting is outside, exposed to freezing weather; some in a steam bath. In both conditions the results have been very gratifying, over 600 tons having been handled in ten hours time."

MAIN BELTING COMPANY,
1225-41 Carpenter Street, Philadelphia.
55-57 Market St., Chicago. 120 Pearl St., Boston.
SEND FOR PRICE LISTS AND SAMPLE.

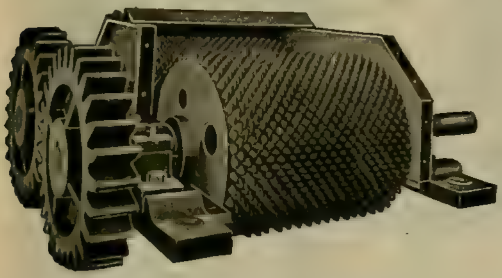
Small Portable Saw Mills and
DRAG SAWING MACHINES
FOR RANCHES AND MINES.

Woodworking Machinery.

LINK BELTING, SPROCKET WHEELS, ELEVATOR BUCKETS & BOOTS, TAKEUPS, FRICTION CLUTCH PULLEYS, ETC.

ALL STYLES AND SIZES IN STOCK FOR IMMEDIATE DELIVERY.

JNO. D. EBY,
17 & 19 MAIN STREET, - SAN FRANCISCO, CAL.



LINK-BELT ELEVATORS —AND— CONVEYORS.

BREAKER ROLLS,
PICKING TABLES,
MALLEABLE IRON BUCKETS,
SHAFTING, PULLEYS,
GEARING, CLUTCHES, Etc.
Catalogue Upon Application.

LINK-BELT MACHINERY CO.,
Engineers, Founders, Machinists,
CHICAGO, U. S. A.
DENVER, 1328 17th St.,
A. E. LINDROOTH, Manager.

For handling Ore, Coal, Tailings and Dredgings. Catalogue mailed on application.
ROBINS CONVEYING BELT CO., Park Row Building, NEW YORK.

McFARLANE & CO.,
1734 FIFTEENTH ST., DENVER, COLO.

Mining and Milling Machinery.

STAMP AND CONCENTRATING MILLS BUILT AND ERECTED.

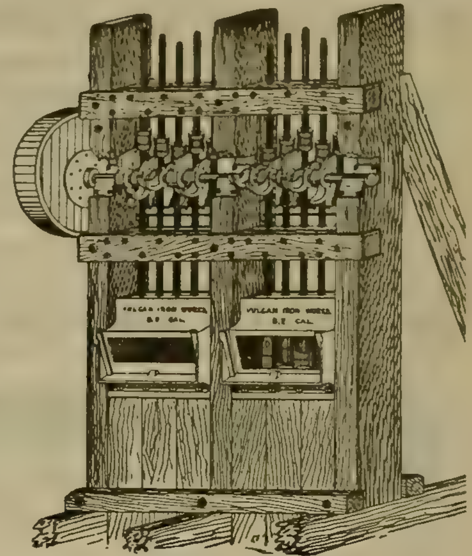
STEAM AND ELECTRIC HOISTS, CRUSHERS, ROLLS, REVOLVING SCREENS, JIGS, ORE CARS, CYANIDE TANKS, CORNISH PUMPS, CORLISS ENGINES.

WEST COAST OF MEXICO.

WÖHLER, BARTNING Suc's, Mazatlan (Sinaloa), Mex.
Bankers, Importers, Exporters and Commission Merchants.

Representatives and Agents of the principal Mining Companies in the State of Sinaloa and the dependencies of the Pacific coast in the States of Durango, Chihuahua, Sonora, Lower California and Jalisco.

ORE BUYERS AND EXPORTERS. - MINING SUPPLIES.

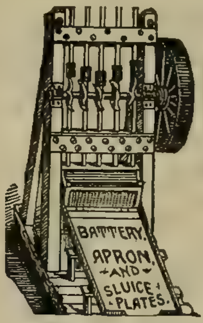

VULCAN IRON WORKS S.F. CAL.
VULCAN IRON WORKS S.F. CAL.

Mining Machinery.

Stamp Mills
Of the Latest Improved Design for
Gold Milling.

VULCAN
WIRE ROPEWAYS
For Conveying Ore, Etc.

Vulcan Iron Works,
Office: 505 Mission Street,
San Francisco, Cal.



To Gold Miners!

Silver Plated Copper Amalgamating Plates
For Saving Gold in Quartz and Placer Mining.

ONLY BEST COPPER AND REFINED SILVER USED. OLD MINING PLATES BOUGHT OR TAKEN IN EXCHANGE FOR NEW PLATES. GOLD EXTRACTED FROM OLD PLATES AT A MODERATE COST. OLD PLATES REPLATED. GOLD, SILVER, NICKEL, COPPER AND BRASS PLATING.

Denniston San Francisco Plating Works,
652 Mission Street, Cor. Annie, San Francisco, Cal.
E. G. DENNISTON, ... Proprietor.
——:Send for Circular.:——

THE WM. HAMILTON MANUFACTURING CO.,
LIMITED,
MINING MACHINERY,
PETERBOROUGH, ONTARIO,
CANADA.

TRADE MARK.
(M'ARTHUR-FORREST PROCESS.)

CYANIDE PROCESS.
The MacArthur-Forrest Cyanide Process is the Best

For the Treatment of Refractory and Low Grade Gold and Silver Ores and Tailings. We are the Originators of the Cyanide Treatment, and have kept up with the times in all Improvements in Cyanide Methods.

Successful Plants in Operation in all Western Mining States.

Samples Assayed and Fully Reported Upon. Properties Examined Designs Furnished. For Terms and Particulars, Address

The Gold and Silver Extraction Co. of America, Ltd.
GEO. A. ANDERSON, General Manager,
Testing Works: 1716 Blake Street, Denver, Colo. 208-210 McPhee Building, Denver, Colo.
ALMARIN B. PAUL, Agent, 27 Crocker Building, San Francisco, Cal.

"PNEUMATIC" CYANIDE PROCESS.
(Patented in U. S., So. African Republic, New Zealand, Victoria, New So. Wales, So. Australia.)

WILL DO IN 7 HOURS WHAT REQUIRES FROM 2 TO 6 DAYS BY OLDER METHODS.
SEND FOR PAMPHLET.
THE PNEUMATIC CYANIDE PROCESS CO., 306 Boston Bldg., Denver, Colo.

STEEL RAILS, TRACK FIXTURES,
PRODUCT PENNSYLVANIA STEEL COMPANY.

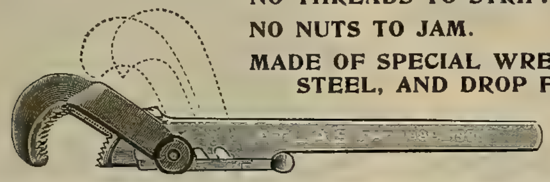
BAR, SHEET AND BOILER STEEL,
STRUCTURAL MATERIAL,
Cold Rolled Shafting.

GEORGE W. GIBBS COMPANY,
33-39 Fremont Street, 38-40 Beale Street,
CORRESPONDENCE SOLICITED. SAN FRANCISCO, CAL.

ATTENTION! USERS OF PIPE WRENCHES.

THE LATEST, BEST AND CHEAPEST PIPE WRENCH.

NO THREADS TO STRIP.
NO NUTS TO JAM.
MADE OF SPECIAL WRENCH STEEL, AND DROP FORGED.



The good qualities of Chain Pipe Wrench and Screw Pipe Wrench combined, without the faults of either.

Quick, effective and positive in adjustment. Cannot slip, crush or lock on the pipe.

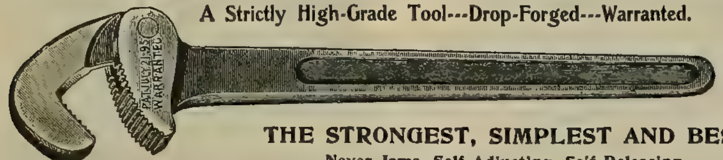
Made in four sizes: 10, 18, 24 and 36 inches. Handling from ⅛ of an inch wire to 4½-inch pipe. Price no higher than other pipe wrenches on the market.

ATLAS PIPE WRENCH CO.,
Flood Building, SAN FRANCISCO.
NEW YORK OFFICE, 121 LIBERTY ST. WORKS, NEW HAVEN, CONN.

OUR 24-INCH WRENCH IS ESPECIALLY ADAPTED FOR MINE WORK.

The Johnston Patented Pipe Wrench.

A Strictly High-Grade Tool---Drop-Forged---Warranted.



THE STRONGEST, SIMPLEST AND BEST.

Never Jams, Self-Adjusting, Self-Releasing.

MADE IN 3 SIZES:

	10 in.	16 in.	24 in.
Pipe	⅛ to 1 in.	¼ to 1½ in.	½ to 2½ in.
List	$2 25	$3.00	$6.00

WM. B. VOLGER,
SOLE MANUFACTURER,
88 Chambers St., NEW YORK.

Agencies: THE MINE & SMELTER SUPPLY CO., Denver and Salt Lake City.

ADAMANTINE SHOES AND DIES.

CHROME CAST STEEL.

CANDA Improved Self-Locking CAMS.

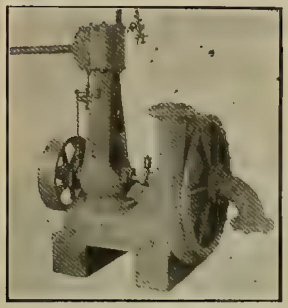
TAPPETS, BOSSES, ROLL SHELLS AND CRUSHER PLATES.

These castings are extensively used in all the mining States and Territories of North and South America. Guaranteed to prove better and cheaper than any others. Orders solicited subject to the above conditions. When ordering, send sketch with exact dimensions. Send for Illustrated Circular.

Manufactured by CHROME STEEL WORKS, Brooklyn, N. Y.

H. D. & H. W. MORRIS,
AGENTS,
Room 194 Crocker Building, San Francisco, Cal.

Canda Cam.



MODERN MINING MACHINERY.

QUARTZ MILLS of any capacity,
IN UNITS OF TWO AND FIVE STAMPS.

Acme Amalgamators for CAPE NOME

and other placer mining. Successfully applied to quartz mills in addition to or displacing plates.

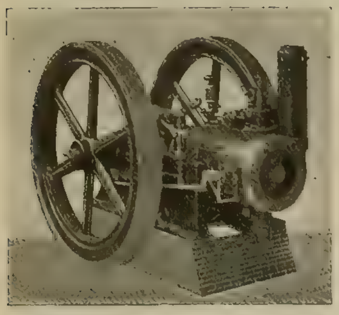
SUCCESSFUL GRAVEL MILL RECENTLY IMPROVED.

Special Gold Dredging Pumps and Machinery. Concentrators, Feeders, Rock Breakers and Power Plants.

Largest manufacturers of Irrigation and Reclamation Pumps in the United States.

Catalogues: No. 20, Pumps; No. 22, Cape Nome; No. 25, Mining.

Krogh Manufacturing Co.,
9-17 STEVENSON STREET AND 134-136 MAIN STREET, - SAN FRANCISCO, CAL.

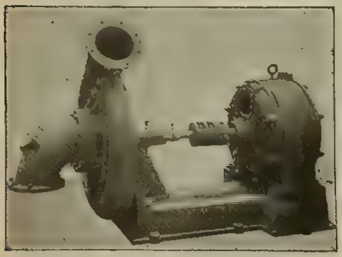


WE CAN SHOW YOU A

HERCULES
Gasoline Engine

Running on less than ½-gallon of fuel per H. P. hour, with a speed regulation of 2½%.

JOHN WIGMORE & SONS CO.,
117-123 S. LOS ANGELES ST.,
LOS ANGELES, CAL.



CENTRIFUGAL PUMPS

— FOR —

Mine Draining or Hydraulicking.

WE DESIGN PUMPS FOR ALL CONDITIONS.

WRITE FOR CATALOGUE.

BYRON JACKSON MACHINE WORKS, - SAN FRANCISCO, CAL.

DEWEY, STRONG & CO., Patent Solicitors, 330 Market St., San Francisco, Cal.

GENERAL ELECTRIC COMPANY

Schenectady, N. Y.

Standard of the World.

EQUIPPED

The Great Electrical Transmissions

— OF —

FOLSOM-SACRAMENTO (Cal.), 24 Miles,
SAN JOAQUIN-FRESNO (Cal.), 36 Miles,
WILLAMETTE-PORTLAND (Or.), 12½ Miles.

The Power is now used for Railways, and Lighting and Operating Large Mill Plants.

Write--
SAN FRANCISCO, CAL., Claus Spreckels Building.
DENVER, COL., Kittredge Building.
PORTLAND, OR., Worcester Building.
SALT LAKE CITY, UTAH, Templeton Building.

If You Want Anything Electrical.

The only roofing without a fault

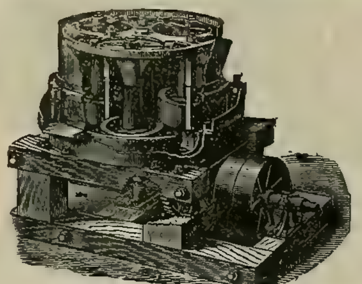
P & B
Ready Roofing

Paraffine Paint Co
116 Battery Street—San Francisco

The best builders in America use P & B Ready Roofing

Shingles may warp, slate may chip, tin may sweat, tar may run, or iron expand, but P & B will stand any climatic condition—the weather of the west requires it

Demand it of your dealer


Centrifugal Roller Quartz Mill.

F. A. HUNTINGTON,
—Manufacturer of—
CENTRIFUGAL
Roller Quartz Mills.

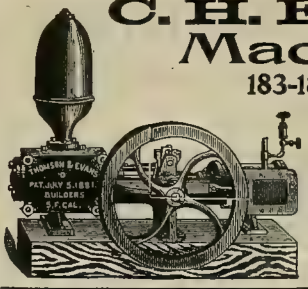
CONCENTRATORS and ORE CRUSHERS.

Mining Machinery of Every Description.

Steam Engines, Shingle Machines.

Room 1, 3d Floor, Mills Building,
SAN FRANCISCO, CAL.

C. H. EVANS & CO.,
Machine Works,
183-185-187 FREMONT STREET,



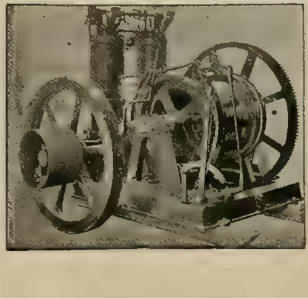
Where, with Enlarged and Increased Facilities, they are better than ever prepared to do

First-Class Machine Work

Promptly, and at Reasonable Prices, and will continue the manufacture of

Thomson & Evans Steam Pumps,

Deep Well Pumps, Power Pumps, Etc.,
Also Marine Engines, Ship and Steamboat Work, Pipe Cutting, General Jobbing and Repairing.



Mining Hoist.

THE GOLDEN GATE GAS ENGINE
Will raise more ore than any other AT LESS COST.

MANY IN USE, Giving Satisfaction.

Built for any Capacity and for any Purpose.
Pumping Water, Propelling Boats, Hoisting Ore, Machine Shop Power, Etc.

Send for Particulars and Catalogue.

ADAM SCHILLING & SONS,
213 & 215 Main St., San Francisco, Cal.

SELBY SMELTING AND LEAD CO.,

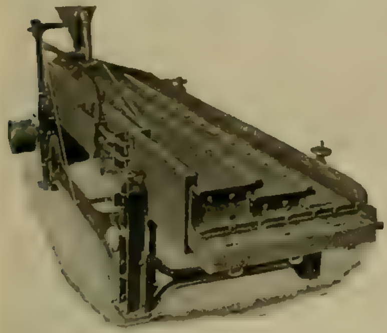
REFINERS OF GOLD AND SILVER BARS, GOLD DUST, ETC.

Buyers of Gold, Silver, Lead and Copper Ores, Gold Concentrates, Lead Bullion, Cyanide Product, Etc.

ORE AND BULLION ASSAYERS.

Works at VALLEJO JUNCTION, CAL. Office, 416 MONTGOMERY ST., SAN FRANCISCO, CAL.

THE IMPROVED BARTLETT CONCENTRATING TABLE.



The BARTLETT CONCENTRATING TABLE has been GREATLY IMPROVED recently by the substitution of iron in place of wood wherever possible. It is now built with SOLID IRON TOP, PLANED TO A TRUE SURFACE AND POLISHED; all parts are made by template and EACH PART BEING INTERCHANGEABLE. As now constructed, the table has no special wearing parts and will last for many years. It has a CAPACITY OF FROM FIFTEEN TO FORTY-FIVE TONS IN TWENTY-FOUR HOURS, according to the class of ore worked. It is the only table in the world which will take the place of jigs and do away with all costly and complicated machinery.

It is Especially Designed for Separating Zinc from Lead.

Send for our illustrated catalogue, containing all the latest information on the concentration of ores.

THE COLORADO IRON WORKS CO.,

Established 1860. DENVER, COLO., U. S. A.

CHAS. C. MOORE & CO.,

—ENGINEERS AND DEALERS IN—

MAGNOLIA ANTI-FRICTION METAL,

HAMILTON CORLISS ENGINES, N. Y. SAFETY AUTOMATIC ENGINES,
BABCOCK & WILCOX BOILERS, McINTOSH & SEYMOUR ENGINES,
GREEN'S ECONOMIZERS, HOPPES LIVE STEAM PURIFIERS,
WHEELER CONDENSERS, BARNARD-WHEELER COOLING TOWERS,
EDMISTON FEED WATER FILTERS, BUNDY STEAM TRAPS,
SNOW STEAM PUMPS, QUIMBY SCREW PUMPS,
GOUBERT FEED WATER HEATERS, STRATTON STEAM SEPARATORS,
SPENCER DAMPER REGULATORS, HYATT ROLLER BEARINGS.

Contracts for Installation of Power Plants, Any Capacity.

SEND FOR CATALOGUES AND FULL INFORMATION.

32 FIRST STREET, SAN FRANCISCO, CAL.

SEATTLE BRANCH.............313 FIRST AVE. SOUTH.
LOS ANGELES BRANCH.......103 SOUTH BROADWAY.

THE

Pelton Water Wheel Company

Gives exclusive attention to the development and utilization of water powers by the most modern, economic and improved methods. An experience of more than fifteen years, involving both the theory and practice of hydraulic engineering as relates to power development in its widest range of application, is at the service of its customers.

Nine Thousand Wheels Now Running,

Averaging some 700,000 H. P.

ELECTRIC POWER TRANSMISSION.

Pelton wheels afford the most reliable and efficient power for such service and are running the majority of stations of this character in the United States, as well as most foreign countries. Highest efficiency and absolute regulation guaranteed under the most extreme variations of load.

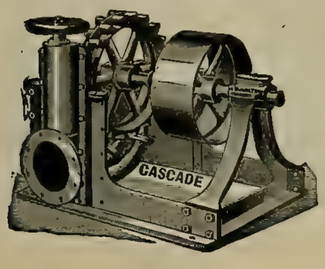
The Pelton Water Wheel Company,

121 & 123 MAIN STREET, SAN FRANCISCO, CAL.

TURBINE AND CASCADE WATER WHEEL

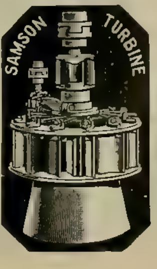
Adapted to all Heads from

3 Feet to 2000 Feet.



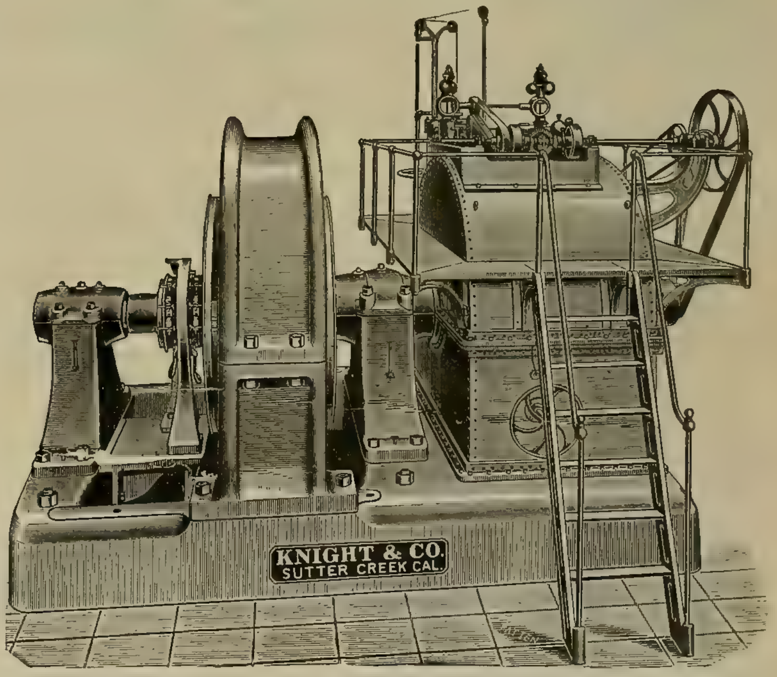
Our experience of 38 YEARS building Water Wheels enables us to suit every requirement of Water Power Plants. We guarantee satisfaction.

State your Head and requirements. Send for pamphlet.



JAMES LEFFEL & CO.
SPRINGFIELD, OHIO, U. S. A.

KNIGHT'S WATER WHEEL.


KNIGHT & CO.
SUTTER CREEK CAL.

The accompanying cut shows the general arrangement of **The Knight Water Wheel,** direc-coupled to a 750 kilowatt generator, with governor mounted on top of wheel casing.

These wheels are designed for **100 to 2500 H.P. Highest efficiency and regulation guaranteed.**

WHEELS FROM 6 TO 24 INCHES, ENCLOSED IN CAST-IRON CASING.

Wheels for mill and reversible hoisting works a specialty.

KNIGHT & CO., Sutter Creek, Cal.

For full particulars, send for descriptive catalogue.

PIPE BARGAINS.

Suitable for Water Mains, Mining, Irrigation, Air, Oil, etc , etc. New Spiral Welded Asphalted Steel Pipe with any style coupling desired.

460 ft. 6-in. 3,480 ft. 10-in. 1,828 ft. 14-in. 1,077 ft. 18-in.
50,000 " 8 " 2,428 " 12 " 520 " 16 " 1,623 " 24 "

All Sizes Wrought Pipe, Well Casing and Straight Riveted Pipe in Stock. Equipment of All Kinds for Mine, Railroad and Contractors' Outfits. Write for Prices and Particulars.

BOWES & CO., 23 Lake St., Chicago, Ill.

PROFESSIONAL CARDS.

R. H. POSTLETHWAITE, M.I.E.E.
Hydraulic Mining Engineer.
River Dredging for Gold a Specialty.
1315 Leavenworth St........San Francisco, Cal.

THEO. F. VAN WAGENEN, E. M.
Consulting Mining and Hydraulic Engineer.
1508 Fillmore St., DENVER, COLO.

D. B. HUNTLEY,
Mining Engineer and Metallurgist,
De Lamar, Owyhee Co., Idaho.

BERNARD MACDONALD,
Consulting Mining Engineer.
General Manager British America Corporation, Ltd., Rossland, B. C.

DRAPER & McLEOD,
Assayers, Chemists, and Mining Engineers,
1736 CHAMPA STREET,
DENVER..COLORADO.

JOHN DWYER, Mining Engineer,
MEXICO.
Address 762-17th Street......East Oakland, Cal.

Established 1879.
CHAS. B. GIBSON,
Chemist, Metallurgist and Mining Engineer,
81 CLARK ST., CHICAGO, ILL.

W. C. WYNKOOP, M. E.
Woodbury (Cochiti District),
New Mexico.
Economic Geology and Mine Examinations.

E. H. BENJAMIN, Mining Engineer.
A. M. HUNT, Mechanical & Hydraulic Engineer.
WYNN MEREDITH, Electrical Engineer.
EXPERT EXAMINATIONS. ADVISORY REPORTS.
CONSTRUCTION SUPERVISION
331 Pine Street,............San Francisco, Cal.
Telephone Main 1870. Cable Address "Edben."

JOHN W. GRAY,
Mining and Hydraulic Work.

Prospecting Operations and Exploration Work.
Examinations, Surveys, Development, Equipment of Mines, Gold-Bearing Gravels, and Water Supplies.
923 Linden St.,..................Oakland, Cal.
Cable "Espra." Correspondence invited.

ABBOT A. HANKS,
CHEMIST AND ASSAYER.
Successor to Henry G. Hanks, est. 1866. The supervision of sampling of ores shipped to San Francisco a specialty.
—531—
California Street,
San Francisco.

RICHARD A. PEREZ, E. M.
Assayer and Analytical Chemist,
120 North Main St., - Los Angeles, Cal.

S. W. TYLER,
Mining and Metallurgical Engineer,
6 Windsor Hotel Block.
Cable: Retyl, Denver. DENVER, COLORADO.

The SPOKANE BUREAU OF MINING,
N. E. LINSLEY, Manager.
SPOKANE, : : WASHINGTON.
Consulting Mining and Milling Engineer.
Will Examine and Report on Mines.

DANIEL G. JEWETT,
Metallurgist and Assayer.
Specialty: The Mining and Smelting of Copper or Lead Ores.
P. O. BOX 5, GUFFEY, PARK CO., COLO.

CLARENCE HERSEY,
Assayer and Chemist,
(Established 1879.) LEADVILLE, COLO.
Gold, Silver and Lead..................$1.00.
Any two of above 75c; any one of above 50c.
Copper analysis..................................$1.00.
Platinum, Nickel or Tin, each..............$5.00.
Twenty-one years successful experience in the mining metropolis of Colorado.
Write for mailing envelopes and price list.

ALMARIN B. PAUL, M. E.,
ROOM 27, CROCKER BUILDING, SAN FRANCISCO.
Will act as AGENT for the sale of RELIABLE Mining Property. SPECIAL AGENT FOR
MacArthur-Forrest Cyanide Process
for California north of and including Mono, Madera and Merced counties; also for State of Nevada. Will act as agent for Eastern parties owning mining interests in California.

F. H. HARVEY,
GALT, CAL.,
Mining and Metallurgical Work in All Branches.
Assays, Chemical Analysis of Ores and experiments on rebellious ores for treatment by cyanide or other processes. Surveys and reports upon mining properties.

Simonds & Wainwright,
Mining Engineers,
Assayers and Chemists,
159 Front Street,
NEW YORK.

HUDSON H. NICHOLSON,
Consulting Mining Engineer,
Rooms 216 and 217, Boston Building,
DENVER, COLO., U. S. A.
Cable address: Aichen, Denver.
Expert examinations of and advisory reports on mining propositions.
Specialty: The chemical treatment of ores

DAVIDGE & DAVIDGE, Attorneys and Counsellors at Law, Corcoran Building, Washington, D. C. Practice in the Supreme Court of the United States, the Court of Claims, the Courts of the District of Columbia, and the General Land Office. Western Union Code.

W. J. ADAMS, E. M.,
Mining Engineer and Metallurgist.
Graduate of Columbia School of Mines.
Author of "Hints on Amalgamation," etc., etc.
ROOM 14, 434 CALIFORNIA STREET,
SAN FRANCISCO, CAL.

R. J. WALTER,
1452 Blake St., DENVER, COLO.
Mining Engineer and Metallurgist.
Reports on mining properties.
Assay office and chemical laboratory. Established in Colorado 1879.

SAM'L A. RANK,
MINING ENGINEER,
U. S. DEPUTY MINERAL SURVEYOR.
Mine Examinations and Reports.
514 Cooper Building,
DENVER ....COLORADO.

EDWARD L. HAFF,
MINING ENGINEER,
U. S. DEPUTY MINERAL SURVEYOR.
Mine Examinations and Reports.
National Annex Block,
P. O. Box 21. CRIPPLE CREEK, COLO.

FRANK C. MANDELL,
MINING ENGINEER,
U. S. Deputy Mineral Surveyor for Idaho and Oregon.
Mine Examinations, Surveys and Reports.
HAILEY, IDAHO.

ERNEST H. SIMONDS,
Late Instructor in Assaying, University of California.
ASSAYS AND ANALYSES.
LABORATORY TESTS OF ORES.
Special Attention Given to the Instruction of Students.
521 Sacramento St., Cor. Leidesdorff. S. F., Cal.

RALPH E. STEVENS,
ATTORNEY AND COUNSELOR,
43-44 Jacobson Building, DENVER, COLO.
Special attention to examination of titles. Corporation, commercial, mining law. Collections receive prompt attention. Notary in office. Refers to Denver representative of Mining and Scientific Press.

School of Practical Mining, Civil,
Mechanical and Electrical Engineering.
Surveying, Architecture. Drawing, Assaying, Cyanide Process and Metallurgy.
933 Market St., S. F., Cal. OPEN ALL YEAR.
A. VAN DER NAILLEN, President
Assaying of Ores, $25; Bullion and Chlorination Assay, $25; Blowpipe Assay, $10. Full course of Assaying, $50. Established 1864.
☞ Send for Circular.

FRED H. BROWN,
Electrical Mining Expert.
Inventor of the Electro-Geodetic Mineral Locator. Patented March 20, 1900.

Will electrically survey mines and lands for mineral; furnish charts showing run of ore, extensions, pay streaks, and their approximate depth from surface.

References include scientific men, and miners for whom we have located rich mines.

Address, 1025 West 7th St.,
LOS ANGELES, CAL.

Geo. W. Schneider, E. M.,
Mining Engineer,
U. S. Deputy Mineral Surveyor.
Mineral Properties examined and reported on.
Central City. Colorado.

A. F. WUENSCH, M. E.
Inspection and Valuation of Mines.
Ref. D. H. Moffat, Pres. 1st Nat'l Bank, Denver.
827 Equitable Bldg..................Denver, Colo.

WM. VAN SLOOTEN,
Consulting Mining Engineer and Metallurgist.
Cable address: "Yadoplata."
35 WALL STREET.......... ....NEW YORK, N. Y.

MINERS' ASSAY OFFICE.
(JNO. HARRIGAN)
10 Stevenson Street, - San Francisco, Cal.
Telephone Clay 972.
Assaying, Analyses, Sampling, Grinding and Pulverizing of all kinds.
Practical Working Tests of Ore by all Processes. Mining Machinery Bought and Sold. Check Assays. Instructions given in Assaying. All Work Guaranteed. Mines Examined, Sampled and Reported on by M. P. BOAG, M. E. and Cyanide Expert.

LOUIS FALKENAU,
STATE ASSAY OFFICE,
434 California St., near Montgomery.
Analysis of Ores, Metals, Soils, Waters, Industrial Products, Foods, Medicines, etc., etc.
Court Experting in all branches of Chemical Technology. Working Tests of Ores and Investigation of Metallurgical and Manufacturing Processes. Consultations on all questions of applied chemistry. Instructions given in assaying and all branches of chemistry.

RELIABLE ASSAYS.

Gold	$ .50	Gold and Silver	$ .75
Lead	.50	Gold, silver, copper	1 50

Samples by mail receive prompt attention.
Rich Ores and Bullion Bought.
OGDEN ASSAY CO.,
1429-16th St., Denver, Colo.

E. E. BURLINGAME & CO.,
ASSAY OFFICE AND CHEMICAL LABORATORY
Established in Colorado, 1866. Samples by mail or express will receive prompt and careful attention
Gold & Silver Bullion Refined, Melted and Assayed OR PURCHASED.
Concentration Tests—100 lbs. or car load lots. Write for terms.
1736-1738 Lawrence St., Denver, Colo.

HENRY E. WOOD,
ASSAYER,
1734 Arapahoe St., DENVER, COLO.
Ore Tested in Carload Lots.
Write for Circular.

J. W. RICHARDS,
(Late of Aspen, Colo.)
ASSAYER AND CHEMIST. 1754 Champa Street, DENVER, COLO.
Ore Shippers' Agent. Write for Terms.

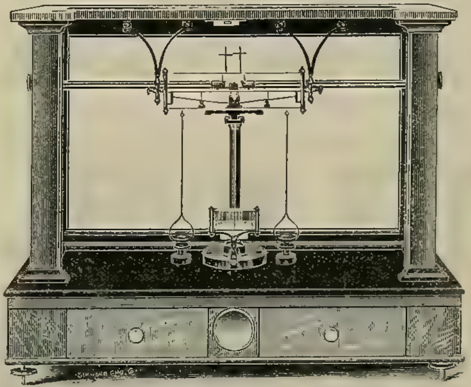
Samples by Mail or Express Will Receive Prompt Attention.
ALBERT I. GOODELL,
ASSAYER AND CHEMIST,
1430 Stout Street.....................DENVER, COLO.

CHAS. BUTTERS & CO., Limited.
E. S. LEAVER, Manager.
Ore Testing Works,
Chemical and Metallurgical Laboratory,
Assay Office,
DOOLY BLOCK, - SALT LAKE CITY, UTAH.

Telephone, MAIN 5104.
Cable Address, LUCKWARD.
◆ ESTABLISHED 1869. ◆
A. H. WARD.
C. A. LUCKHARDT CO.,
NEVADA METALLURGICAL WORKS,
71 & 73 STEVENSON STREET, - - - - SAN FRANCISCO, CAL.
Assaying, Analyses, Sampling.
PRACTICAL WORKING TESTS OF ORE BY ALL PROCESSES.
STAMP MILL AND CONCENTRATOR IN OPERATION ON PREMISES.

Thomas Price & Son,
Assay Office, Sampling Works
And Chemical Laboratory.
526 Sacramento Street, San Francisco, Cal.

No. 0 PRECISION BALANCE.
5-INCH BEAM.



This is the most accurate and sensitive button balance made. All contacts with the beam and hangers are of agate. Improved construction throughout; extension plate glass sub-base and cylindrical reading glasses for beam and index.

For full particulars regarding this and other balances send for catalogue "A" to

WM. AINSWORTH & SONS,
DENVER, COLORADO, U. S. A.

F. W. Braun & Co., Los Angeles, Cal., Agents for balances and the Brunton Patent Pocket Transit.
John Taylor & Co., San Francisco, Cal., Agents for balances and the Brunton Patent Pocket Transit.
H. S. Crocker Co., San Francisco, Cal., Agents for the Brunton Patent Pocket Transit.
Pacific Optical Co., Los Angeles, Cal., Agents for the Brunton Patent Pocket Transit.

JAMES ANGUS SNEDAKER,
Mining Engineer,
721-722 Equitable Building, Denver, Colo., U. S. A.

HERMANN J. VAN DIEREN,
Assayer and Metallurgist,
1407 Seventeenth St., DENVER, COLO

Stamp Mill and Reduction Works: 19th St and Platte River.

Buyer of every description of Ores and Precious Stones. Rights for sale for process of treating refractory gold ores; also process for treating low grade copper ores. Write for particulars.

Independent Assay Office.
ESTABLISHED 1886.
D. W. Reckhart, E. M., Proprietor.
Agent for Ore Shippers
Assays and Chemical Analysis
Mines Examined and Reported Upon.
BULLION WORK A SPECIALTY
P. O. Box 88 Office and Laboratory:
Cor. SAN FRANCISCO & CHIHUAHUA Sts.
EL PASO, TEXAS.

ALVIN PHILLIPS & CO.,
Chemists, Mining and Metallurgical Engineers,
1761 MARKET STREET,
DENVER, - COLO.

Complete Ore-Testing Works — capacity ten pounds to two tons. Modern Methods of Lixiviation, Cyanide and Chlorination. Concentration on Bartlett Table. Assaying and Bullion Refining Chemical Analyses of Oils, Coal, Water, and all solutions. WRITE FOR PRICES.

Hoskins' Patent Hydro Carbon Blow-Pipe and Assay Furnaces.

No dust. No ashes. Cheap, effective, economical, portable and automatic.

SEND FOR PRICE LIST TO
W. HOSKINS, 81 South Clark St., Room 55, CHICAGO, ILL.

SMITH & THOMPSON,
Manufacturers of Fine
ASSAY BALANCES.
Write for Catalogue
2219 Stout St,
Denver, Colo.

The State Ore Sampling Co.
DENVER, COLO.

We buy Gold, Silver, Lead, Copper, Bismuth, Uranium, Wolframite, Cobalt, Molybdenite and Antimony Ores. We have modern sampling mills, also test ore for the new processes of ore reduction.

Our long experience in the market enables us to obtain the highest prices for all marketable ores. Write for our "Reference Book." Send analysis of your ore for prices and information.

BAILY & MONNIG, Managers.

THE ROESSLER & HASSLACHER CHEMICAL CO.,
100 William Street, New York.

CYANIDE

Peroxide of Sodium

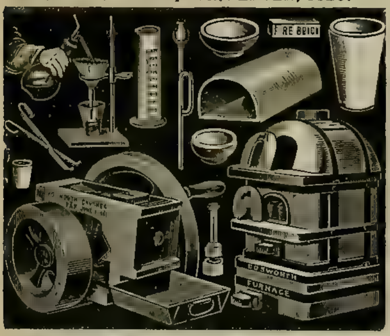
Hyposulphite of Soda

Chloride of Lime

Sulphide of Iron

And Other Chemicals for Mining Purposes.

THE DENVER FIRE CLAY CO.,
1742 to 1746 Champa St., DENVER, COLO.



Manufacturers, Importers and Dealers in
Chemicals, Apparatus and Assayers' Supplies, Fire Brick and Tile.
Sole Agents for the "AINSWORTH BALANCES."
WRITE FOR CATALOGUES.

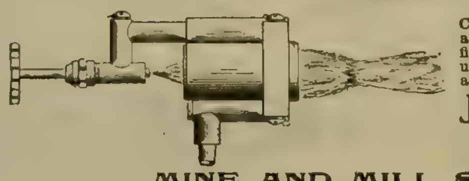
DEARBORN Drug and Chemical Works. Laboratories. Water Chemists. Vegetable Boiler Compounds.

ALL KINDS OF ANALYSES. WATERS FREE. OILS A SPECIALTY.

10,000 Boiler Feed Waters Are Being Treated by DEARBORN METHODS.

29, 30, 31, 32 and 33 Rialto Bldg. - - - CHICAGO, ILL.

Taylor's Coal Oil and Gasoline Burner
(PATENTED)



A new heating burner for Assayers and Chemists, or for brazing, in which coal oil at 33 deg. to 45 deg., Beaume and 150 deg. fire test, or gasoline at 74 deg. test can be used for fuel. Adapted to crucible, muffle and brazing work. Price $6. For sale by

JOHN TAYLOR & CO.,
63 FIRST STREET,
SAN FRANCISCO, CAL.

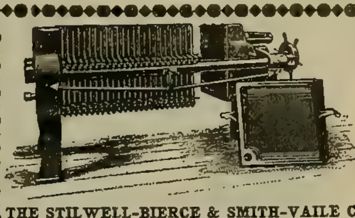
MINE AND MILL SUPPLIES.
Importers and Manufacturers of Assayers' Materials, Chemicals and Acids, Etc.
CATALOGUE ON APPLICATION.

IMPROVED BONE ASH.

It is 100% better than Bone Ash now being used; will absorb more lead, will never crack or split in the Muffle, can be dropped before or after using without breaking. Cupels can be made and used at once; no drying required. Excessive heat has no effect on them. Will stand shipping any distance. It takes up none of the precious metals in cupeling. Cupels much quicker. Once used always used. Sold under a positive guarantee or money refunded. Now being used by all smelters and assayers who have tried it.

Price of Improved Bone Ash, $60.00 per ton; $3.50 per 100 lbs.; or manufactured Cupels, $1.50 per hundred.

J. J. CUMMINGS & CO., Sole Mfrs.,
Telephone Clay 972. 10 STEVENSON ST., SAN FRANCISCO, CAL.
For Sale also by Justinian Caire Co. Dealers in Assay Goods and Mining Supplies. 521-523 Market St.



FOR **Removing Slimes**
BROMINE
CYANIDE
CHLORINATION
And Other Aquarious Chemical Solutions.
Our FILTER PRESS
Removes all Slimes and Hastens the Deposition of the Metals.

THE STILWELL-BIERCE & SMITH-VAILE CO., 276 Lehman St., Dayton, Ohio. Risdon Iron & Locomotive Works, San Francisco, Cal.; C. B. Boothe & Co., Los Angeles, Cal., Sales Agents.

PIONEER REDUCTION CO.
Established 1858. Nevada City, Cal.
Buyers of Gold, Silver and Copper Ores and Concentrates.
HIGHEST PRICES PAID FOR COPPER ORES.
WRITE FOR RATES.

ESTABLISHED 1856.
Controls AND Check Assays
(A SPECIALTY.)
MARINER & HOSKINS,
ASSAYERS AND CHEMISTS,
Mining Engineers and Metallurgists.
81 South Clark Street.
Rooms 51-55,
CHICAGO, ILLINOIS.
SEND SAMPLES BY MAIL OR EXPRESS.
MAILING SACKS ON APPLICATION. : :

ST. LOUIS SAMPLING & TESTING WORKS,
1225 and 1227 Spruce St.,
ST. LOUIS, MO.

The Largest and Most Complete Ore Testing Works in Existence for Making all Kinds of Practical Working Tests of Ore, etc., to Determine the Most Suitable Method of Treatment.

PLANT FOR COAL WASHING, COKING AND STEAMING TESTS OF FUELS. ASSAYS, ANALYSES, CHEMICAL AND PHYSICAL INVESTIGATIONS OF ALL KINDS. MINERAL PROPERTIES, MINES AND METALLURGICAL PROCESSES EXAMINED AND REPORTED UPON. CORRESPONDENCE SOLICITED.

TELEPHONE MAIN 5303
Union PHOTO-ENGRAVING Co.
DESIGNING
HALF-TONES
ZINC ETCHING
523 MARKET ST
SAN FRANCISCO, CAL.

HEALD'S
BUSINESS COLLEGE.
24 Post Street, - - - San Francisco.

MINING AND CIVIL ENGINEERING DEPARTMENT: Mathematics, Draughting, Strength of Material, Chemistry, Assaying, Blow-Pipe Analysis, Geology, Mineralogy, Surveying, etc., under the direction of Prof. O. H. Packer, an engineer of national reputation.

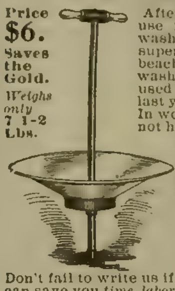
ELECTRICAL DEPARTMENT: Theory and Practice; Construction,

BUSINESS: Bookkeeping, Shorthand, Typing, Modern Languages, etc.

Twenty teachers; individual instruction; can enter at any time; Catalogue and Journal free.

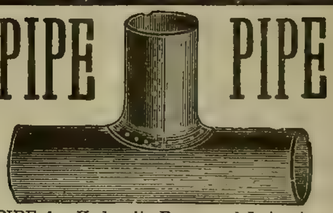
THE LITTLE ALASKA GOLD WASHER.

Price $6.
Saves the Gold.
Weighs only 7 1-2 Lbs.



After several years practical use in different fields, our washer has established its superiority over all placer or beach washers. It is just the washer for Cape Nome; it was used extensively in Alaska last year with every success. In working the operator does not have to wet his hands and can stand in an upright natural position. It is just the washer for the poor man who has not the money to put in expensive machinery. It will do the work of ten men with gold pans. It is just the washer for the prospector, being light and easy to pack. Don't fail to write us if in need of a washer; we can save you *time, labor* and *money*. RUSSELL & KINSEY, 1237 Magnolia Ave, Los Angeles, Cal

PIPE PIPE



PIPE for Hydraulic Power and Irrigation.
OIL STORAGE TANKS.
GENERAL SHEET IRON WORK.
Lacy Manufacturing Co.,
LOS ANGELES.

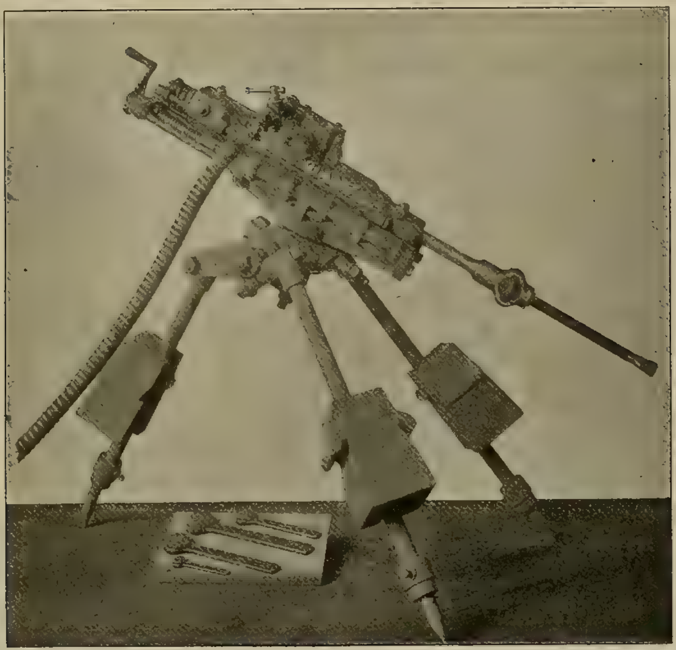
PATENTS

Our U. S. and Foreign Patent Agency presents many and important advantages as a Home Agency over all others, by reason of long establishment, great experience, thorough system, intimate acquaintance with the subjects of inventions in our own community, and our most extensive law and reference library, containing official American reports, with full copies of U. S. Patents since 1872. All worthy inventions patented through DEWEY, STRONG & CO.'s Patent Agency will have the benefit of a description in the *Mining and Scientific Press.* We transact every branch of patent business, and obtain patents in all countries which grant protection to inventors. The large majority of U. S. and foreign patents issued to inventors on the Pacific Coast have been obtained through our agency. We can give the best and *most reliable* advice as to the patentability of new inventions. Our prices are as low as any first-class agencies in the Eastern States, while our advantages for Pacific Coast inventors are far superior. Advice and circulars free.

DEWEY, STRONG & CO.,
PATENT AGENTS,
330 Market Street, San Francisco, Cal.

WHITEWASHING
—AND—
TREE SPRAYING
PUMPS.

Prices from $4 to $60. Nozzles from 75 cts. to $1.00. Catalogues. WM. WAINWRIGHT, 1411 Jackson St., San Francisco. Telephone Hyde 2986.



“GIANT” DRILLS AND COMPRESSORS
ARE THE BEST.
“GIANT” BABY DRILLS CHEAPEN MINING.
WRITE US FOR PARTICULARS.
THE COMPRESSED AIR MACHINERY CO., 11-13 First St., San Francisco, Cal.

SULLIVAN

Diamond Core Drills
FOR PROSPECTING. Catalogue 29.
The most extensive line of sizes and styles ever offered.
CONTRACTORS FOR PROSPECTING WITH DIAMOND DRILL.
ROCK DRILLS
FOR MINING. Catalogue 30.
Superior valve and ratchet motions. The highest possible grade.
Send for Our New Catalogues.
Sullivan Machinery Co.,
New York. Pittsburg. Claremont, N. H.
Main Office, CHICAGO.....................54 to 60 N. CLINTON ST.
Western Office, DENVER.....................332 SEVENTEENTH ST.
Pacific Agency, SAN FRANCISCO, HENSHAW, BULKLEY & CO.
Cable Address, Diamond, Chicago. Codes: A. B. C. 4th Edition, Postal Directory, Western Union, Liebers.

Established 1837.
I. C. Yawger,
Successor to VICTOR BISHOP & CO.
IMPORTER OF CARBONS FOR DIAMOND DRILLS.
21 Maiden Lane, - NEW YORK.

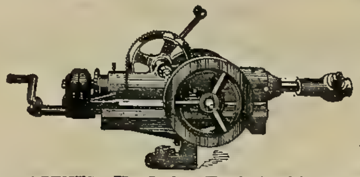
DIAMOND DRILLS
FOR PROSPECTING.
AMERICAN DIAMOND ROCK DRILL CO.
120 LIBERTY ST N.Y.

THEODOR LEXOW, 14 JOHN STREET, N.Y.
......Importer of......
CARBONS
(BLACK DIAMONDS)
For DIAMOND DRILLS and all Mechanical Purposes.
HENRY DEMMERT.

RAND ROCK DRILLS and Drill Mountings.

HIGHEST DEGREE OF PERFECTION ATTAINED. .·. INDISPENSABLE IN MINING, TUNNELING & EXCAVATING.
AIR —AND— Gas COMPRESSORS.
STANDARD TYPES! SPECIAL PATTERNS! ALL SIZES!
RAND DRILL CO., 100 BROADWAY, New York, U. S. A.
San Francisco Office: 223 First St.
1328 Monadnock Blk., CHICAGO, ILL.

THE JACKSON HAND POWER ROCK DRILL.



Works in Any Rock, in Any Position.
Write for Circulars and References.
THE JACKSON DRILL & M'F'G CO.,
1756 Larimer Street, DENVER, COLO.
Sole Licensees for all Foreign Countries and Eastern United States: THORNTON N. MOTLEY COMPANY (INC.), 43 John St., New York.
AGENTS: The Joshua Hendy Machine Works, 38 Fremont St., San Francisco, Cal.; Chas. B. Boothe & Co., 126 So. Los Angeles St., Los Angeles, Cal.

FIRTH'S DRILL STEEL,
16 cents per pound.
The best drill steel on the market. Has no equal for hard rock drilling. Miners cannot afford to use an inferior steel when FIRTH'S can be bought at the above price.
Abner Doble Company, Gen. Agts.,
Fremont and Howard Sts., SAN FRANCISCO, CAL.

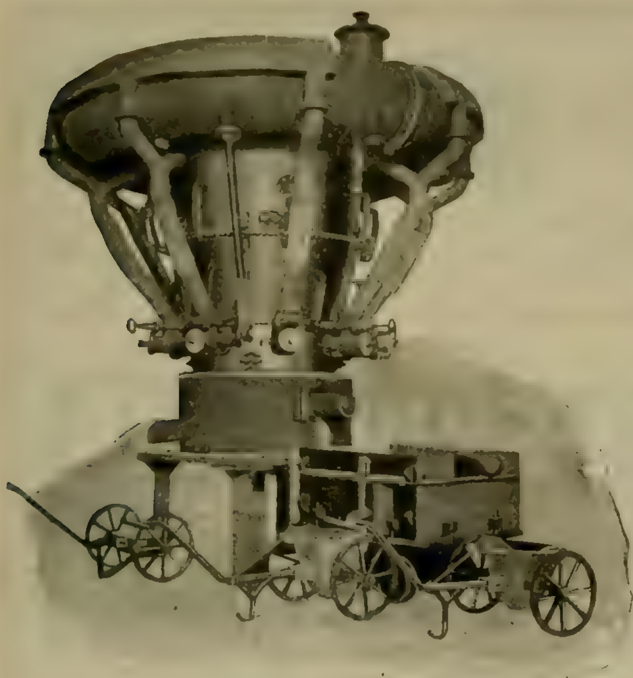
CANTON STEEL COMPANY,
—— Manufacturers of ——

CANTON DRILL STEEL.
CANTON ENG.CO.

UNEQUALED FOR TOUGHNESS AND ROCK-CUTTING QUALITIES. WRITE FOR 1900 STEEL LIST, CONTAINING ENDORSEMENTS AND USEFUL INFORMATION.
Works: CANTON, OHIO. Branch Warehouse: DENVER, COLO.

ANY BOOK
ON ANY SUBJECT
Connected with Mining, Metallurgical, Mechanical or Industrial Interests,
WILL BE SENT ANYWHERE, POSTPAID,
AT PUBLISHER'S PRICES.
SEND FOR CATALOGUE OF LINE DESIRED.
ADDRESS BOOK DEPT. MINING AND SCIENTIFIC PRESS,
NO. 330 MARKET STREET, SAN FRANCISCO, CAL.

BULLOCK DIAMOND DRILLS
If you are interested in prospecting send for our new Diamond Drill Catalogue (No. 33).
BULLOCK MINING MACHINERY
PORTABLE HOISTS—Send for our new Catalogue (No. 40). CHAMPION MINE VENTILATORS—Send for our new Catalogue (No. 35).
HOISTING AND HAULAGE PLANTS, ORE CARS, SKIPS, CAGES, ETC., ETC.
PARKE & LACY CO., Agent,
21 & 23 Fremont St., San Francisco, Cal.
M. C. BULLOCK MFG. CO.,
1172 West Lake St., Chicago, Ill., U. S. A.



THE COPPER FURNACE

Here illustrated has OUR PATENT

WATER VAPORIZING ATTACHMENT.

Experience has proven this to be the best of all methods for applying water for the cooling of jackets. It has the further great advantage of using only about one-eighth the usual amount of water needed for that purpose, and all jackets are kept at the same temperature.

We Manufacture Smelting Furnaces and Equipments

FOR THE TREATMENT OF

GOLD, SILVER, LEAD, COPPER and NICKEL ORES.

of any desired tonnage capacity above forty tons per day, and put them into successful operation under guarantee. Write for catalogue showing different styles of furnaces.

We also design, manufacture and erect Smelter Sulphide Mills for crushing and sampling ores. We are the originators of the Narrow Face, Large Diameter, High Speed Crushing Rolls. A full description of our Crushing Machinery is given in a special catalogue, which will be sent on application.

THE COLORADO IRON WORKS CO.

ESTABLISHED
1860.

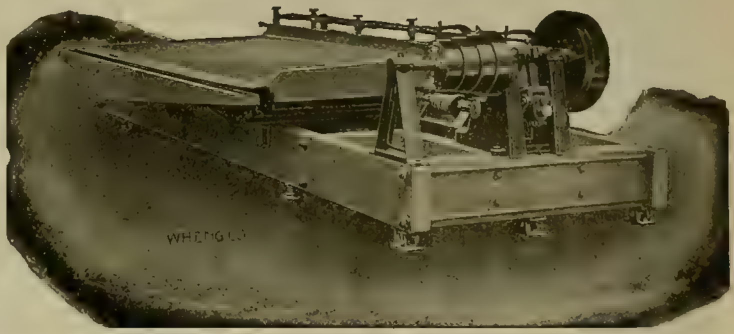
DENVER, COLO., U. S. A.

THE : CAMMETT : CONCENTRATOR.

Designed with some Regard for the Laws of Concentration.

From **The Denver Evening Post**, July 15th, 1900.

* * * "Now about concentrating tables. Here's a fellow who says there's nothing equal to the Wilfley, and I am trying to convince him that old man Woodbury over in California makes the finest table in the world." "No, sir," said his comrade, "you're way off. I've tried the CAMMETT too thoroughly to believe there's anything made to equal it."



Manufactured Under U. S. Patent No. 632,892; Dated Sept. 12, 1899.

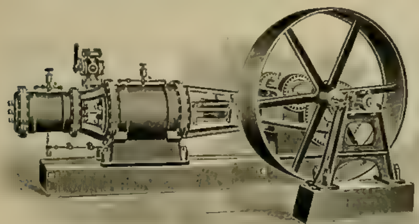
Denver Engineering Works,---Shepard & Searing,---Sole Manufacturers,

30th and Blake Streets, - - - - DENVER, COLORADO.

WHY NOT

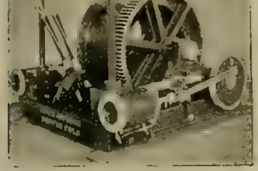
have our catalogues, specifications and prices before you purchase

AIR DRILLS OR COMPRESSORS?



Our guarantees are strong; our customers are satisfied. We can satisfy YOU.

J. Geo. Leyner,
729 Seventeenth St.,
DENVER, COLO.



The above cut illustrates my new and improved Hoister.

Hoisting Engines

A SPECIALTY.

REVERSIBLE, LINK-MOTION, GEARED and FRICTION CLUTCH HOISTS carried in stock.

Special Machinery Built to Order.

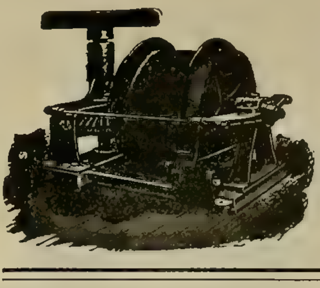
GEO. G. JACKSON,
1724-34 Wynkoop St., DENVER, COLO.

JOSHUA HENDY MACHINE WORKS,

No. 42 FREMONT STREET, SAN FRANCISCO, CAL.

—BUILDERS OF—

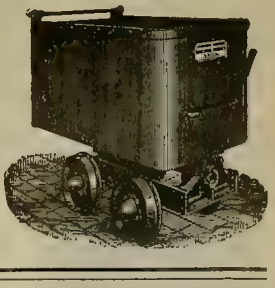
"Davis" Horse Power Whims. Ore and Rock Cars.



Specialty of
PROSPECTING, MINING and MILLING PLANTS.

ORE and WATER BUCKETS.

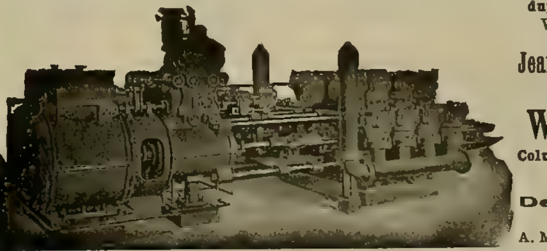
"T" RAIL OF USUAL WEIGHTS, EITHER NEW OR SECOND-HAND, FOR SALE CHEAP.



The Best MINE PUMPS in the World.

COMPOUND CONDENSING AND TRIPLE EXPANSION STATION PUMPS.

We carry in our Denver store a stock of Improved Pattern Sinkers and Duplex Station Pumps, with duplicate parts for repairs.



Write for Catalogue and Estimates.

Jeanesville Iron Works Co.,
JEANESVILLE, PA.

Western Office,
Columbia Hotel Building,
1328 17th St.
Denver, Colo.
Telephone 2298 A.
A. MIDDLEBROOK, Manager.

THE CAL. ANTI-CALORIC COMPANY,

Tel. Main 5752. Office, 217-219 Mission St., San Francisco, Cal.

Sole Manufacturers of CAL. ANTI-CALORIC SECTIONAL COVERINGS AND BLOCKS FOR BOILERS. PLASTIC (dry) for Steam Domes, Etc. Sole Agents for the Boston Asbestos Paper Co. Asbestos Goods of All Kinds. Send for Information. Factory, Potrero.

Founded by Mathew Carey, 1785.

HENRY CAREY BAIRD & CO.,
INDUSTRIAL PUBLISHERS, BOOKSELLERS & IMPORTERS,
810 Walnut St., Philadelphia, Pa., U. S. A.

☞ *Our New and Revised Catalogue of Practical and Scientific Books, 92 pages, 8vo; a Catalogue of Books on Steam and the Steam Engine, Machinery, etc.; a Catalogue of Books on Sanitary Science, Gas Fitting, Plumbing, etc., and our other Catalogues and Circulars, the whole covering every branch of Science applied to the Arts, sent free and free of postage to any one in any part of the world who will furnish his address.*

Duncan.—The Practical Surveyor's Guide: Containing the necessary information to make any person of common capacity a finished Land Surveyor, without the aid of a Teacher. By Andrew Duncan, Land Surveyor and Civil Engineer. A new, revised and greatly enlarged edition. Illustrated by 72 engravings. 214 pages, 12mo.................**$1.50**

ABSTRACT OF CONTENTS.—Introduction; Object of Surveying; What a Survey should include; Definition of Points; Determination of a Straight Line and of a Plane Surface; Map of a Survey; Scale according to which Maps of Surveys are Drawn; Instruments for Measuring Distances and their Use; Instruments for Setting out Right Angles and their Use; Survey of Smaller Tracts with the Assistance of the Previously Described Instruments; Problems; Trigonometrical Surveying; Tables of Surveys; Systems of Rectangular Surveying for Surveying the Public Lands of the United States; Index.

WE ALSO PUBLISH:

The Assayer's Guide: Or, Practical Directions to Assayers, Miners and Smelters for the Tests and Assays, by Heat and by Wet Processes, of the Ores of all the Principal Metals, of Gold and Silver Coins and Alloys, and of Coal, etc. By Oscar M. Lieber. A new, revised and enlarged edition. 283 pages, 12mo. Price..**$1.50**

☞ *The above or any of our Books sent by mail, at publication prices, free of postage to any address in the world.*

☞ *Illustrated circulars of the above Books, showing full Tables of Contents, will be sent free to any one who will furnish his address.*

HENRY CAREY BAIRD & CO.,
INDUSTRIAL PUBLISHERS, BOOKSELLERS & IMPORTERS,
810 Walnut St., Philadelphia, Pa., U. S. A.

DELINQUENT SALE NOTICE.

NATIONAL CONS. MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Rich Gulch, Shasta County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 12) levied on the 4th day of June, 1900, the several amounts set opposite the names of the respective shareholders, as follows:

Name.	No. Cert.	No. Shares.	Amt.
F. Knottner	20	1,000	$50 00
F. Knottner	110	500	25 00
F. Knottner	111	500	25 00
L. Knottner	112	150	7 50
E Knottner	113	150	7 50
O. Knottner	114	100	5 00
G. Knottner	115	100	5 00
J. Gretz (balance)	186	1,500	70 00
F. E. Hartmann	223	250	12 50
C. A. Mueller	226	500	25 00
C. A. Mueller	229	500	25 00
G. Berbert	228	350	17 50

And in accordance with law, and an order from the Board of Directors, made on the 4th day of June, 1900, so many shares of each parcel of such stock as may be necessary, will be sold at public auction, at the office of the company, 773 Mission street, San Francisco, California, on MONDAY, the 20th day of August, 1900, at the hour of 1 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

GEO. W. FLEISSNER, Secretary.

Office—773 Mission street, San Francisco, California.

DELINQUENT SALE NOTICE.

COLUMBIA ATHLETIC CLUB (INC.)—Location of principal place of business, San Francisco, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 4) levied on the 27th day of June, 1900, and payable Saturday, June 30, 1900, the several amounts set opposite the names of the respective shareholders, as follows:

Name.	No. Cert.	No. Shares.	Amt.
Daniel F. Crowley		15	$50 00

And in accordance with law, and an order from the Board of Directors, made on the 27th day of June, 1900, so many shares of each parcel of such stock as may be necessary, will be sold at public auction at the office of the club, 1200 Market street, San Francisco, California, on THURSDAY, the 30th day of August, 1900, at the hour of 12:30 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

JNO. H. EFFINGER, Secretary.

Office—1200 Market street, San Francisco, California.

DENVER & RIO GRANDE R.R.
SCENIC LINE OF THE WORLD

The ∴ Mining Man's Favorite Route

BETWEEN

Denver, Colorado Springs, Pueblo and Florence, Cripple Creek, Leadville, Glenwood Springs, Aspen, Gunnison, Lake City, Creede, Durango, Silverton, Telluride and Ouray,

Reaching all the Mining, Milling, Cyaniding, Chlorinating and Smelting centers in Colorado and Utah, and all mining points in California, British Columbia and the Pacific Northwest by close connections and a perfect system of through car service.

Pullman Palace and Tourist Sleeping Cars between Denver and San Francisco and Los Angeles, and Pullman Palace and Tourist Sleeping Cars and Free Reclining Chair Cars between Denver and Portland. : : A Perfect Dining Car Service on All Through Trains. : :

For Illustrated Pamphlet, address

W. J. SHOTWELL,
G. A. D. & R. G. R. R.,
126 California St.,
San Francisco, Cal.

S. K. HOOPER,
G. P. & T. A.,
Denver,
Colo.

ASSESSMENT NOTICES.

GOULD & CURRY SILVER MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Virginia, Storey County, Nevada.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 6th day of August, 1900, an assessment (No. 91) of fifteen (15) cents per share, was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, room No. 69, Nevada block, No. 309 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 8th day of September, 1900, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 1st day of October, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

ALFRED K. DURBROW, Secretary.

Office—Room No. 69, Nevada block, No. 309 Montgomery street, San Francisco, California.

BEST & BELCHER MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Virginia District, Storey County, Nevada.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 3d day of August, 1900, an assessment (No. 71) of fifteen (15) cents per share, was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, room 33, Nevada block, No. 309 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 7th day of September, 1900, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on FRIDAY, the 28th day of September, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

M. JAFFE, Secretary.

Office—Room 33, Nevada block, No. 309 Montgomery street, San Francisco, California.

ALLIANCE EXPLORATION & MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Ophir, Placer County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 3d day of August, 1900, an assessment (No. 3) of five (5) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 236 Sutter street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 11th day of September, 1900, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 2nd day of October, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

S. GOLDSMITH, Secretary.

Office—236 Sutter street, San Francisco, California.

EUREKA CONSOLIDATED DRIFT MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Forest Hill, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 9th day of August, 1900, an assessment (No. 26) of one (1) cent per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 214 Pine street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 8th day of September, 1900, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on SATURDAY, the 29th day of September, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

GEO. W. DIXON, Secretary.

Office—214 Pine street, San Francisco, California.

SAVAGE MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Virginia, Storey County, Nevada.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 13th day of August, 1900, an assessment (No. 101) of ten cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Rooms 20-22, Nevada block, No. 309 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 18th day of September, 1900, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 8th day of October, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

JOHN W. TWIGGS, Secretary.

Office—Rooms 20-22, Nevada block, No. 309 Montgomery street, San Francisco, California.

THE MINES OF
Eastern Oregon
Which are now attracting so much attention are reached only by the lines of the
OREGON RAILROAD & NAVIGATION CO.
For Descriptive Pamphlets, Through Rates, Etc., Address
E. C. WARD, Gen. Agt.,
630 Market Street, San Francisco.

COLORADO'S GOLD

Output for 1899 is unequaled by any State in the Union. Cripple Creek, Leadville, and all the important mining towns are reached by

THE COLORADO & SOUTHERN RY...

For copies of our publications on the Swandyke and Pine Creek Gold Districts, or our pamphlet "Hints to Prospectors," address

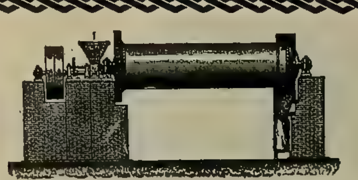
T. E. FISHER, GEN. PASS. AGT.,
DENVER, COLO.

INVENTORS, Take Notice!

L. PETERSON, MODEL MAKER,

544A MISSION STREET, bet. First and Second Sts., SAN FRANCISCO. Experimental machinery and all kinds of models. Tin and brasswork. All communications *strictly confidential.*

THE DAVIDSEN



PATENT TUBEMILL.

FOR FINE GRINDING,

Uniformity of Output, Effectiveness, Simplicity, or Economy of Operation and Maintenance, "THE DAVIDSEN" HAS NO EQUAL.

ENORMOUS GRINDING SURFACE. ✤ SLOW SPEED. ✤ ANY DEGREE OF FINENESS.

WRITE FOR CATALOGS.

F·L·SMIDTH & CO
ENGINEERS
66 MAIDEN LANE, NEW YORK
COPENHAGEN, VESTERGADE 29.K. LONDON. 9 BRIDGE ST., S.W.

THE SMIDTH BALLMILL

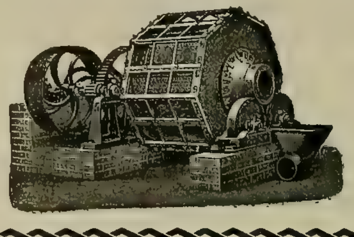
Crushes, Grinds and Sifts in One Operation, Working Continuously.

AMONG ITS SPECIAL FEATURES OF MERIT ARE:

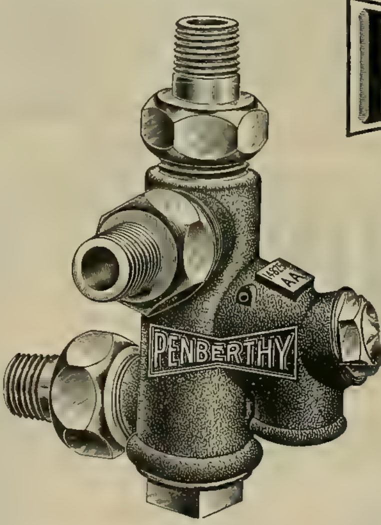
Maximum Output, Slow Speed, Low Horse Power, Absolute Uniformity, Ease of Access, Slight Cost of Repairs.

OUR AUTOMATIC FEEDER INSURES REGULARITY AND EFFECTIVENESS.

THE SMIDTH BALLMILL.



BEST. CHEAPEST. MOST SIMPLE.



TRADE **PENBERTHY** MARK.

AUTOMATIC INJECTOR.

14 Years in the Market.

SALES 200,000.

The result of a business established on MERIT and built up by the production of Injectors unequaled for SIMPLICITY, RELIABILITY AND ECONOMY.

Penberthy Injector Co.,
DETROIT, MICH.

FULDA'S PATENT SELF-TIGHTENING TANK.

Fulda's Planing Mills and Tank Manufactory,

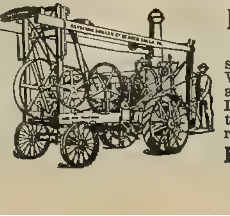
30-40 SPEAR STREET, SAN FRANCISCO, CAL.

—MANUFACTURERS OF—

RAILROAD,
MINING,
OIL,
WATER,
WINE,
TANKS.

Chemical and Cyanide Vats a Specialty.

WRITE FOR PRICE LIST.



Prospecting Machinery.

Multitudes in use for testing for minerals. Sizes and equipments to suit any and all conditions. Unexcelled for Placer Testing, Oil Wells, Water Wells, testing for Lead and Zinc, Iron and Coal; goes through anything; brings up everything. Large sizes drill as much as 1500 feet. In use all over the world. Every purchaser pleased. Used on boats for testing river and lake beds. Water no hindrance. No skilled labor required.

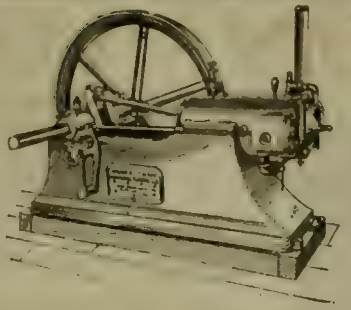
KEYSTONE DRILLER CO., Beaver Falls, Pa., U. S. A.

Most reliable for controlling steam and other fluids. Can be reground, if necessary, while valve is inposition on steam pipe

—MADE BY—

The Wm. Powell Co.,
CINCINNATI, O.

Carried in stock by Miller, Sloss & Scott, San Francisco.



Distillate Engines and Hoists.

Air Compressors.

HADWEN SWAIN MFG. CO.,
215-217 SPEAR ST., SAN FRANCISCO, CAL.
CATALOGUES MAILED.

WITTE GASOLINE HOISTS

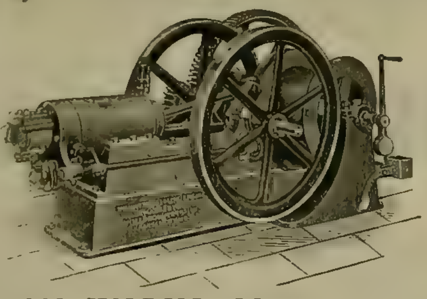
ARE MONEY EARNERS.

Made for use in places far from factory. Are built in parts and in duplicate. Renewals easy and quick to get. Strong, substantial and reliable.

Operate on GAS, GASOLINE or DISTILLATE.

There Are Others, but None as SAFE AND RELIABLE.

Write for Illustrated Catalogue G.



WITTE IRON WORKS CO.,
515 WEST 5th ST.,
KANSAS CITY, MO., U. S. A.

Hendrie & Bolthoff Mfg. & S. Co , Denver, Colo.
C. B. Boothe & Co., Los Angeles, Cal.
Tracy Engineering Co., San Francisco, Cal.

THE MARION STEAM SHOVEL CO.,

Steam Shovels Dredges and Traction Dredges

Suitable for all kinds of **Excavating Work**, making a specialty of

PLACER MINING MACHINES,

separate or self-contained, either as a **dry land excavator or floating dredge.**

The Marion Steam Shovel Co.
MARION, OHIO.

GEO. W. BARNHART, No. 4 Sutter St., San Francisco, Cal.

RIVETED IRON AND STEEL PIPE

FOR HYDRAULIC MINES, IRRIGATION AND POWER PLANTS. Manufactured from the best grades of IRON or STEEL by MODERN MACHINERY.

AGENTS FOR THE Celebrated **CANTON STEEL.**

Schaw, Ingram, Batcher & Co.,
539 Mission St., SAN FRANCISCO.
211 to 219 J St., SACRAMENTO.

WE HAVE MOVED TO LARGER QUARTERS.

TRUAX ORE CARS

CARS ALWAYS IN STOCK TO FILL RUSH ORDERS.

WE MAKE CARS FOR YOUR CAGE AND SKIPS FOR YOUR INCLINE SHAFT.

SEND FOR PAMPHLET AND REFERENCES.

Truax Mfg. Co., 69 STEVENSON ST., S. F.

TO SECURE GOOD RESULTS BUY

JESSOP'S STEEL

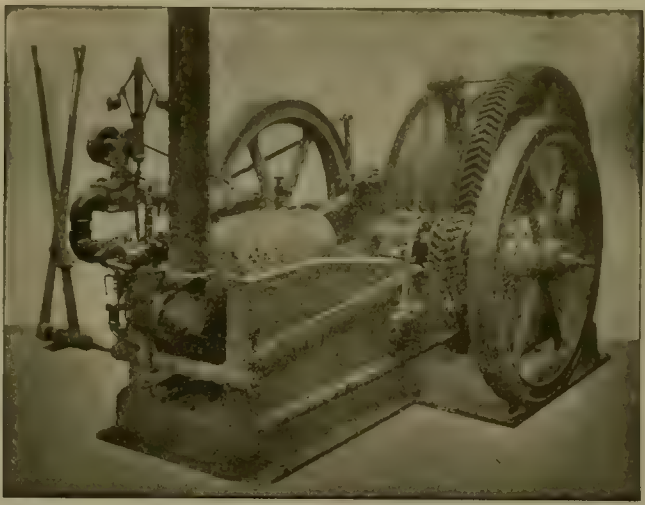
FOR TOOLS, MINING DRILLS, ETC.

Chief American Office,
91 John St., New York, N. Y.

Wm. Jessop & Sons, Ltd.
Manufactory, Sheffield, England.

I. WILLARD BEAM, Agent,
29 MAIN STREET,
SAN FRANCISCO, CAL.

HERCULES HOISTS Are Sold the World Over.



Hercules Gasoline Hoist--Speed 385 Ft.; Load 2500 Lbs.

HERCULES GAS ENGINE WORKS,............141-143 FIRST STREET, SAN FRANCISCO, CAL

DON'T SAVE PENNIES AND WASTE DOLLARS

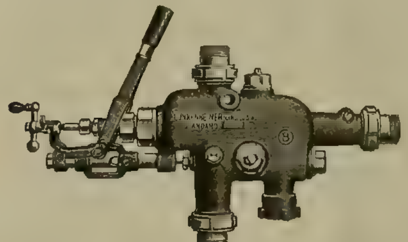
in the purchase of a Gasoline and Oil Engine and Hoist. Buy the best—the Weber—and get results. Full particulars on request.

WEBER GAS & GASOLINE ENGINE CO.,
430 S. W. Boulevard,
Kansas City, Mo.

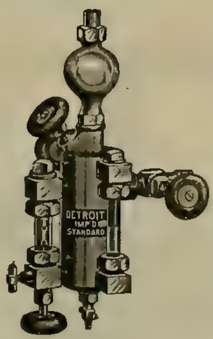
The Lunkenheimer
("99" MODEL)
Standard Injector.
UNIVERSALLY APPLICABLE.

This machine is warranted to show in actual service results hitherto unattainable with any other make of injector on the market. With feed water at 75° F., LIFT 6 FEET, it will work WITHOUT ADJUSTMENT OF STEAM OR WATER AT ALL PRESSURES FROM 40 TO 250 LBS., AND HIGHER, AND THE CAPACITY CAN BE GRADED OVER 50% AT ANY POINT in that range of work. Note carefully, ALL CONDITIONS ARE MENTIONED in this statement. The construction is simple and free from all complicated mechanism. All parts are easily accessible and tubes are very durable. In grading the capacity, the steam supply is cut down in proportion to the water, hence the discharge is cool and scale is not so liable to form.

It is thoroughly reliable and can be started promptly under the most extreme conditions, and UNLIKE many others its efficiency is not confined to any particular season of the year The capacity increases with the pressure. A trial is solicited and satisfaction guaranteed. Write for Catalogue of superior brass and iron Steam Specialties.



The Lunkenheimer Company,
Sole Makers and Patentees.
General Offices and Works: CINCINNATI, OHIO, U. S. A.
—— BRANCHES: ——
26 Cortlandt St..................NEW YORK. | 35 Great Dover St.....LONDON, ENGLAND.



ALL ABOUT Sight Feed Lubricators.

Our new catalogue for 1900 is ready for distribution. It explains in detail the principles governing the operation of **Sight Feed Lubricators**, using sectional view to show the internal construction, and containing cuts of the different styles in parts before being assembled into the complete lubricators, thus enabling every one to understand their construction and operation thoroughly.

In addition it shows our full line of **Glass Oilers, Oil Pumps, Oiling Devices, Multiple Oilers, Valves, Etc.** It will be sent to any address on application.

DETROIT LUBRICATOR CO., DETROIT, MICH.

MACHINERY BARGAINS.

I have some splendid Air Compressors, Hoisting Engines, Rock Drills, Rock Crushers, Channeling Machines, Steam Pumps, Boilers, Steam Shovels, Locomotives and Relaying Rails, all in splendid condition. Send for printed list and specify your requirements. I can save you money. WILLIS SHAW, 627 New York Life Building, CHICAGO.

RISDON IRON WORKS,
SAN FRANCISCO, CALIFORNIA.

Cable: "Risdon's." Code: A. B. C. & Leiber's.

MANUFACTURERS OF

Gold Dredging Machinery

And COMPLETE EQUIPMENT for Placer Mines
OUR SPECIALTY.

We build **GOLD DREDGES COMPLETE IN RUNNING ORDER** to handle 2500 cubic yards per day at a cost of 3 cents per cubic yard.

We excavate 50 feet below water, 20 feet above water and handle boulders up to one ton weight.

Send for Dredging Catalogue No. 17.

—WE ALSO BUILD—

All kinds of Mining, Milling, Concentrating, Pumping, Air Compressing, Hydraulic, Water Wheel and Hoisting Machinery.

EVANS' HYDRAULIC GRAVEL ELEVATORS.

We publish sixteen catalogues. Write for one in the line you are interested in.

RIVETED STEEL WATER PIPE

RISDON IRON WORKS
MANUFACTURERS

BEALE & HOWARD STS.
SAN FRANCISCO, CAL.

All sizes of Steel Water Pipe for City and Town Supply, Placer, Hydraulic and Quartz Mining. Cut, punched and rolled to be riveted at destination or made up complete.

We make a specialty of all kinds of Heavy Sheet Iron and Steel Work. Plans and Estimates furnished.

THE HALLIDIE ROPEWAY

For Transporting Ore, Fuel, Earth, Sugar Cane, etc., by Wire Ropes.

SIMPLE, ECONOMICAL, PRACTICAL, DURABLE.

LOADS MECHANICALLY. DUMPS AUTOMATICALLY.

WIRE TRAMWAYS (Single and Double Rope Systems),

Cableways, Transmission by Wire Ropes,
Incline Planes, Cable Grips,
Logging by Cables, Automatic Loaders,

PLOWING, SCRAPING AND TRANSPORTING by Wire Ropes,

DESIGNED, SUPPLIED AND ERECTED. Estimates Furnished.

Improved GRIP PULLEY.
Patents Nos. 483,442; 610,353.

EFFECTIVE, SIMPLE, AUTOMATIC.
Saves Wear on Wire Rope and Cable.
Send for Illustrated Pamphlet.
Correspondence Solicited.

CALIFORNIA WIRE WORKS, - 9 Fremont St., San Francisco, Cal.

SIMMONS PATENT DOUBLE-JOINTED, BALL BEARING GIANTS, With Weighting Attachment.

NO CENTER BOLT.

Deflectors,

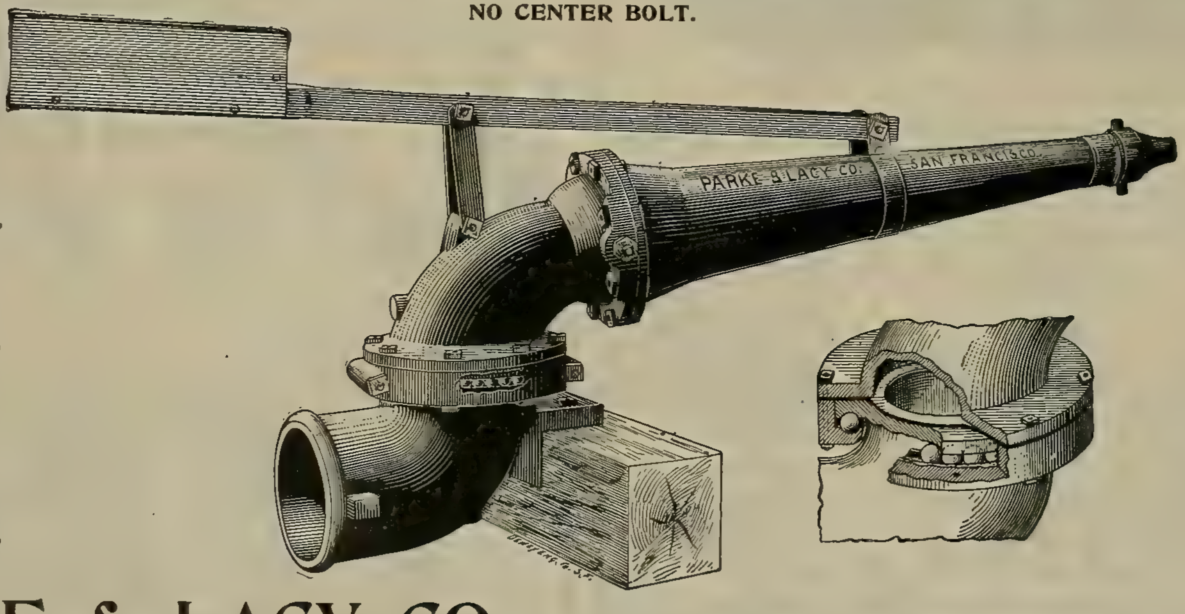
Retorts,

Water Gates,

Hydraulic Water Pipe,

Valves, Etc.

Huntington Quartz Mills,



Paul Ball Mill,

Rock Breakers,

Rolls, Etc.

Sole Agent for
INGERSOLL-SERGEANT
Rock Drills and Air Compressors,
BULLOCK DRILLS.

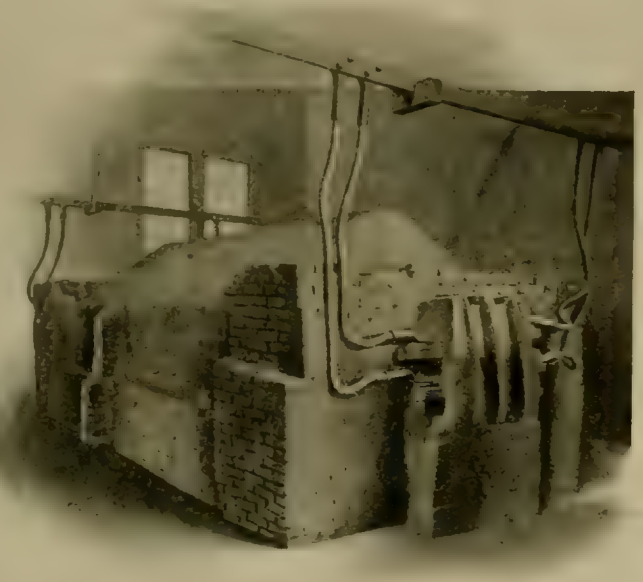
PARKE & LACY CO., 21 & 23 FREMONT ST., SAN FRANCISCO, CAL.
Sole Agent for KNOWLES PUMPS and PULSOMETER PUMPS.

CALIFORNIA STATE LIBRARY

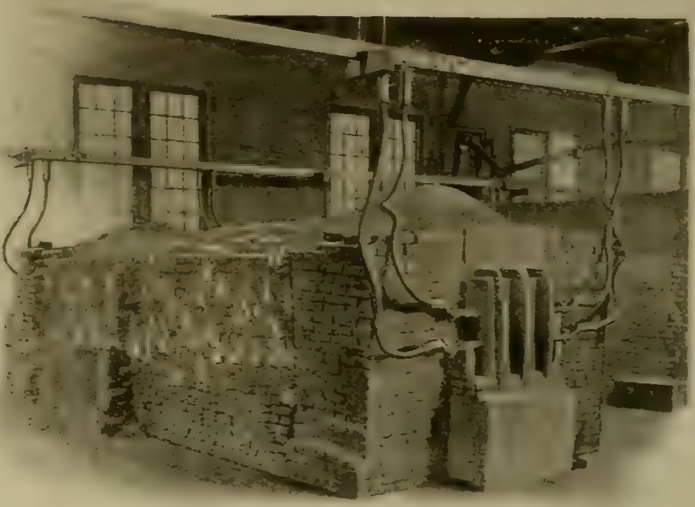
This Paper not to be taken from the Library.

MINING AND SCIENTIFIC PRESS.
AND PACIFIC ELECTRICAL REVIEW.

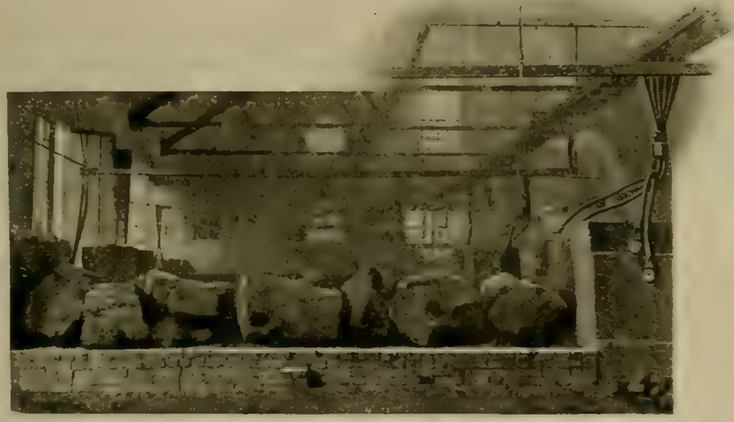
No. 2092.—VOLUME LXXXI. Number 8. SAN FRANCISCO, SATURDAY, AUGUST 25, 1900. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.



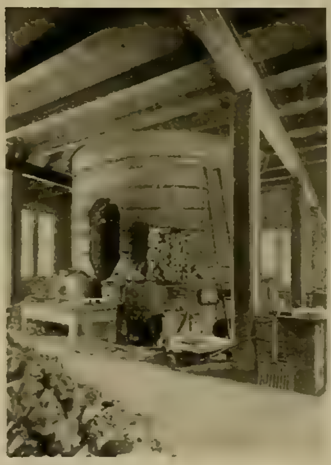
Carborundum Furnace Ready to Burn.



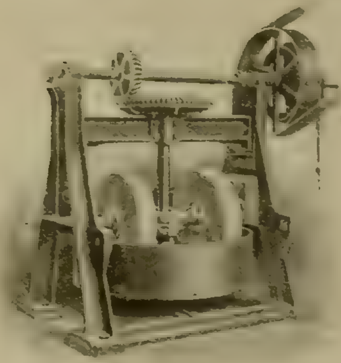
Carborundum Furnace Burning.



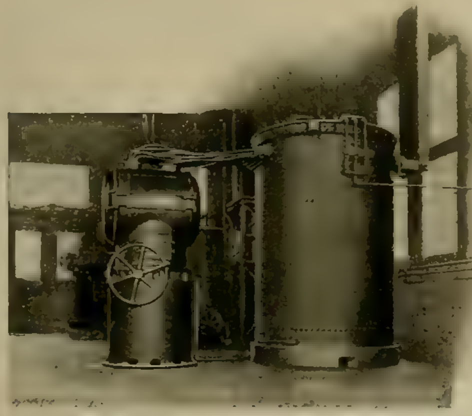
Carborundum Furnace After Burning.



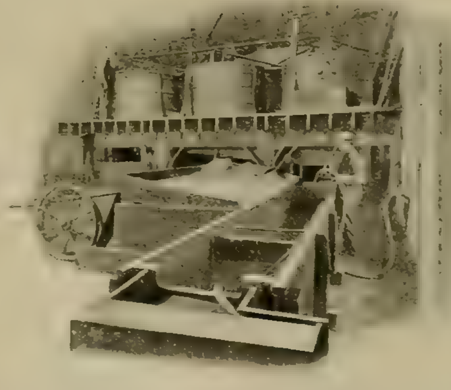
A Section of the Kiln Room.



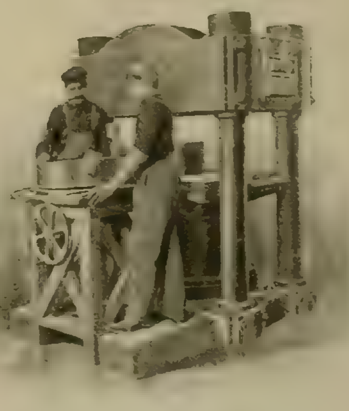
The Grinder



One of the Largest Transformers in the World.



Where Carborundum Receives Its Chemical Treatment.



The 1500-Ton Hydraulic Press.

Carborundum Manufacture at Niagara Falls, N. Y.—See Page 218.

MINING AND SCIENTIFIC PRESS.

ESTABLISHED 1860.

Published Every Saturday at 330 Market St., San Francisco, Cal.

ANNUAL SUBSCRIPTION:
United States, Mexico and Canada..........$3 00
All Other Countries in the Postal Union.......... 4 00

Entered at the S. F. Postoffice as second-class mail matter.

J. F. HALLORAN..........Publisher.

Special Representatives:
EASTERN.
E. H. HAVEN..........150 Nassau St., New York City.
MIDDLE WEST.
CHAS. D. SPALDING ....153 La Salle St., Chicago, Ill.
INTER-MOUNTAIN.
W. A. SCOTT..........43 Jacobson Building, Denver, Colo.
SOUTHERN CALIFORNIA.
W. D. CURTIS..........223 W. Second St., Los Angeles, Cal.

San Francisco, August 25, 1900.

TABLE OF CONTENTS.

ILLUSTRATIONS.—Carborundum Manufacture at Niagara Falls, N. Y.—Carborundum Furnace Ready to Burn; Carborundum Furnace Burning; Carborundum Furnace After Burning; A Section of the Kiln Room; The Grinder; One of the Largest Transformers in the World; Where Carborundum Receives its Chemical Treatment; The 1500-Ton Hydraulic Press, 213. The Crystal Springs Dam; The Top of Crystal Springs Dam, Showing the Method of Blocking; The Crystal Springs Dam, Showing Overflow; Showing Filter Pipes, Subterranean Aqueducts and Gravel Filter in Preparation; Subterranean Water Developed at Sunol, 216. Crystal Springs Dam as Seen from the Lake; Opening Cut for Subterranean Filter Aqueduct; Showing the Filter Pipes in the Concrete, Subterranean Aqueduct; Showing Details of Aerator at College Hill Reservoir, 217. Laying Pipes Across the Bay of San Francisco from Dumbarton Point to Ravenswood; Showing the Connection of the Millbrae Pumps with the 44-inch Crystal Springs Main, 218. Latest Mining and Metallurgical Patents, 218-219. Monte Cristo Mines, Baranof Island, Alaska, from the Southeast; Quarry of Slate, Quartz and Schist, 300 Feet High, 1500 Feet Long, Baranof Island, Alaska; Bringing Sample Ores from Mountain Top to Tidewater, Baranof Island, Alaska, 220.
EDITORIAL.—Economic and Mining Geology; The Menace of Fire; Miscellaneous, 214.
MINING SUMMARY.—223-224-225-226.
LATEST MARKET REPORTS.—227.
MISCELLANEOUS.—Concentrates, 215. San Francisco's Water Supply, 216-217. Carborundum Manufacture, 218. Latest Mining and Metallurgical Patents, 218-219. The Copper Queen Mine, Arizona; The Anaconda Converter; On Baranof Island, Alaska, 220. Uranium and Its Ores; A Cooling Tower, 221. Silver Mining in Mexico; California Oil Production, 222. Personal; Commercial Paragraphs; List of U. S. Patents for Pacific Coast Inventors; Notices of Recent Patents; Recently Declared Mining Dividends; Catalogues Received; Obituary, 226-227.

Economic and Mining Geology.

In the issue of the 11th inst., considerable space was given to the statements of Director Walcott of the U. S. Geological Survey concerning the relation of the work in which he and his assistants are engaged to the mining industry.

In continuance of this subject, so important to the miners of this west half of America, is given further space to additional statements of Director Walcott in connection with the economic and mining geology of the U. S. Geological Survey. He desires to define the difference between the work of the Survey and the domain of private enterprise, and to show the status and limitations of the branch of the public service that he directs. He says:

It is well known that in creating the United States Geological Survey Congress and the people whom it represents expected that its energies would be largely devoted to the development of the mineral resources of the country. How this method should be accomplished was left to the Director and his principal assistants, who, by scientific training and long practical experience, were the best qualified to judge what could and what could not be done by such a corps of specialists as the Survey must necessarily consist of—men whose whole life is devoted to the abstract side of geology and whom neither the regulations of the Survey as defined by law nor the exigencies of their official duties would permit to participate in the practical or commercial development of these resources.

It was evident that these specialists could not take the place of either the prospector or the mining engineer, as a somewhat superficial view of the subject has led some to think they might. They should, of course, understand the principles that underlie the work of either of these classes of men, but they can not be expected to possess that expertness of instinctive second sense in each of these professions which can be acquired only by lifelong practice.

The Survey should furnish an accurate basis upon which the work of each of these experts, so indispensable in the development of the mineral resources of the country, may be founded. The Survey stands, so to speak, between them and nature. It should endeavor to tell the prospector where he may and where he may not prospect to advantage for this or that valuable mineral, but it can not be expected to actually find the mineral for him. It should aim to discover for the mining engineer first of all the general laws which govern the occurrence of the different useful minerals, and to show the special applications of these laws in the particular mining regions that come under survey; but it can not undertake to direct the workings of individual mines or quarries, nor guarantee that every mining engineer will make a correct application of the laws that have been discovered.

In the early years of the Survey there were practically no topographic maps upon which the surface distribution of different classes of rock formations could be indicated (areal geology), and which should thus serve as a basis for the work of the prospector. Hence it was only the study of the already developed ore deposits, for the purpose of determining the laws under which they were formed, that could be immediately undertaken. A number of monographs or exhaustive studies of important mining districts were made, during which several new laws or generalizations concerning the formation of ore deposits in general were formulated. Incidentally, the accurate geological descriptions contained in these monographs proved to be of great practical value to those engaged in mining in these particular districts. By these studies, conducted for the most part at great depths below the surface, those engaged in them acquired a practical familarity with many geological phenomena connected with ore deposits that could not be seen upon the surface, and were thereby specially fitted to judge of ore bearing capabilities of rock formations in general. This constitutes a special training that can not be acquired in the schools, but can only be imparted to the young geologist by actual experience in mining or economic work under the guidance and instruction of older geologists who have already gained it by long continued special work.

During the last five years the topographic maps of very large areas have been completed, constituting several hundred of the sheets that will form the basis of the Geologic Atlas of the United States. Many of these sheets have already been colored geologically—that is, the areal geology has been completed—and they have been published as geologic folios. In a few cases the areas have also been studied economically; that is, the manner of occurrence of the known ore deposits has been observed, and deductions drawn therefrom are given in the folio, which will show the prospector where similar favorable conditions exist, and where, in consequence, are the most promising localities to search for other ore deposits. The latter class of work is more difficult and more expensive, for many reasons, than other geological work.

The increase in effectiveness of this work must, however, proceed slowly. Even with unlimited amounts of money immediately available the economic work of the Survey could not at once be spread over the whole country, as it should be, for the reason that it would take time to train the additional number of specially prepared geologists required. But there is no doubt that by a natural enlargement of the present plan of work the demands of the mining community for Government aid in the development of their particular branch of industry can readily be largely met.

It has been generally understood that information acquired by the Government is open to all and is not for the benefit of one individual or corporation. Language to this effect was inserted in the statute organizing the Geological Survey, in 1879. This, then, draws the line between public and private interests. There is more or less extended desire that assays and analyses and examinations of prospects and mines should be undertaken by the General Government; but it would seem to be clear that expert work and assaying should be left to individuals and corporations, so far as General Government is concerned. State mining bureaus or schools of mines can properly assist in the study of details and lend much aid to local development, but the General Government should deal only with interstate and such other problems as the State can not well undertake.

◆

FROM nearly every part of the foothill and mountain region of California comes the usual annual statement that milling operations are ceasing because of the scarcity of water. The annual gold yield of California is in exact ratio with the amount of rain and snowfall. With adequate system of water storage the normal supply would serve throughout the greater part of the year. The subject is one that has received constant and intelligent attention, but is necessarily difficult of successful solution. The California Miners' Association has recognized the importance of the subject and has made tentative efforts to remedy existing evils. The recently organized State Water and Forest Association is the result of such work, and that association has its co-operative support. In the practical carrying out of the plans of the Water and Forest Association lies largely the ultimate satisfactory solution of this important problem.

The Menace of Fire.

From all parts of the mining area of the country come reports of devastation by forest fires, entailing loss. The deplorable destruction of private interests is even surpassed by the direct public loss. The daily press rightly reasons that drastic measures of repression must be put in force. The miscreant who deliberately burns his neighbor's property is no less a destroyer than the careless idiot who drops a cigarette in a bunch of dry grass and burns out a whole country side. Most things are becoming foolproof, but as yet much is at the mercy of the itinerant, who, in ignorance or defiance of results, carelessly causes a fire to spread destructively over a wide area. Colorado and California have suffered great damage in this way, as have other States; and, while nearly every commonwealth has a law making such occasioning of fires a penal offense, there is little effort at enforcement. 'Tis true there should be an era of stern repression; a few examples are needed.

Washington, D. C., reports that a scientific investigation of forest fires and reforestation on burnt areas is being pursued by the Division of Forestry through C. S. Crandall of the Colorado experiment station. This work will be carried on chiefly in the northern part of the State, where the prevalence of Lodgepole pine makes the conditions very different from those in the south. The investigation is an important one, for, until the forester knows what to expect from fire and how to deal with burnt-over areas, he can do little in a region where burning has been as extensive and is still as common as in Colorado.

In this investigation the examination of the first stages of reforestation will be made on areas of which some were burned over thirteen years ago, and on which others in government employ had already made surveys and recorded progress at different periods since. In the case of the old fires of which there is no record, the date of burning can usually be determined by the age of the trees which came up after the fire, and the necessary surveys and measurements can then be made.

Mr. Crandall will have four assistants and will begin his examination in the Medicine Bow range. From there he will work down the Continental Divide to the neighborhood of Long's peak.

G. B. Sudworth, the dendrologist of the Division of Forestry, is in the Sierra forest reserve of California to determine the feasibility and cost of making a forest working plan for the reserve. Such a working plan would be a detailed and scientific programme for managing the reserve and harvesting its timber crop in such a way that the forests and their productive power would be maintained. This would imply the careful regulation of cutting and grazing, the adaptation of a system of protection from fire and trespass to the needs of each locality and provision for the maintenance of the water supply in the regions dependent on the reserve for irrigation. It would make it possible to bring the reserve to the point of highest usefulness under skilled and farsighted management. Unlike much of the reserved land in California, a good deal of the region in the northern part of the Sierra reserve, which is within the range of the Bigtree and the upper limit of which is the southern boundary of the Yosemite National Park, is heavily timbered. A working plan would therefore provide not so much for the production of forest growth as for its maintenance.

Mr. Sudworth will also gather material for a report on the composition and stand of timber in the reserve and its commercial importance, the classification of the various lands and the origin, extent and character of fires.

Concentrates.

THE weight of one cubic inch of rolled steel is 0.2833 pound.

ONE SECOND-FOOT is figured to equal 50 California miners' inches or 40 Colorado miners' inches.

THERE is no mining directory for California or any other State that is of more than transitory value.

THE bottom of the shaft of the Kennedy mine, Amador county, Cal., is 750 feet below the level of the sea.

THE heating surface exposed to the fire is the actual heating surface of the boiler, on which its capacity depends.

A SOLUTION of one part picric acid and seventy-five parts water will relieve an ordinary burn occasioned by the electric current.

A DISCOVERY OF MINERAL on each twenty acres of a placer location serves to except the whole location from school indemnity selection.

EXTENDED EXPERIMENTS indicate that to the ton of ore milled gold is absorbed by new copper plates to the extent of one-half a pennyweight.

IN the Seattle-Tacoma, Wash., electrical transmission there are two aluminum circuits to each city; the voltage of transmission is 30,000; distance, 30 miles.

IN a flywheel whose radius to the center of the rim is 15.5 inches, weight 100 pounds, and speed 280 revolutions per minute, the centrifugal force is 3,451 pounds.

EXPLOSION, blowing out or scattering of lead poured around a wet joint may be avoided by putting a piece of resin the size of one's thumb into the ladle, and allowing it to melt before pouring.

LORD KELVIN has said, "I believe that with proper apparatus electric current can be carried as far as 300 miles, and used for commercial purposes," and electricians are inclined to agree with him.

ANY ONE can tell just what a back number of any procurable issue of this paper would cost postpaid; current issues, 10 cents each; for the previous year 15 cents; for the next preceding year 20 cents, and so on.

THERE is no regular rate of increase in the temperature of air as it is compressed. Assuming that the air is dry, at twenty-one atmospheres or 294 pounds, by the gauge, the temperature would be 742° F.; for eight atmospheres, 494°.

CALIFORNIA STAMPS are made as heavy as 1400 pounds. At the Banner mine, near Oroville, Cal., forty stamps, each weighing 1200 pounds, dropped 110 times a minute, each crushing four and one-half tons quartz ore every twenty-four hours.

THE U. S. government will not issue a patent for a divided or undivided interest in a mining claim. But a joint owner can get the claim patented against the wishes of the other co-owner or owners, and in making entry may use the names of dissenting owners.

THE Civil Code of California defines hydraulic mining to be "mining by means of the application of water under pressure through a nozzle against a natural bank." The California Debris Commission defines it to be "mining by means of water under pressure through a nozzle."

CEMENTATION is understood to mean the filling of mineral cavities or interstitial space therein by deposition from solutions, chemical action not being involved. Metasomatism is the conversion of one rock or of an aggregate of minerals into another of wholly different chemical composition.

IN the "life of a gold lode mine" enter several factors; prominent among them are the amount of ore available, the number and capacity of the stamps, the method of working, the desire for dividends, the skill of the manager and other considerations that necessarily render any general calculation only approximate.

THIS paper will be pleased to receive from any of its readers statements of work done or results accomplished, or other matters of general interest, accompanied by such detail and data as would make the matter plain. Where practicable, photos or sketches would be of additional value in presenting the subject.

FROM a pattern made of soft pine, put together with nails, an iron casting will weigh about sixteen pounds to every pound of the pattern's weight. A brass casting will weigh eighteen pounds to each pound of the pattern's weight. An alloy nine parts lead, two parts antimony and one part bismuth will expand in cooling.

THE extraction of 95% by the chlorination process from gold ore going $100 to the ton would be good result. The ore loses about 24% of its weight in roasting and leaching. Tailings in the case would assay about $6 per ton, and for every 100 tons of ore treated there would be about 76 tons tailings, containing about $456, gold.

TO PREPARE PROOF GOLD, dissolve several ounces fine gold in nitro-muriatic acid; allow to stand several days, that any silver chloride present may settle; filter the solution; evaporate to crystallization. After diluting copiously with distilled water place the solution in a receptacle, from which it is allowed to pour slowly into a glass jar containing several small pieces of pure aluminum; the gold is at once converted from chloride to metallic; considerable heat is generated; remove the larger pieces of aluminum, pour off the solution; wash the gold precipitate several times to remove any acid. Then add muriatic acid and heat to dissolve any minute particles of aluminum, after which wash well till free from acid: then dry and melt the gold, which should be proof 1000 fine if proper care has been exercised.

ABOUT one ounce to the gallon of water is the maximum amount of cyanide California millmen generally use in cleaning amalgamating plates. This often requires dilution until is found the least amount that will accomplish the result desired. There is great diversity of opinion in regard to this subject, some four authorities varying from less than one-half ounce up to eight ounces per gallon. No particular character of ore is specified.

CARBOLITE, from which ethylene, a rival of acetylene, is generated, is made from slag at Hammond, Ind. The process of converting the slag into a white metallic substance of twice the weight of gold is by impregnating the molten slag with pulverized coke and then subjecting the mixture to an electrical process whereby the whole is fused. It is claimed that each pound of the product will produce 5 feet of the gas, each foot equal to 15 of coal or water gas in illuminating power.

UNDER ordinary conditions of use, superheated steam is saturated steam to which heat has been added without raising its pressure, but, under the same conditions, the volume is increased. If saturated steam is confined in a separate vessel from that in which it was generated, and more heat applied, it becomes superheated, and as it can not increase in volume under these conditions its pressure is increased. The dearer the fuel the more incentive there is to use superheated steam. Where fuel is very costly it is economical to use superheated steam.

THE air consumed by a given compressed air engine may be calculated from the volume, pressure and temperature at cut-off or release, and the volume, temperature and pressure at compression, in the same way that the indicated consumption of a steam engine is calculated; but in this case the indicated and actual consumption should be the same, since there is no change of state of the working fluid. Since the intrinsic energy of a gas is a function of the temperature only, the temperature will not be changed by loss of pressure in the valves and passages, and the air at cut-off will be cooler than in the supply pipe, only on account of the chilling action of the cylinder during the admission, which cannot be energetic when the air is dry, and probably is not very important when the air is saturated.

WHEN zinc is melted with argentiferous lead in order to remove the silver from the lead by the production of a zinc-silver alloy, considerable loss of zinc and silver occurs, owing to the oxidation of the former. In the Rossler—Edelmann process this is avoided by adding ½% aluminum to the melt. The aluminum combines with the oxygen present as oxides of the other metals, and the separation of the fused mass into two layers is more effectual owing to the greater fluidity of the melt. The temperature of the mass before the addition of the aluminum should be 500° C. The alloy of zinc and silver obtained in this way can contain up to 20% of the latter metal. It is cast into anode plates of suitable form, and these are used in an electrolyte of dilute sulphuric acid containing zinc sulphate. The zinc of the anode is dissolved and redeposited at the cathode, while the silver and the small quantity of lead present remain as an insoluble sludge upon the bottom of the vat.

STEAM is superheated to 480° F., and in exceptional cases to 570° F. As used in common practice, steam carries with it more or less water in the form of small globules. Even the best boilers deliver steam containing from 2% to 5% of water. If this saturated steam be heated, superheated steam is formed, which acts after a certain increase in temperature exactly like a perfect gas. If this increase of temperature is carried on under constant pressure, the temperature of the steam rises, and its volume increases. Saturated steam of ninety pounds per square inch of pressure, superheated to 424° F., increases its volume one-third. This increase of volume means a less amount of steam for a certain cut-off. Superheated steam has a high elasticity, and can therefore be carried at a great velocity through the pipes. A velocity of 400 feet is not unusual. Smaller pipes can be used to carry the same amount of steam, and these small pipes give less loss of heat through radiation than larger ones would give.

ANSWERING Colorado, Utah, Idaho and Arizona inquiries as to the 16 to 1 in the Kansas City platform: by the mint act of 1834 every owner of gold bullion and of silver bullion was permitted to take it to the mint and have it coined free of expense, except for refining and for alloy used, at the rate of sixteen times as many dollars for a given weight of gold as for a given weight of silver. While 23.22 grains went to the dollar in gold, 371¼ grains of pure silver were required for a silver dollar. With the alloy added it took 25.8 grains of standard gold for the dollar in gold, and 412½ grains of standard silver for the silver dollar, or about 16 to 1 by weight. The provision of this law as to silver was repealed in 1873. This is what the ratio of 16 to 1 means. A gold dollar weighs 25.8 grains, of which 23.22 grains are pure gold, the remainder being alloy. A silver dollar weighs 412.5 grains, of which nine-tenths, or 371.25 grains are pure silver, the remainder being alloy. Thus the pure silver in a silver dollar weighs about sixteen times as much as the pure gold in a gold dollar, and this is the meaning of "16 to 1." The proposal to adopt the free coinage of silver at a ratio of 16 to 1 is a proposal that any owner of silver bullion shall be authorized by law to take it to a United States mint and have coined and returned to him $1 for each 371.25 grains of silver, this dollar to be legal tender for the payment of all debts, public or private. The silver in such a dollar (and the dollar itself under free coinage) would be worth, at the present price of silver, about 50 cents in gold.

A SIMPLE and rapid way of testing a dynamo to determine whether any changes in the efficiency have occurred after a period of running consists in uncoupling the dynamo from the engine and running it as a motor, current for the purpose being taken from the bus bars or from another machine until its speed of revolution has reached a given value, when the current is broken and at the same instant a stop watch started, and the time which the machine takes in gradually coming to rest noted. A standard may be obtained by making the test when the machine is new or when it is known to be working at its highest efficiency, and then at any other time the dynamo may be tested for comparison with the standard. Such tests will show whether the bearings are in good order or not, whether the brush friction has become abnormal and with the fields excited, and also what the foucalt losses are, for under this condition the armature will come to rest sooner than with the field open, since the foucalt current losses will then be added to the friction losses in bringing it to rest. This method aims only to show the relative efficiency of the dynamo, as it would be necessary to know the moment of inertia of the armature to determine the actual value by such methods.

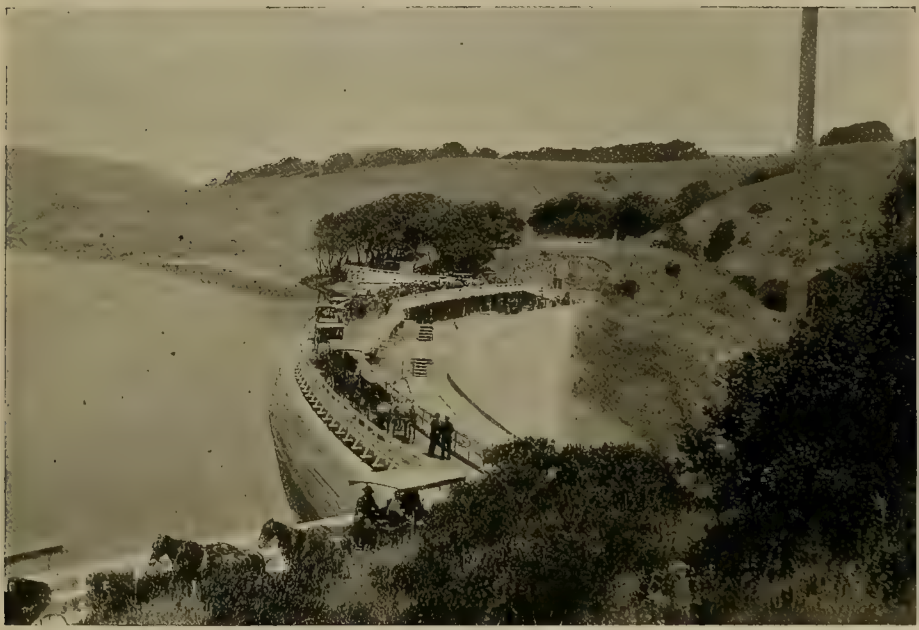
GOLD and silver refining by electrolytic methods is carried on at three works in Europe, two being in Germany and one in Belgium. At Frankfort the Moebius process is used for refining silver on a large scale. This process is also used at St. Louis, at Perth Amboy and at Pittsburg, in the United States. The plant at Frankfort is designed for an output of 35,000 ounces of silver per day of twenty-four hours. A 25 H. P. gas engine drives a dynamo yielding 150 ampères at 100 volts. This current is passed through sixty to seventy cells in series, each requiring about one and one-half volts. The vats are of pine, coated internally with tar; each vat is divided into seven compartments. In these are hung three rows of anode plates and four rows of cathode plates. The former are plates of bullion .40 inch thick, each weighing 3.3 pounds. The latter are thin sheets of rolled silver. The anodes are enclosed in linen bags. The electrolyte consists of a copper nitrate solution, containing one-eighth of silver, and during the electrolysis it is kept slightly acid by addition of nitric acid. To prevent short-circuiting the crystals of silver are continuously removed from the sheet silver cathodes and are allowed to collect upon a canvas tray suspended beneath the electrodes. They are withdrawn, washed, dried and fused at intervals to obtain ingots of fine silver.

THE rotary booster is a machine consisting of two dynamo electric machines, one of which is a motor which may be either alternating or direct current, directly coupled or belted to a generator either alternating or direct current or arc. This machine is for use on long-distance feeders in railway and central station work. The generator end of the machine is series wound, and through it passes all the current which goes through the feeder to which it is attached. It is a low voltage machine and increases the voltage on the feeder to which it is attached a sufficient amount to enable current to be delivered at the end of a long feeder at the same pressure that it is delivered at the ends of shorter feeders connected with the system. It is a device to save copper; but when it is used, the line loss is increased, though, under conditions where for short periods of the day the load is heavy, it pays to do this instead of adding the requisite amount of copper. It is used in stations operating storage batteries for increasing the potential when charging. The efficiency of such a machine is from 80% to 85%. A static booster is practically a transformer and is intended to be upon the long feeders of alternating systems. It performs the same function that the rotary booster does, by raising the pressure of the long feeder to a higher potential, so as to make the current delivered of the proper potential. It has an efficiency of 90% to 97%.

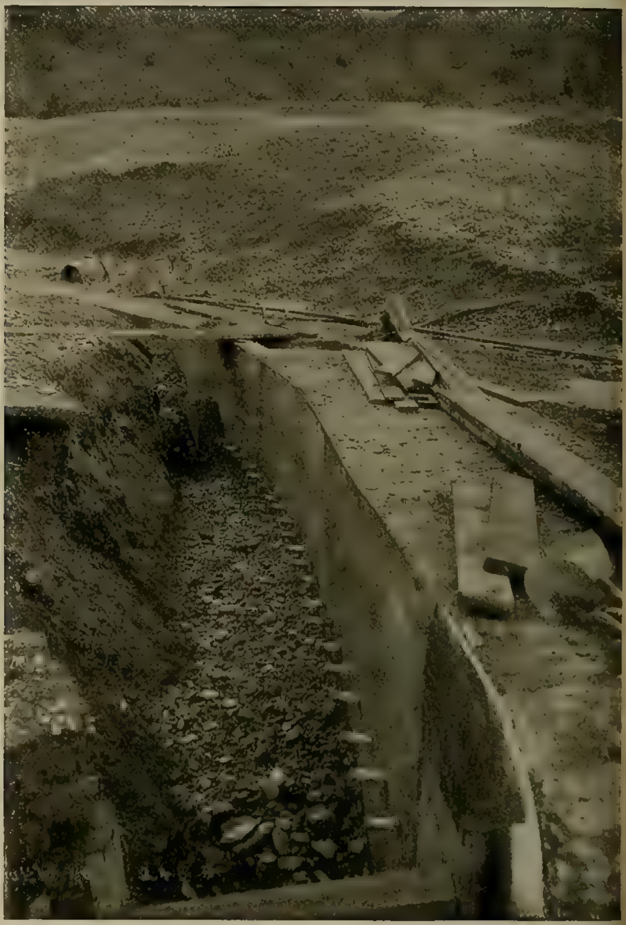
AN adverse mining claim must be filed with the register and receiver of the land office where the application for patent was filed, or with the register and receiver of the district in which the claim is situated at the time of filing the adverse claim. It must be on the oath of the adverse claimant, or it may be verified by the oath of any duly authorized agent or attorney in fact of the adverse claimant cognizant of the facts stated. Where an agent or attorney in fact verifies the adverse claim, he must distinctly swear that he is such agent or attorney, and accompany his affidavit by proof thereof. The agent or attorney in fact must take the affidavit in verification of the adverse claim within the land district where the claim is situated. The adverse notice must fully set forth the nature and extent of the interference or conflict; whether the adverse party claims as a purchaser for valuable consideration or as a locator; if the former, a certified copy of the original location, the original conveyance, a duly certified copy thereof, or an abstract of title from the office of the proper recorder should be furnished, or, if the transaction was merely a verbal one, he will narrate the circumstances attending purchase, the date thereof, and the amount paid, which facts should be supported by the affidavit of one or more witnesses, if any were present at the time, and if he claims as a locator he must file a duly certified copy of the location from the office of the proper recorder.

San Francisco's Water Supply.

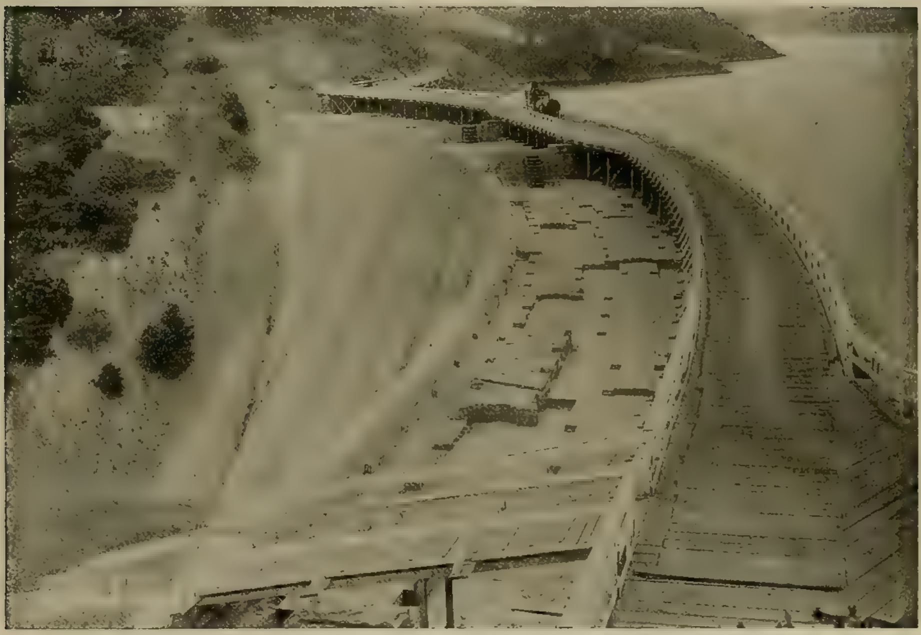
The city of San Francisco, Cal., daily consumes 30,000,000 gallons of water, or about eighty-six gallons per day for each inhabitant. When the early Spanish authorities were sent to select a site for a city on the bay of San Francisco they rejected the peninsula on which San Francisco is now built, as it lacked water, or facilities for securing adequate supply. From the days when water was taken from wells, hauled about the streets and distributed for twenty-five cents a bucket, to the present system of supply there is a long record of effort to furnish good water in sufficient quantity at a low price. The effort has been successful, and at an estimated cost of $30,-



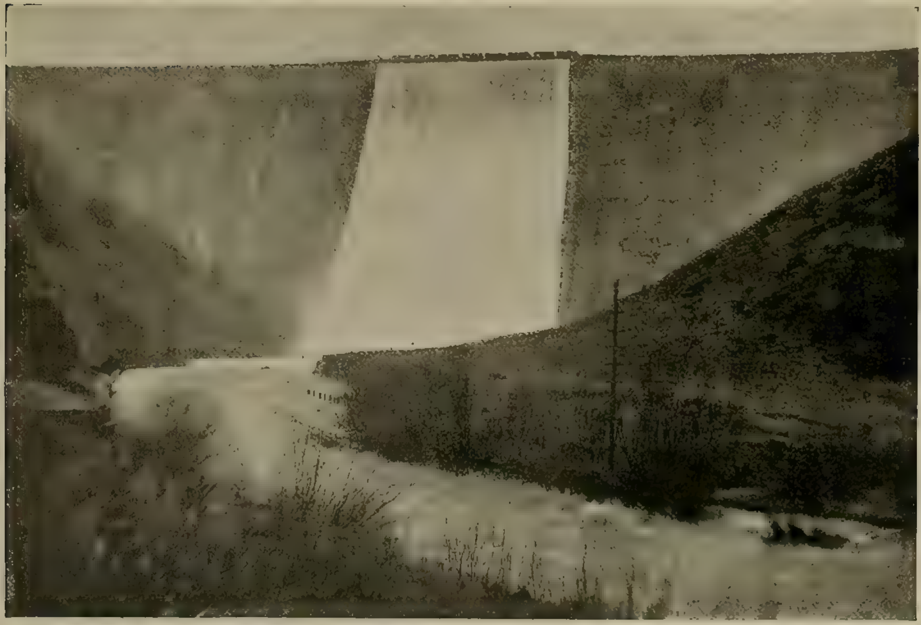
THE CRYSTAL SPRINGS DAM.



SHOWING FILTER PIPES, SUBTERRANEAN AQUEDUCTS AND GRAVEL FILTER IN PREPARATION.



THE TOP OF CRYSTAL SPRINGS DAM—SHOWING THE METHOD OF BLOCKING.



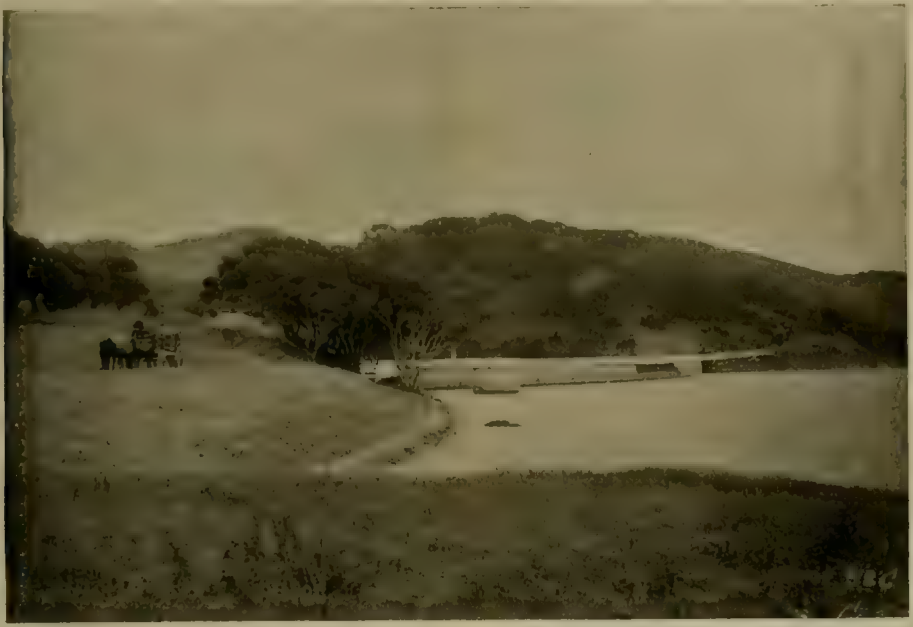
THE CRYSTAL SPRINGS DAM—SHOWING OVERFLOW.

SUBTERRANEAN WATER DEVELOPED AT SUNOL.

000,000 San Francisco has water abundant and pure at a fair figure, the result of half a century of engineering effort.

There was not anywhere on the peninsula sufficient natural storage capacity for a city of 25,000 people, and to accommodate the city of 1900, with its 370,000 inhabitants, an elaborate and complex system of artificial supply and storage reservoirs has been constructed.

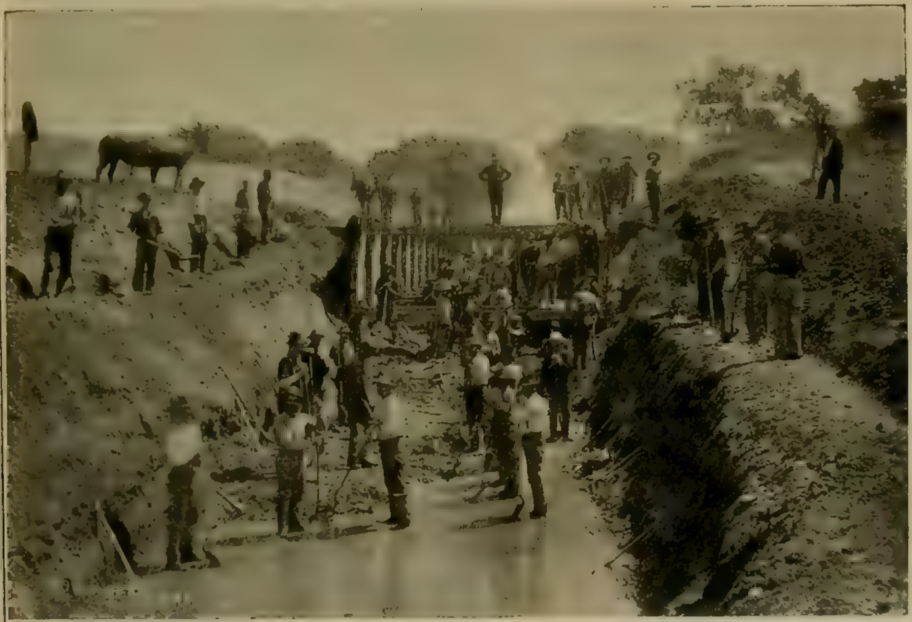
The engineers of the Spring Valley Water Co., which corporation supplies San Francisco with wholesome water, figure that they now have sufficient resources to supply more than a million people.

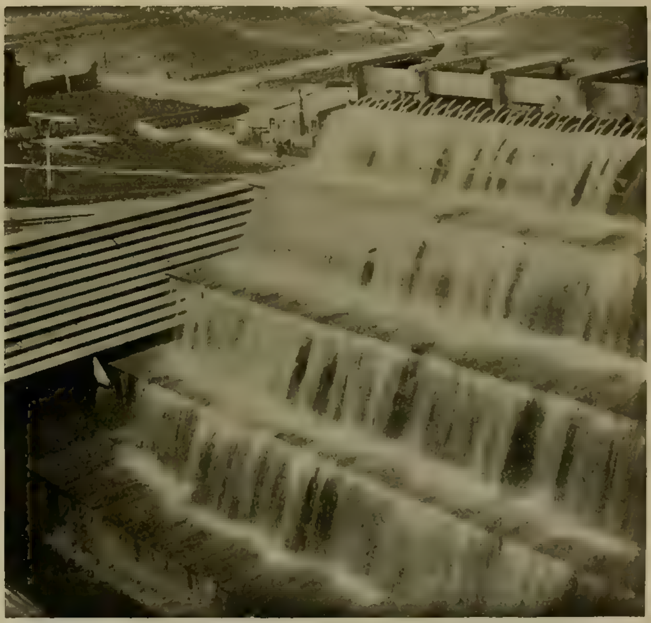

THE CRYSTAL SPRINGS DAM—AS SEEN FROM THE LAKE.

The conditions are peculiar. In San Francisco it may rain a little between the months of November and May. It is not at all likely to rain between May and November. During the six months specified 22 inches of rain may fall. This with six months' annual absence of rainfall, and with occasionally only 10 inches of rainfall in the time when rain is likely to fall at all, with no natural reservoirs, and in a hilly city, surrounded on all sides by deep salt water, the problem of water supply afforded unusual difficulty.

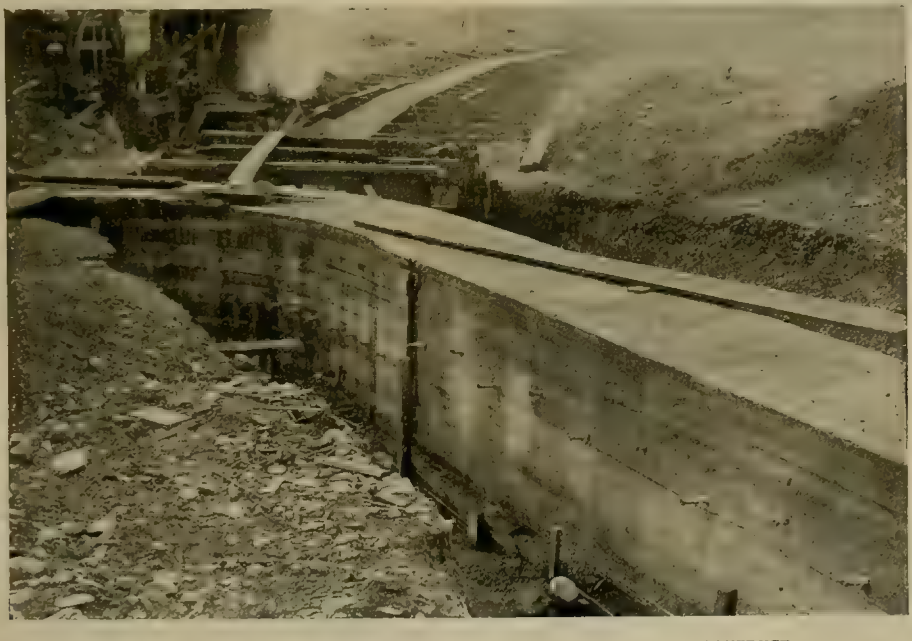
The city of San Francisco is built on a peninsula pushed northward from an outlying spur of the coast range, the area about that of Manhattan island, on which New York city is built, the contour varying from sea level to a height of 900 feet. It is a city of hills and valleys, like the country to the southward. In the adjacent country, about 25 miles south of the Golden Gate, artificial lakes and storage reservoirs have been created and are maintained, from which water is piped to distributing reservoirs in the city having an aggregate capacity of about 200,000,000 gallons. From these reservoirs the water flows by gravity at a pressure of from thirty-five to seventy-five pounds per square inch at the hydrants, of which scattered throughout the city are nearly 4000. There are about 375 miles of water pipe.

Among the reservoirs Crystal Springs lake deserves especial notice. It is in San Mateo county, 23 miles from San Francisco, and is the largest of the reservoirs. It is at an elevation of 350 feet, is formed by a great concrete dam, which impounds about 28,000,000,000 gallons. Herewith are illustrated some of the details of the Crystal Springs reservoir, the building of which is conceded by engineers to embody some of the best and safest principles of dam construction. It is believed to be the largest concrete dam in the world, and the highest dam in the United States. It is noted no less for its magnitude than for the originality of much of its construction. The dam is 145 feet high and is to be raised to the height of 170 feet. It is 176 feet thick at the base; at its summit it is 700 feet long, 40 feet thick; its front slope is 1 foot horizontal to 4 feet vertical; the rear slope begins 1 foot vertical to 1 horizontal, and ends in the upper 60 feet with a 2-foot slope vertical to 1 foot horizontal, the two rear slopes connected by a curve of 298 feet radius; the convex side of the dam facing upstream being curved with a radius of 637 feet.


OPENING CUT FOR SUBTERRANEAN FILTER AQUEDUCT.

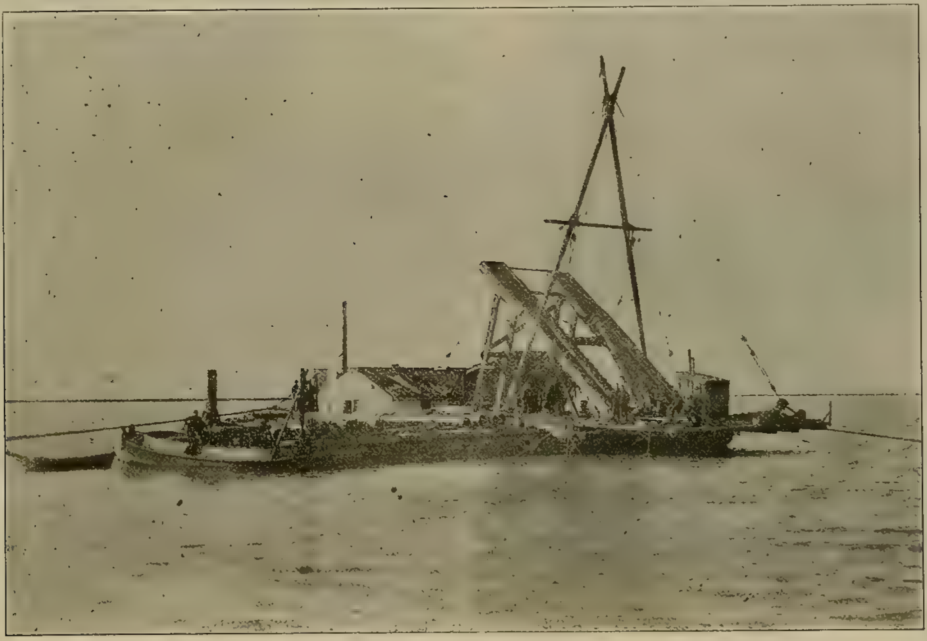

SHOWING DETAILS OF AERATOR AT COLLEGE HILL RESERVOIR.

In building the dam the site for the foundation was cut down from the surface for a depth of from 10 to 40 feet. No explosives were used, lest the bedrock be cracked. The bottom being ready, blocks of concrete were made, each 40x30x8 feet, and when ready were laid and dovetailed, as shown in the illustration. About 5000 of these blocks of varying size were thus used, no two blocks being of just the same shape or dimensions. Thus this dam is not a homogeneous mass of concrete, but is built of interlocking blocks, thus providing an elasticity that aids in withstanding the pressure of the artificial lake, nearly 9 miles in length, it creates—a pressure estimated to be 130,000 tons against its face. The concrete used was in the proportion of two pounds specially prepared sand to one of cement and six barrels of rock. In the construction were consumed 1,230,000 barrels of rock, 410,000 barrels sand and 205,000 barrels Portland cement. The dam was built far into the solid rock on each side of the canyon, to insure greater security.

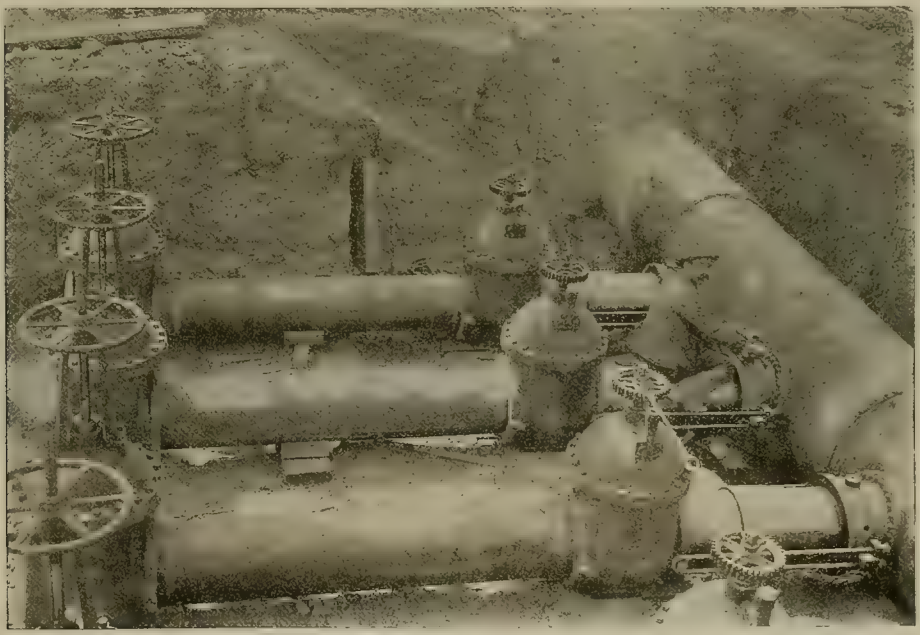

SHOWING THE FILTER PIPES IN THE CONCRETE, SUBTERRANEAN AQUEDUCT.

Portola lake, 26 miles from San Francisco, near Menlo Park; Lake Merced, a natural reservoir, within the city limits; San Andreas and Calaveras reservoirs, are among other sources of San Francisco's water supply as arranged by the Spring Valley Water Co., besides a unique development of subterranean supply across the bay, near Sunol. This last deserves especial mention, being a natural subterranean lake, fed by hundreds of square miles of watershed, successfully tapped and piped to supply the city, filtered as it flows, and further aerated before use.

The water from the San Andreas reservoir flows under a 340-foot pressure, through a 30-inch pipe, 16 miles, and at the College Hill reservoir is subjected to such aeration as in the judgment of bacteriologists gives it the minimum of bacteria.



LAYING SUBMARINE PIPES ACROSS THE BAY OF SAN FRANCISCO, FROM DUMBARTON POINT TO RAVENSWOOD.



SHOWING THE CONNECTION OF MILLBRAE PUMPS WITH THE 44-INCH CRYSTAL SPRINGS MAIN.

The accompanying engravings give a good idea of the system which abundantly supplies the chief city of the Pacific coast with wholesome water.

A NEW METHOD of making joints in heavy wires and cables is explained as follows: Sleeves of soft copper, long enough to receive the two cable ends for a distance of about twice their diameter, are provided, the walls of the sleeves being sufficiently thick so that the sleeve contains as much metal to the running inch as the cable, or more. The two ends are butted in the sleeve, and the jaws of a hydraulic press of considerable power, but light weight and small size, are set on the joint. One squeeze at a pressure of about forty tons to the square inch welds the sleeve and the cable into a solid mass, so that if the joint is sawed apart it is impossible to tell where the metal of the sleeve ends and that of the cable begins.

OIL WELLS, says the Bakersfield Californian, are drilled, not bored nor sunk. Water wells are bored, fortunes are sunk. An oil well is dry or a duster if it contains no oil, even though it discharges a river of water.

Carborundum Manufacture.

In the issue of Jan. 4, 1896, was given an illustrated technical account of the manufacture of carborundum at Niagara Falls, N. Y., the photographs having been taken specially for the article, which was written by one of our correspondents who had special access to reliable information concerning the details of that new industry.

Like other commercially scientific subjects, the carborundum industry is a progressive one, and some of what in 1896 was up-to-date is in 1900 becoming obsolescent. When the article referred to was written, the crude materials for the manufacture of carborundum at Niagara Falls were sand, coke, sawdust and salt. These were ready for use except the coke, which had to be ground to a fine powder. The furnaces were built of brick and had the form of an oblong box about 16 feet in length and 5 feet in width and depth. In the center of either end were the terminals, consisting of sixty carbon rods 30 inches long and 3 inches in diameter. The mixture was thrown into the furnace, connection made with the dynamo, and after twenty-four hours the process was complete. The carborundum occurred in the center of the mixture as bright, radiating crystals. In order to prepare the carborundum for the market, it was first placed under heavy iron rolls for the purpose of crushing apart and separating the individual crystals, which were then washed in a solution of acid and water to remove solubles, and finally dried and sifted to separate the different-sized crystals. During the year 1896 the Carborundum Company produced in round numbers 1,191,000 pounds of crystalline carborundum, used chiefly as an abrasive, for which it is well suited, owing to its excessive hardness.

The first manufacture of carborundum for commercial uses was on so small a scale as to make it practically a laboratory product. The carborundum so produced was at such a high cost that its commercial usage was restricted to very limited lines. The first sales of carborundum were made to lapidaries, to be used in the place of diamond powder, and the price ranged from $400 to $600 per pound. This was in 1892. Later in the same year the scale of manufacture was so increased that an average of one-quarter of a pound per day was produced, and as this amount was found to be in excess of the capacity of the lapidaries to absorb, attempts were made to introduce the use of carborundum into other lines, and considerable quantities were sold to brass manufacturers for valve grinding at prices which varied from $15 per pound down to $2 per pound in 1893.

In 1894 the Carborundum Company commenced the manufacture of carborundum on a really commercial scale by the use of an electrical current of 150 H. P., which gave a production of 100,000 pounds of carborundum per year; in 1895 the company built its factory at Niagara Falls, and in 1896 commenced the use of 1000 electrical H. P. In 1899 this was increased to 2000 H. P.; the production of carborundum for that year amounted to 1,742,000 pounds. On Jan. 1, 1900, the company had in operation fourteen furnaces.

The scale and the character of the sale of carborundum has changed from a measurement by the carat at $600 per pound in 1892 to the measurement by the carload at 10 cents per pound in 1899. The total sales of carborundum in 1899 amounted to 2,018,000 pounds.

The illustrations on the front page show the latest progress that has been made in the carborundum manufacture, and comparison of them with those published in January, 1896, would exemplify the ratio of progress.

Besides the varied commercial uses of carborundum it is now becoming of interest to metallurgists in other fields, notably in its substitution for ferrosilicon in steel manufacture. The composition of ferro-silicon averages 15% silicon; commercial carbide of silicon averages 62%. The carbide of silicon is in the form of grains or powder, and, on account of its chemical nature, is readily taken up by the molten steel, so that in actual practice it is now customary to merely put the necessary amount of the carbide into paper bags and throw the latter into the ladle, which is then filled with the molten steel. The object of adding silicon to steel is to increase the fluidity of the metal while in the molten state, this being occasioned by the increased temperature produced. In the use of ferro-silicon a certain proportion of heat becomes latent or is absorbed in effecting its decomposition when added to steel: this meaning so much heat lost. Carbide of silicon is an endothermic compound, giving out heat during decomposition.

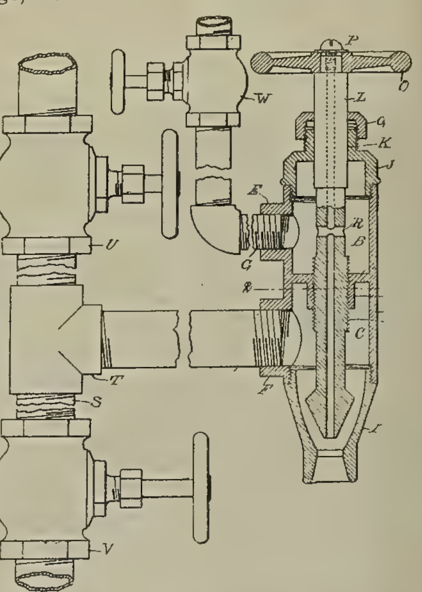
So far as known, carborundum does not occur in nature, probably because the temperatures of formation and decomposition lie so close together. Carborundum is insoluble in water or any acid; it approximates the diamond in hardness, and is fast coming into general use as an abrasive.

Mining and Metallurgical Patents.

Patents Issued August 14, 1900.

Specially Reported for the MINING AND SCIENTIFIC PRESS.

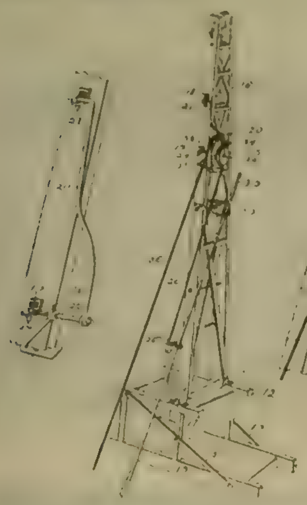
HYDROCARBON BURNER.—No. 655,942; B. F. Weber, Chicago, Ill.



In an oil burner, combination with cylindrical casing divided between its ends into two compartments adapted to be connected respectively with oil supply and fluid pressure supply, fluid pressure chamber terminating at one end in mouth contracted between its end, of valve stem passing centrally through both compartments and provided at one end with an enlarged conical head serving as valve to control supply of fluid under pressure and seating against contracted portion of mouth, central opening in valve stem extending centrally through head, and lateral openings in valve stem adapted to connect central opening therein with oil receiving compartment of casing.

◆

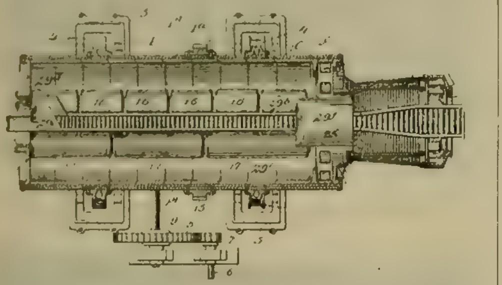
DERRICK ATTACHMENT FOR HANDLING DRILL ROD SECTIONS OF WELL AUGERS.—No. 655,743; W. L. Thomas, Fontanelle, Iowa.



In a derrick attachment for handling drill-rod sections, a shaft for pulleys having right-angled extension at one end adapted to enter fixed perforated ear, hanger having shaft bearing at lower end and hook-shaped trunnion at other end, rope or rope guide extending at right angles from shaft, two pulleys mounted on shaft to rotate jointly, rope fixed to each pulley and perforated ears fixed to derrick for pivotally connecting shaft and hanger with derrick.

◆

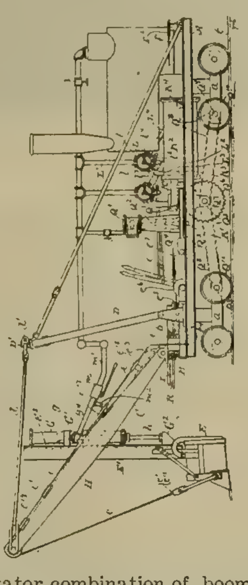
CYLINDRICAL ROLLER CRUSHER. — No. 655,745; T. O. Walker, Denver, Colo.



Combination of rotable cylinder provided with heads having central openings, series of crushing rollers in cylinder, cylindrical screen attached to discharge end of cylinder, series of buckets between baffle ring and discharge end of cylinder, series of buckets at other ends of the screens, trough extending through cylinder and screen, spout near feed end of cylinder, pan above trough adapted to receive material discharged from buckets between baffle ring and discharge end of cylinder, and means to reciprocate trough and pan.

◆

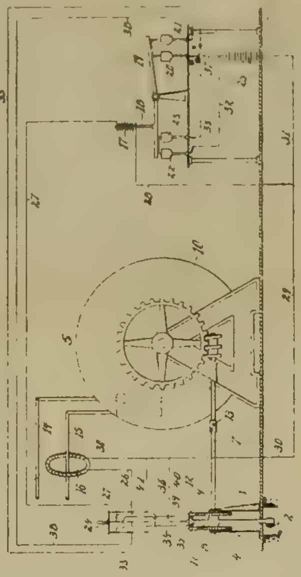
EXCAVATOR.—No. 655,758; A. E. Cheney, G. A. Cheney and G. W. King, Marion, O., assignors to Marion Steam Shovel Co., same place.



In an excavator combination of boom, excavating shovel, cylinder, suitably actuated piston within cylinder, piston rod, four parallel sheaves e^{5}, e^{7}, e^{9} and e^{11} supported from piston rod, equalizing sheave e^{8} supported an equal or approximately equal distance from both outer piston sheaves, two guide sheaves e^{6} e^{10} supported an equal distance, or approximately equal distance, from different inner piston sheaves, respectively, and continuous hoisting cable having its opposite ends operatively connected with excavating shovel, and leading from each end and being suitably guided along boom and thence leading to and engaging all of the sheaves in the manner shown.

◆

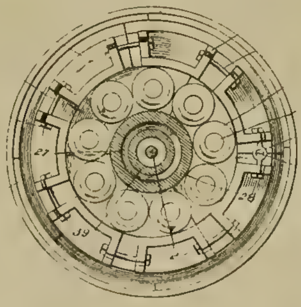
ELECTRIC FURNACE.—No. 655,780; W. S. Horry, New York, N. Y., assignor to the Union Carbide Co., Chicago, Ill.



Means for regulating one or more electric furnaces which comprise motor apparatus, furnaces and their movable elements, power transmission mechanism for independently connecting movable element of each furnace with motor apparatus to shift it in either direction and for disconnecting same, electro-mechanical controlling devices in operative position to the furnace circuits adapted to automatically actuate power transmission mechanism to keep amperes constant in furnaces, and switches constructed and arranged to control power transmission by hand, to shift regulating elements in either direction, and to permit and prevent control by electro-mechanical devices.

◆

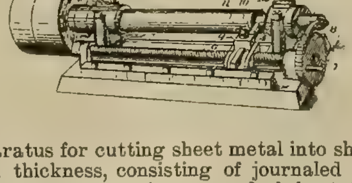
QUARTZ MILL.—No. 656,793; A. T. McMurtrey, Medford, Or.



Quartz mill combination with pan of mullers, consisting of sections of flat ring, provided with inner and end flanges, latter having opposite notches, of double-headed bolts dropped into notches to couple mullers loosely together, vertical shaft, yoke carried thereby, knees secured to arms of yoke, cap or driving ring secured on knees, and coupling pin passed downward through cap and into eye in one of the muller coupling bolts.

◆

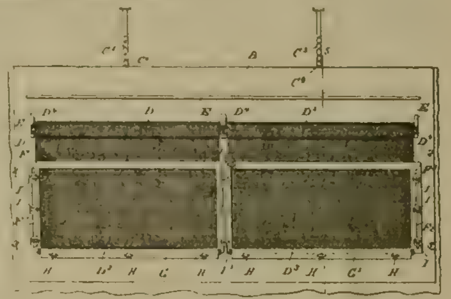
APPARATUS FOR CUTTING METAL SHAVINGS.—No. 655,868; A. Holtgen, San Francisco, Cal., assignor of one-half to W. E. Hampton, same place.



Apparatus for cutting sheet metal into shavings of uniform thickness, consisting of journaled revoluble arbor, means for securing one end of sheet to arbor, sheet being coiled upon itself and outer edge fastened, screw journaled and revoluble parallel with arbor having ratchet wheel upon outer end, pawl mounted upon pin fixed eccentrically in end of arbor whereby pawl is moved to advance ratchet wheel at each revolution of arbor, tool holder consisting of lower slidably guided plain portion, an upper portion hinged thereto having screw threads engaging those of screw when closed, upper section being adapted to receive tool, with means for adjusting and locking latter thereto.

◆

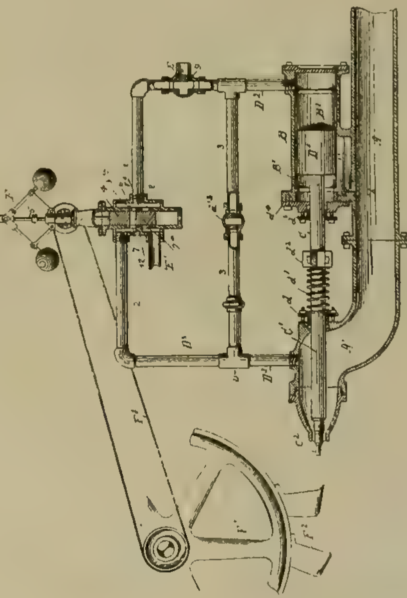
SCREEN FOR STAMP MILLS.—No. 656,098; M. R. Driscoll, Frisco, Utah.



Screen for stamp mills, comprising an apertured frame, roll of screen cloth mounted above aperture and having portion of cloth extending over aperture, being adjustable to bring roll in firm contact with front face of apertured frame, rectangular clamping frame for clamping cloth to sides, top and bottom of aperture, bolts for adjustably holding clamping frame in place on apertured frame and auxiliary clamping bar on apertured frame for clamping lower end of cloth upon front face of bottom bar for rectangular clamping frame; a combination with apertured skeleton frame on front of stamp mill or mortar, of plurality of clamping frames for screen, to hold latter in front of skeleton-frame openings, clamping bolts for engaging side bars of frames, bolts for adjacent side bars simultaneously engaging latter and clamping bolt on skeleton frame, adapted to engage either clamping frame.

◆

REGULATING MEANS FOR HYDRAULIC MOTORS.—No. 656,104; J. D. Fricot, San Francisco, Cal.



Combination of motor, water-supply pipe therefor, cylinder communicating with supply pipe, piston in cylinder, controlling device for supply pipe, connected to piston, pipe connection between supply pipe and cylinder, valve casing interposed in pipe connection, valve in valve casing, mechanism for operating valve in accordance with speed of motor, valve-controlled discharge for pipe connections and intermediate pipe connection constituting by-pass around valve and stop-cock in by-pass; combination, with main pipe having nozzle, of cylinder parallel with main pipe and means for controlling admission and exhaustion of fluid to and from auxiliary chamber.

◆

BLASTING POWDER.—No. 655,832; J. Ross and W. D. Cairney, Glasgow, Scotland.

Method of producing an explosive which consists in taking a proportion of chlorate of potash, passing same through a sieve to granulate it, mixing granulated chlorate of potash with proportion of charcoal and black oxide of manganese, taking proportion of wax and mixing it with mixture of chlorate of potash, charcoal and black oxide of manganese until wax becomes perfectly black, placing whole in vessel, heating vessel with its contents until contents become moist with melted wax, taking proportion of vaseline and bringing it to liquid state, pouring liquid vaseline over mixture and thoroughly stirring whole mixture together for filling crevices in substance to which paraffine is inaccessible, and providing coating on substance which paraffine has failed to coat. An explosive consisting of mixture in the following proportions of ingredients: Chlorate of potash, 75%; black oxide of manganese, 6%; charcoal, 6%; wax, 9%; vaseline, 4%.

The Copper Queen Mine, Arizona.*

Edward Keller, Baltimore, Md., in a communication to the secretary, says: When, at the New York meeting, February, 1899, Mr. Douglas gave an abstract of his highly interesting paper on the Copper Queen mine, he invited the members of the Institute, in his usual progressive spirit, to make a full scientific investigation of the region of that mine during the prospective excursion to Bisbee, Arizona. I volunteered to examine some of the metallurgical processes and products of the works, and obtained from Mr. Douglas a valuable series of samples. Upon the issue of his paper, however, I found that he had already a considerable volume of analyses of those products, and that little was left for me to do in that respect, except to duplicate his results, the importance of which work would not have been commensurate to the time and labor involved. I selected, therefore, only some points which he had not made entirely clear, or concerning which I was skeptical. The details of most of my work will appear in a future paper.

From Mr. Douglas' figures I have calculated the values for the elimination of impurities in the so-called Leghorn converter, introduced by him at the Copper Queen works, and have found them to be as follows:

PERCENTAGE OF ELIMINATION OF IMPURITIES IN FOUR BLOWS OF A CONVERTER.

Number of blow.	Sulphur..	Iron......	Zinc......	Nickel....	Lead.....	Antimony	Arsenic ..	Selenium, Tellurium
1.....	99.4	99.6	88.0	92.6	94.4	81.6	83.8	40.3
2.....	99.0	99.6	98.1	92.5	96.9	71.9	76.6	38.1
3.....	98.8	99.5	93.5	91.4	96.3	63.8	80.6	25.3
4.....	99.8	99.5	95.8	95.8	97.5	65.3	76.9	36.3
Av.	99.2	99.6	93.8	93.1	96.2	73.1	79.5	35.0

Those elements for which I have determined the elimination in other converters, and which also appear in the above table, are lead, antimony, arsenic, selenium and tellurium. Mr. Douglas' results as to these show no new feature; they closely corroborate my own, as given in a former paper.† Selenium and tellurium, in Mr. Douglas' case, as well as in my own heretofore, were determined jointly. As the Copper Queen mattes contain a greater amount of both elements than the mattes which I had previously analyzed, I now took occasion to separate the two, and found the elimination of selenium to be somewhat greater than that of tellurium. To sulphur, iron and zinc I paid no attention in my former publications, because I always considered them as members of a group of elements of which 99% or more is eliminated in the converter. In fact, I have been unable to find zinc in the copper of the Copper Queen or in any other converter copper.

Mr. Douglas gives to nickel as high a figure for elimination as to zinc. Since zinc is a far more oxidizable and volatile metal than nickel, I thought there was good reason to doubt the correctness of this conclusion. In the course of analysis, unless a separation of nickel and cobalt be attempted, the two elements would naturally be determined together. In the Copper Queen mattes I found that, of the sum of the two metals, from one-fourth to one-half is cobalt; and as the latter (being practically all eliminated in the converter process) could not be found in the copper, I found the elimination of nickel to be much below Mr. Douglas' figure. The cobalt, on the other hand, must now be placed in the same category as sulphur, iron and zinc.

I subjoin an analysis of a Copper Queen matte as being, perhaps, of some mineralogical interest. The figures are not derived from one sample, but culled from half a dozen:

COMPOSITION OF COPPER QUEEN MATTE.

	Cu.	S.	Fe.	Zn.	Co.	Ni.
Per cent.....	54.98	23.36	30.25	0.34	0.024	0.0341
	Pb.	Bi.	Sb.	As.	Se.	Te.
Per cent.....	0.1178	0.0044	0.0232	0.0171	0.0113	0.0088
	Ag.	Au.				
Ozs. per ton..	6.0	0.10				

As compared with the mattes of Butte City, Mont. (see my paper already referred to), it will be seen that the Arizona matte is lower in gold, silver and bismuth, but higher in selenium and tellurium. This I mention because it is my impression that all these elements are generally supposed to be associated.

On mathematical grounds one might expect that with increase in the capacity of a converter there would be an increased economy in the wear of the converter lining, the surface of the matte in contact with the lining increasing at a "square" rate, while the mass of the same matte increases at a "cubic" rate. In the case of Mr. Douglas' slags their acidity, in fact, decreases in each succeeding blow, as will be seen by his figures:

ACIDITY OF CONVERTER SLAGS.

	First pouring, per cent silica.	Second pouring, per cent silica.
First blow...........	36.78	34.64
Second blow	35.30	33.46
Third blow..........	34.35	32.60
Fourth blow........	32.57	

Mr. Douglas does not give the weight of the matte charged or of the copper produced. Only the number of copper bars are given, as follows:

	First blow.	Second blow.	Third blow.	Fourth blow.
Number bars...	9.5	14.5	14.5	12

It may be assumed that the weight of matte or copper was proportional to the number of copper bars, in which case there was no regular increase in the capacity of the converter. The mathematical theory, therefore, does not apply in this case. Perhaps the real reason for the reduced acidity of the slags in successive blows is found merely in the physical condition of the lining, which may have become more and more compact by continued heating.

---

*Trans. A. I. M. E.

†"The Elimination of Impurities from Copper Mattes in the Reverberatory and the Converter," Trans., xxviii, 127 (1898).

The Anaconda Converter.

When approaching Anaconda by the B., A. & P. Railroad, almost the first object in connection with the reduction works to attract the eye is a huge pyramidal pile just below the converter. It is nearly black in color, and extending up the elongated western slope is what appears to be a railroad track. Investigation discloses the fact that this conspicuous object is composed of granulated slag from the blast furnaces of the converter. This slag is drawn off from the furnaces in a molten state. It is run into a sluice carrying a strong stream of water, which cools and granulates it. Passing down the surface a couple of hundred feet, it is deposited into two large receiving tanks. These tanks are elevated on piling, so that small cars or skips can pass under them. In the bottom of the tanks are doors through which the cars are loaded, and then by means of a stationary engine they are hauled to the top of the pile referred to and dumped. Inquiry at the converter will bring out the fact that this huge pile has all been formed within the last five or six months. When it is considered that it has all come from the six blast furnaces, and constitutes but a small fraction of the ore treated at these works, it is faintly suggestive of the magnitude of their operations, and also of the tremendous quantities of ore that are taken from the Anaconda mines at Butte. This method of disposing of the slag from the blast furnaces is made necessary by the nature of the ground, the fall not being sufficient to carry it away by mere gravity.

The converter is always a busy place, as may readily be imagined from the fact that it turns out an average of about 12,000,000 pounds of metallic copper each month. This is partly in the form of pig copper, which is sent East for refining, and partly in anode plates, which go to the refinery here.

The regular work of converting has been broken in upon during the last few days by the cleaning of the flues. About once in two months this is done. The quantity of flue dust saved is large, and very high in copper, that from the converters running from 20% to 50%.

An improvement just made of some importance is in the method of lining the converters. For this purpose the material heretofore used was ground silica, reduced to the consistency of thick mud, the work of lining being done entirely by hand. By the new method, slimes from the concentrators are used, and these are tamped into the converters by tamping machines. A small quantity of silica is mixed with the slimes to give them consistency and aid in the tamping process. A square pit has been prepared at the west end of the converter, equipped with three of these tamping machines, which are run by compressed air. Into this pit the converters are lowered by the electric crane and placed under the tamper. Being thus placed, it is connected with shafting whereby it is turned slowly round and round, each revolution bringing in the entire circle under the tamping bar.

There are two primary objects in lining the converters. One is to preserve them from the effects of the intense heat, and the second is to furnish an increased quantity of oxygen to keep alive and strengthen the combustion. Silica has heretofore been used, because it consists largely of oxygen; but the slimes also are composed to a large extent of that same gas, and hence will serve the same purpose. Besides this, the slimes contain a certain percentage of copper and other values, the most of which are saved by the process of converting. This is literally killing two birds with one stone. It is said that about 125 tons of slimes are used each day for this purpose, and the quantity of copper thus saved is an item well worth considering.

It is very evident that in the onward march of improvement at the works the converter is not to be left out of the line of march.—Anaconda, Mont., Standard.

On Baranof Island, Alaska.

H. C. Langrehr of San Francisco and N. K. Foster of Oakland, Cal., have returned from Baranof island, Alaska, where they located twenty-one mining claims between Yule bay and Fersting bay, 22 miles from Sitka. The accompanying illustrations from special photographs furnish idea of the character of the region, which is heavily timbered, the coast accessible to deep-water vessels, the hills ribbed with quartz, slate and schist, carrying low-grade gold ore which the locators propose developing, a 4800-foot tunnel being among their projects.

Monte Cristo Mines, Baranof Island, Alaska, From the Southeast.

Quarry of Slate, Quartz and Schist, 300 Feet High, 1500 Feet Long, Baranof Island, Alaska.

Bringing Sample Ores From Mountain Top to Tidewater, Baranof Island, Alaska.

◆

THE operation of cutting down an elm tree over 3 feet in diameter at Jacksonville, Ill., by means of wires heated by electricity, was successful, though slow. The cautery device consisted of a piece of 7-strand No. 16 iron wire connected with an electric light circuit, three of the strands being removed to afford air space within the cable. The current used was from 120 to 135 amperes, the voltage at the machine being varied from 80 to 115. After the wire became heated it was pulled back and forth like a crosscut saw, and in this manner it burned its way through the tree, the time consumed being two hours and ten minutes.—Western Electrician.

Uranium and Its Ores.

Written for the MINING AND SCIENTIFIC PRESS by DR. J. OHLY.

The metal uranium, discovered in 1782 by the chemist Klaproth and named by him thus from the planet Uranus, has a steel-gray color and a specific gravity of 18.7, approaching closely that of gold, which is 19.3. Like many of the rarer metals its isolation in the chemically pure condition is combined with considerable difficulty, so that its utilization as such has not reached any degree of prominence. It is mainly for this reason that the tendency of modern engineering leans toward the production of alloys of the rare metals instead of the metals themselves, a circumstance which has led to the development of a peculiar industry aiming at the manufacture of a great number of metallic alloys, among which the undetermined compounds of uranium and steel play a significant role. Especially in France, the beneficial effect produced by the addition of a small percentage of uranium carbide to steel has been realized, so that an extended manufacture of war material from that alloy has sprung up there in the last two years. It seems that a compound of this kind surpasses any other product obtained by mixing and incorporating ferro or carbon alloys with fluid steel, as it increases the tensile strength, toughness and elongation of that substance remarkably. Hence the demand for uranium ores has materially increased in later years.

The application of uranium derivatives, is, however, not limited to this industry alone, but extends into several other branches of manufacture. Thus two of the uranium oxides U_2O_5 and U_3O_8, the latter corresponding in composition to the compound occurring in nature as the ore pitchblende, are prized as a means for producing a pure intense black glaze on porcelain. A hydrated sodium uranate, known in trade as uranium yellow, and a hydrated ammonium uranate, serve for the manufacture of a brilliantly fluorescent uranium glass, possessing the peculiar property of arresting chemically active rays, and also as permanent colors in the decoration of glass and chinaware.

The first of these oxides is best prepared by strongly igniting uranium nitrate, when a black powder results, which may be utilized immediately after cooling. The second compound remains on heating the black oxide at a moderate heat in air or oxygen, but is generally produced by igniting uranium nitrate or ammonium uranate at a gentle heat, not sufficient to reduce it to the lower oxide U_2O_5. Finally a sodium salt is obtained by adding an excess of sodium hydrate to the solution of a uranium salt, but preferably by fusing uranic oxide with sodium carbonate. On the large scale, a mixture of 100 parts of pitchblende, containing about 45% of U_3O_8, and 14 parts of lime is roasted in a reverberatory furnace, the calcium uranate formed decomposed by the addition of dilute sulphuric acid, and the solution of uranic sulphate thus obtained mixed with an excess of sodium carbonate, whereby the metals present are precipitated, while the uranium enters into solution. After boiling and filtering, the clear filtrate is just neutralized with dilute sulphuric acid and heated, when a finely divided sodium uranate of the formula $Na_2U_2 .6H_2O$ separates out. The ammonium uranate, on the other hand, is obtained by adding ammonium chloride or sulphate to a boiling solution of sodium uranate, and forms, when dried and gently heated, the fifth commercial uranium compound mentioned.

Of the several uranium ores occurring in nature only two deserve special consideration, namely, pitchblende and carnotite, as these ores are known to occur in quantities in the territory of the United States sufficient to answer the purposes of commercial exploitation. The former ore is mostly encountered in the form of pockety formations, while the latter is found in fissures, sometimes over 2 feet in thickness, or in blanket formations breaking through the adjoining rock of sandstone deposits, sandstone cliffs or decomposed silicates. Both of these minerals are readily recognized by their appearances and specific gravity, since pitchblende is velvet-black in color, when unaltered, and, when partly decomposed on the surface, of a brownish or grayish tint. Its luster is sub-metallic or dull, and its streak black, while its specific gravity reaches the figure 9.2 and 9.3, so that the mineral can be readily distinguished by its weight or heft. It is composed of a mixture of uranous and uranic oxides—$UO_2 .2UO_3$ or U_3O_8—chemically speaking, with casual admixtures of small percentages of lead and iron, and is of special interest to the scientist, since it gives off, on heating with sulphuric acid, several rare and newly discovered elements, among them radium and polonium, two radioactive substances.

The second uranium ore of importance, carnotite, has been discovered but recently, and been named thus from the French scientist, Carnot, who first ascertained its composition and was especially instrumental in bringing it to prominence. It is of slight reddish-yellow color, hence easily distinguished, crumbles readily into powder, and leaves traces wherever placed or whenever touched, as it is very soft and brittle, when pure. The ore varies in contents of uranic oxide from 52% to 15% or less, and carries values of vanadium pentoxide in quantities of 18% down to 4%, being mainly a hydrous potassium uranium vanadate, as becomes apparent from the following analyses:

U. S. GEOLOGICAL SURVEY—REPORT OF ANALYSIS. CARNOTITE, YELLOW BOY GROUP MINES, LA SAL CREEK CANYON, MONTROSE COUNTY, COLO.

UO_3	52.28
V_2O_5	17.80
K_2O	5.32
Na_2O	.07
Li_2O	Trace
CaO	1.85
BaO	3.21
MgO	17
Fe_2O_3	3.36
H_2O 105°	4.52
H_2O 105° — 350°	3.49
H_2O redness	.38
SiO_2	5.05
Al_2O_3 MoO_3 PbO	2.50
	100.00
Trace	P_2O_5 Na As

Hillebrand, June 2, 1899.

U. S. GEOLOGICAL SURVEY—REPORT OF ANALYSIS. CARNOTITE, ROCK CREEK, NEAR PARADOX, MONTROSE COUNTY, COLO.

Insoluble parts.

SiO_2	5.18
TiO_2 Al_2O_3	1.15
P_2O_5	.09
V_2O_5	.26
K_2O	.26
Na_2O	.04
Li_2O	Trace
Cr_2O_3	Trace
H_2O 150°	.56
H_2O 312°	.32
H_2O redness	.48
	8 34
Soluble	91.50
	99.84

Hillebrand, May 26, 1899. (Washington Gov. Chemist.)

Soluble in Dilute Acids.

UO_3	52.25
V_2O_5	18.35
K_2O	6.73
Na_2O	.09
Li_2O	None
CaO	2.85
BaO	.72
MgO	.20
PbO	.25
CuO	.20
Fe_2O_3	1.77
Al_2O_3	1.08 app.
TiO_2	.10
H_2O 105°	2.59
H_2O 350°	3.06
H_2O redness	None
CO_2	.33
SO_3	.12
P_2O_5	.33
A_2O_5	.25
MoO_3	.23
CrO_3	Trace
	91.50

A partial analysis of a less rich specimen of carnotite gave:

U_3O_8	15.77
V_2O_5	4.40
SiO_2	55.80
Fe_2O_3 and Al_2O_3	5.76
Alkali, lime, etc	18.27
Total	100.00

showing that the silica predominates in some of these ores to a marked degree, and that they were presumably produced by infiltration and subsequent oxidation.

These ores are of extraordinary value on account of the presence of the two rare metals, uranium and vanadium, the former being quoted in the New York market at $10 per unit and vanadium pentoxide, usually called vanadic acid, at $9 per pound. They are separated from accompanying impurities and gangue by mechanical means, then concentrated by a chemical process and shipped in the form of oxides to New York and thence to English, French and German ports.

Though the analyses given above show the presence of both uranium and vanadium in the ore, this is not always the case, since the writer had occasion recently to analyze an ore of this class of a light canary yellow color which he considered as identical with carnotite in the beginning, but which on careful research showed the complete absence of uranium compounds and was finally recognized as a pure vanadate. Vanadium compounds being still more valuable than those of uranium, and the market for them having been widened by modern inventions in Germany, England and France, the discovery was by no means a disappointing one, and is expected to lead to interesting researches and remunerative speculation.

The country contiguous to the Paradox valley, Montrose county, Colorado, in which the carnotite deposits described above are found, consists of apparently barren cliffs and its most mineralized section lies between that valley and the San Miguel river to the north. A recent shipment of a carload of uranium ore from this part of Montrose county brought the sum of $3580, representing the net profit on the lot, after deduction of mining and transportation expenses. Several small lots which were sent to Denver to be tested gave returns varying in value from $200 to $1600 per ton, the former figure showing the average price offered by the State sampling works for the material. These ores, when mined, contain as a rule from 8% to 10% metallic uranium and their market price increases with the relative degree of concentration.

The recent discovery of a pure vanadate, as indicated above, occurred in a quite different part of the State and is of material importance, since the metal vanadium and its compounds have come prominently to the front during the last two years by the researches of several chemists, among them S. O. Cowper-Coles, who succeeded in producing metallic vanadium of a silver-white color by the electrolytic process. While the fusing point of the metal uranium lies near 1500° C., that of vanadium approaches 2000° C., a circumstance which has induced German manufacturers to utilize vanadium together with zirconium and thorium in the production of gas mantles and similar articles. The fact has also been established that a limited addition of vanadium carbide to fluid steel improves the tensile strength and ductility of that substance, while copper and aluminum are affected in a similar manner.

The usefulness of vanadium and its compounds is further exemplified by the application of the latter in dyeing silk, and printing calico, and by the forcible effect of diminutive amounts of them in the conversion of aniline colors into fixed dyes for indelible inks.

Samples of the ore containing the vanadate, which yet remains to be named, will be submitted to the Smithsonian Institute and the Government chemists for examination and analysis, and the results obtained will be reported in time. A comparatively inexpensive method having been established for the separation of uranium from vanadium compounds and the production of the oxides of the two metals on a commercial scale, it is expected that these conditions will induce renewed efforts in locating deposits of this class, the more so as these possibilities are enhanced by the characteristic properties of the minerals and the high market price maintained for them throughout the civilized world.

A Cooling Tower.

At the Center Star mine, Rossland, B. C., the new forty-drill compressor, which has lately been installed on this property, is worked by steam power, and water in considerable quantity is needed. The compression of the air sets free the latent heat contained in the greater volume uncompressed and its being stored in the lesser compressed volume heats it, and by its presence tends to work against the power used to compressation by expansion.

The air in the low-pressure cylinder is compressed about twenty-five pounds. The low-pressure cylinder is a double one, the outer being a water jacket, and between the two a constant circulation of cool water is passed through, which, condensing the air in volume, allows of the utmost compression commensurate with the power exercised. Hence the compressed air passes into an intercooler, which is also the means of communication between the high and low pressure cylinders. This intercooler is filled with a mass of pipes, through which flows a constant stream of cold water. The partially compressed air then enters the high-pressure cylinder, where a greater force of compression—expressed by eighty-five pounds in practice—is used. After this it enters the main pipe, leading the air to wherever it is needed. In the high-pressure cylinder, as in the low-pressure, a water jacket is placed.

With the system of water jackets and intercooler pipes a great quantity of water has to be used. In addition, the water used must be cold. The steam also uses a quantity of water; and if the exhaust steam is allowed to pass off, much water will have to be brought to the machinery. The exhaust steam is, however, passed through a condenser, which discharges warm water into a pipe which, running round the outside of the building, takes up the discharge from the water jackets and intercooler and is pumped up to the top of the cooling tower. Here, after being cooled, it is run into a tank situated under the floor of the compressor room and thence is pumped into the water jackets, intercooler, etc., completing the circulation. A certain amount is lost through evaporation and other subsidiary causes, and this loss is made up by a stream of water flowing through a small pipe from outside sources into the tank. The pipe would have to be of considerably larger dimensions were the cooling tower cut out of the circulation. The pump forcing the water from the tank through the circulation system takes its supply from the upper part of the reservoir, so as to allow of sediment to drop to the bottom. This in turn can be blown off by means of an outlet below.

The double cooling tower is about 40 feet in height, 36 feet in length and 6 feet in breadth, divided longitudinally by a rough boarding rising to the top of the tower. The water, being pumped up to the summit of the erection, flows along each side of the top in two pipes, which discharge through eight valves into troughs to the right and left. Over the beveled edges of these troughs the water runs over and drops onto the sides of the tower, filled in by a series of smoothed boards set at an angle of 45°, resembling a Venetian blind. Each shutter is 6 inches broad. At its lower edge a metal strip, turned up along its front, catches the dripping water and directs it to the back, where it drops onto the next shutter 6 inches below. The inner edge of this shutter is about on a level with the outer edge of the shutter above. This process is repeated thirty-five times, when the water, thoroughly cooled by its passage in, drops through the air and reaches the metal-sheeted floor, where it is held to run over at the lower end of the floor, which is set at a slight angle, into a pipe which feeds the tank under the compressor room. The longitudinal division of the tower converts each side into a chimney, and a constant updraught of air is thus mechanically obtained.—Rossland Miner.

Silver Smelting in Mexico.

NUMBER V.

The following are examples of silver ore beds:

	SiO_2.	Fe.	CaO.	Zn.	S.	As.	Ag. oz.	Moisture.
VI	35.5	7.0	17.8	1.0	4.8	1.0	53.6	8
VII	44.2	4.6	14.7	2.0	2.4	..	263.3	8
VIII	73.4	3.5	6.8	1.5	2.3	..	30.0	..

No. VI is the type of a low-grade silver ore, valuable on account of the large percentage of lime it contains.

No. VII is the type of a high-grade silver ore with the same characteristic as the former.

No. VIII is the type of an ore which was used as siliceous flux in matte concentration. Such ores as that can only be procured at special rates, as the deduction for excess of silica and the treatment charge would prohibit their shipment to a smelter. If at all suitable, they can be treated cheaper by the patio process, which costs $13.45 per ton, and yields from 93% to 94% of silver.

The following are examples of Angangueo ore from the Michoacan Railway & Mining Co., successors to Las Trojes Co.:

	SiO_2.	Fe.	CaO.	Zn.	Al_2O_3.	S.	Pb.	Ag. oz.	Moisture.
IX	15.6	35.9	1.0	6.8	1.7	8.2	..	32.1	5
X	14.3	37.9	0.9	5.6	..	6.2	1.0	35.9	6

No. IX is the coarse ore (gabarro) from the Angangueo mines. Wood being plentiful and cheap in that part of the country, the ore was roasted in heaps at San Marcial at a cost, it is claimed, of $1 a ton. This ore did not fit in very well with the ores treated at smelter No. 3, and was therefore not frequently put on the furnace charge, but when it was used in large quantities it made the furnaces run very fast. This caused, however, other inconveniences of a serious nature, counterbalancing the gain by increased tonnage, of which I shall speak later on.

No. X was the fines or tierras from the same mines. They were calcined in the long-hearth furnaces of the smelter, but the sulphur was not reduced to the proper point, owing to the insufficient duration (twenty-four hours) of the roasting operation. The roasted tierras have just the contrary effect upon the speed with which the charges descend in the blast furnace; they reduce the tonnage by fully one-third of the normal, and act badly otherwise. While a furnace 42 × 120 inches will take ninety charges of 1000 pounds in twelve hours with the gabarro on, it will only take fifty charges with the tierras on, the normal speed being seventy-five charges.

The tierras should be bricked in a machine prior to being put into the smelting furnace. Another mean product received from Angangueo was matte made from the ores there in a water-jacket cupola. This matte contained neither lead nor copper, but 70% of iron, 6% to 9% of zinc, and thirty-five ounces silver per ton, if I remember right. It was difficult to comminute, and did not roast well at all.

The roasted matte from the ore smelting, so-called first matte, used in part as iron flux, had the following approximate composition: SiO_2 0.8, Fe 42—45, S 2.8—4.2, Cu 3.1—9.2, Pb 13, Ag 67—100 ounces.

When copper percentage rose to 9%, the matte was roasted again and smelted in a separate blast furnace with silicious ore, metallic iron, limestone, and lead dross and scrap for concentrated matte, which was shipped and sold. Below is a sample of shipping matte: Cu 37.5%, Pb 12.0%, Ag 157.3, ounces per 2000-pound ton.

If the siliceous ore was not sufficiently free from sulphur, an intermediate matte would fall, which had to be re-roasted and smelted to attain the proper concentration.

In computing the smelting mixture (furnace charge) the following slag formula was ordinarily used: SiO_2 34, FeO 34 = 26.4, Fe CaO 17, RO 15.

This kind of slag was selected on account of its easy fusibility at a low blast, and because there was an abundance of ferruginous ores in hand. Different conditions prevailing, other types of slag were made; for example, when there was a famine of silicious ores this type was used: SiO_2 32, FeO 34 = 37.3 Fe, CaO 12, RO 8.

Under RO are comprised alumina, baryta, zinc oxide and other bases which have no particular bearing on the character of the slag. Magnesia is figured as calcium oxide in the ratio of their molecular weights. With baryta, when present in the ore as sulphate, that method would not do, for it is not known what part of it will remain in the shape of BaS; it is, therefore, preferable to call the sulphate of baryta RO, and leave it out of the calculation.

Fluorspar is inert, and the calcium corresponding to the fluorine must not be drawn into the calculation. I also consider it wrong to calculate any part of zinc oxide as lime, as it is carried off by the slag mechanically and not in chemical combination.

An average of the slag analyses for six months gives the following result: SiO_2 34.04, FeO 34.30, CaO 17.65, Zn 3, RO 10.01, total 99. Lead contents were 1.1%, silver contents 1.2 ounces per ton. The bullion contained 218 ounces of silver. The slag agrees pretty well with the formula used. The slag from matte smelting did not agree so well with the prototype, although it was frequently corrected. The average composition of about 100 analyses was: SiO_2 41, FeO 32.8 = 25.5 Fe, CaO 16, RO 10.2, Pb 0.8, total 100.8; silver, 1 ounce per ton.

In calculating furnace charges the first consideration is the percentage of lead to be carried, and, secondly, the required grade of the bullion in silver. With a high percentage of lead, the extraction of silver in the bullion will be correspondingly high, and the fusibility of the charge will be increased, while with a low one considerable silver will go into the by-products, and, incidentally, into the slag, and the fusibility of the charge will be decreased. There exists, however, no law in regard to the exact quantity of lead required for the perfect extraction of a given quantity of silver from the ore, too many factors interfering with the union of these two metals. Practice alone can dictate what is proper to do in order to obtain the best metallurgical and commercial results. I consider 12½% of lead in the charge a fair proportion for bullion containing up to 400 ounces of silver per ton, provided that such disturbing elements as zinc and barium sulphate are not present in quantity. At smelter No. 3 the amount of lead in the charge was arbitrarily set at 11% by the owners —a figure which was not always justifiable.

In order to show how necessary it is to have high and low-grade silver ores on hand to choose from, I have computed a smelting mixture on the above slag formula from ores Nos. I, IV, VII, IX, and matte, taking the latter at 42 Fe, 2.8 S, 3.1 Cu, 13 Pb, and 67 ounces silver per ton. Sulphur is allowed for the copper present to form cuprous sulphide. The balance is multiplied by the empirical factor 1.3, except in matte, where sulphur is multiplied by 1.75, to get the iron necessary to satisfy the sulphur not volatilized. This iron is deducted from the iron in the charge to obtain the iron available to satisfy the silica. Since half charges of 500 pounds are weighed up at the charge scales, the computation is made for a half charge. The silica, iron and calcium oxide contained in 200 pounds of slag are drawn into the calculation, but the weight of the slag is not considered as part of the charge, according to the prevailing custom. The half charge will then be composed of 245 pounds bed I, 140 pounds bed VII, 20 pounds bed IX, 20 pounds bed IV, 35 pounds roasted matte, 40 pounds limestone, total 500 pounds.

This half charge contains 72 pounds of lead (14%), and should make a bullion containing 600 ounces of silver, provided no matte were produced.

The amount of sulphur in the half charge is 9 pounds, that of zinc 10.3 pounds, and that of copper 1 pound. There are four basic materials in this mixture to be satisfied with silica. If we leave out the one containing the most zinc—that is No. IX—the charge will come out as follows: 200 pounds bed I, 155 pounds bed VII, 75 pounds bed IV, 35 pounds roasted matte, 35 pounds limestone, total 500 pounds.

In this half charge there are contained 64.6 pounds lead (13%), and a bullion of 718 ounces of silver should be produced. The zinc in the half charge amounts to 9.6 pounds, the sulphur to 8.6 pounds, and the copper to 1 pound.

Since it is inexpedient to make such high-grade bullion, it follows that low-grade, siliceous silver ore should be mixed in to reduce the grade of the bullion. The amount of slag added to the half charge to promote fusion is 200 pounds, or 40%. It is remarkable how much the speed of the furnace is affected by the addition of slag. I have had occasion to cut it down to 100 pounds and to smelt even without addition of slag; but there was always a falling off in the tonnage of the furnace, and the resulting slag looked sickly, which can better be seen than described. The amount of coke considered necessary for proper reduction is 14%, more or less. The half charge requires, therefore, 70 pounds.

The order in which the charge is shovelled into the furnace is first the fuel, then the charge and last the slag and any dross or speiss that may have to be disposed of. It is essential that the charge should be well spread in layers of equal thickness. To determine whether 140 pounds of coke will fully cover the area of the furnace, a frame could be made representing this area and put on the floor. By shovelling the coke into this frame, and levelling it off, it is easily seen whether it will cover the whole area or not. If it should not, both the fuel and the ore charges must be increased in size. Some smelters put four charges into the furnace at once; this is quite practicable at an open-top furnace, but not at a side feeder. Besides, it is hard work for a Mexican to shovel without interruption for a longer period of time and do justice to a proper distribution. Irregular feeding is frequently the cause of derangement of a furnace and shortens its campaign. A vicious habit of the Mexican feeders was to pick the limestone from off the charge and throw it into the furnace by hand. The inexperienced would throw it all in one place. In sinking it would burn itself caustic, and, on coming in contact with the hot firebrick lining, it would form a fusible silicate, which, in its turn, would soon find its way through the red brick and eat out a big hole above the mantle frame. The only way to suppress such pernicious practice is to crush the limestone to pieces of about 2 inches; fines and dismissals only create hatred against the employers. One furnace that was well served ran uninterruptedly for 328 days, while some of the others which received the same charge, but had bad feeders, would scarcely average ninety days. The operation of "barring out" a furnace—that is, to chisel off the wall accretions (embanques) without blowing out the furnace, as it is done in Colorado—is impracticable in Mexico. The temperature of the atmosphere is hot enough without going into a furnace, and the workmen have no changes of clothes nor habitations that would protect them from contracting fatal diseases, like pneumonia. Excessive fuel and high blast drive the fire up in the furnace, and cause it to blaze at the top, whereby metals are volatilized, and the formation of flue dust is increased.

Supposing the composition of the slag be correct, as proved by the analysis, its assay value indicates in some measure whether the fuel proportion is too high or too low. If, for example, the slag assays 1% lead and 3 ounces silver per ton, the reduction of iron has been excessive, and the fuel must be cut down. If, on the other hand, the slag runs 3% lead and 1 ounce in silver, the temperature has been insufficient to reduce or precipitate all the lead, and the fuel charge must be increased.

(TO BE CONTINUED.)

California Oil Production.

The California Petroleum Miners' Association furnishes the following as the result of careful efforts to secure fairly reliable information as to the present scale of operations. The statements are stated to be "the result of much correspondence with the best informed people of the various oil regions, the estimates of many competent authorities and the compilation of all current information."

There are 271 wells in process of sinking; of these, 142 are north of Tehachapi, mainly in the San Joaquin valley.

DRILLING WELLS.

San Joaquin District.—Coalinga 32, McKittrick 29, Kern River 35; total 96.

Los Angeles.—Westlake Park and elsewhere 38.

South Los Angeles.—Whittier 11, Brea Canyon 12, Puente 7, Fullerton 14; total 44.

Ventura District.—Newhall 13, Piru 19, Santa Paula 11; total 43.

Santa Barbara District.—Summerland 4.

Kreyenhagen District.—Kreyenhagen 38, elsewhere (Mendocino, Colusa, etc.) 8.

DAILY OIL PRODUCTION—BARRELS.

San Joaquin District.—Coalinga 1454, McKittrick 450, Kern River 823; total 2727.

Los Angeles District.—Large and small producers 4088.

South Los Angeles.—Whittier 725, Puente 314, Brea Canyon 150, Fullerton 875; total 2064.

Ventura District.—Newhall 361, Piru 868, Santa Paula 805, Callegues 20; total 2054.

Santa Barbara District.—Summerland 533.

Total daily production 11,466 barrels.

TANKAGE—BARRELS.

Los Angeles.—Union Oil Co. 35,000, S. F. R. R. 40,000, Oil Storage & Transportation Co. 165,000, S. P. R. R. 45,000, Standard Oil 50,000, total 335,000.

South Los Angeles.—Union Oil Co.: Brea Canyon 6000, Bixby 17,000, San Pedro 35,000, total 58,000; Central Oil Co. 20,000, Home Oil Co. 4000, total 24,000. Total South Los Angeles 82,000.

Ventura.—P. C. Oil Co.: Ventura 27,000, Newhall 20,000, total 47,000. Union Oil Co.: Santa Paula 68,000, Ventura 41,000, total 109,000. Modelo Oil Co., Piru, 4000. Total Ventura 160,000.

San Joaquin.—Kern & McKittrick 40,000. Union Oil Co.: Oil City 32,000, Coalinga 15,000, total 47,000. Chanslor & Canfield 8000. Total San Joaquin 95,000.

Refineries.—Puente Oil Co.: Chino 77,000, Puente 15,000, total 92,000. Union Oil Co.: Oleum 60,000. Pacific Coast Oil Co.: Alameda 60,000. Total refineries 212,000. Total tankage 884,000.

MINING SUMMARY.

ALASKA.

(Special Correspondence).— The transportation people are making strenuous efforts to keep up the boom and nearly all the Dawson gold is shipped from this port, which, I understand, Nome will be credited with. This city of 15,000 people, or more, is kept up by the money of people who brought the money here from the States and the little taken out of the beach sands, and now the latter is cut off by a decision of Judge Stevens' commissioner.

The Lane party has blown in a large amount of money, of which the greater part may be lost. They will take out but little money this year, and probably not much more next. Some of the claims on Anvil are paying very well, but most of them are a blank. No. 2 below Lane's is closed down and nothing below No. 1 is or will be worked this summer, if ever. I have prospected the country from Port Clarence on the west to Golovin bay on the east, and found a few rich spots, which could soon be worked out if they had water. However, there are thousands of little creeks putting into the various rivers that carry gold in more or less quantity, which will be worked more or less for years to come. But claims that will pay $10 per day to the hand are extremely scarce, and they ask a fortune for them. That is not big when you consider that you can only work three months in the year at most. The only redeeming feature of this country is the tundra, which is usually from 40 to 60 feet deep and always frozen, and of its value but little is known. The lead pencil miners have this all located—hundreds of thousands of acres—and before they would let any capitalist have a bond, or what they call a lay, the capitalist must put up some money, which they are not doing, so far as I can learn. The country is full of stampeders and as soon as the cold weather is on they are to commence, and I am told they get more or less aid from the transportation and business men.

Nome, Aug. 3.

(Special Correspondence). — The rainy season has just set in, giving water in the gulches and enabling miners to work their ground. Some claims are being opened. There is an output from the creek claims, but not as great as it would be were titles more settled and litigation less rampant. Some of the best mines on and around Anvil creek are in the hands of the receiver, who is working them for the benefit, supposedly, of the litigants, but under their protests. Of my own knowledge bench claims have been discovered and the shafts filled in again, the locators simply deciding to hold the ground without working it or letting the value of the find become known until they can be reasonably sure of impartial judgments in the courts. This feeling of insecurity is general and is retarding all development. The beach miners, who number several thousand, especially feel the severity of this condition, as arrests are being made by wholesale, on complaint of any one who can show a recorded location notice, charging criminal trespass, so that the highly respectable citizen of the States finds, on operating his rocker or pumping plant on the beach of Nome, which he had thought free to all, that he is a common felon, and liable to imprisonment for from one to five years. The net result is somewhat disheartening, the more so that the profits of beach mining are, in most cases, doubtful or negative; and, as the local paper remarks, many are taking advantage of the low rates prevailing to leave. The Nome rush (outward bound) has begun.

One of the difficulties of beach mining, besides the legal aspect of from one to five different locators of tundra claims wishing to levy "royalty," with the aid of the criminal court, on an identical strip of beach (the same was not staked or claimed by them on the original location), is an occasional southerly storm, such as we are having to-day, rooting up the suction pipes and washing off the sluice boxes or rockers, washing in the pits and burying machinery if set too low. I notice one dredger (a barge in the open sea) has met disaster, and several tugs, two or three small sailing vessels and one sidewheel Yukon river steamer blown ashore and wrecked. The town is becoming "tough." The few sea dredgers are doing no good. The one on Snake river is believed to be making money. Staking off beach claims was very active on receipt of the news of the law passed July 6th. It is surmised that the present workers on the beach are one and all made to suspend in short order and perhaps the plants seized for damages already done the ground of the intending claimants. This stoppage will mean an almost total loss to the misguided who have machinery which they might stand a show of partly recouping if allowed to continue peaceably for the rest of the season, since, the expense of erecting plant, laying in supplies and experience of how to save the gold having been gained, the larger part of the ground will pay a profit for running through a sluice box. The judge's nephew is "receiver" for most of the Anvil creek claims in litigation. There is probably not less than $1,000,000 worth of machinery on the beach. For myself, the result will be a net loss. I shall return. I have sense enough not to fight the powers that be. While many of the miners feel like holding a hanging bee—with the court for hangee—wherein they would be assisted by the toughs, they would not hold together—are pretty generally discouraged and ready to go "home to sin no more." The ground I am now working returns about $25 a day to the shovel—that is, two shovels day and two at night—$100 cleanup. I only want a few more days at it to finish the ground, which is shallow and narrow, but may be stopped any day. But little importance is attached here to the Bristol bay finds.

Nome, Aug. 4.

Ten more stamps started at Silver Bow basin last week. The Nowell red mill is crushing 2000 tons float quartz from the hydraulic claims; average value $6 a ton.

Ten more stamps are ready at the Ebner mill at Windham. W. Denby has charge of the property.

ARIZONA.

COCHISE COUNTY.

(Special Correspondence).—The mill at the Commonwealth mine is being rebuilt, work having commenced last week. The new mill will be almost a duplicate of the one destroyed by fire a few weeks ago, and it is planned to have it ready to operate by Jan. 1st.

Pearce, Aug. 15.

Supt. Clifford at the Peabody, near Pearce, is reported shipping three carloads a day of copper ore and employing 125 men.

The Solomon Springs Con. M. Co. has incorporated at Bisbee; incorporators, J. G. Pritchard, A. J. McDermott, J. B. Angius, D. O. Williams, R. Humphrey, A. S. Pritchard.

COCONINO COUNTY.

The Central Arizona M. Co.'s property, 40 miles north of Williams, has been bought by Eastern people for $100,000 cash. The new company will put men to work.

The Sunset also passed to the same company for $10,000. Both mines are of blanket formation, carrying copper.

GILA COUNTY.

(Special Correspondence).—The Darius Green M. Co. has under construction a 200-ton plant for treating placer ground by the dry method.

The Black Warrior Copper Co., Amalgamated, has let contract for sinking of 200-foot shaft on its gold gulch sulphide property, west of Globe. This shaft is in sulphide ore, carrying 12½% copper.

Black Warrior, Aug. 20.

The Times says Supt. Cook of the United Globe is unwatering the Hoosier mine to the 800-foot level, when work will be resumed, and that a new three-compartment shaft will soon be under way.

PIMA COUNTY.

Supt. Wakefield says he finds no walls in the Hardshell mine at 300 feet depth. The ore yields lead and silver.

YAVAPAI COUNTY.

(Special Correspondence).—D. Hatz is mining on the southwest side of Senator mountain, 10 miles south of Prescott. W. Rowe is shipping 100 tons of ore to Pickerell's mill for concentration from the Wren mine. W. Kent is running a tunnel on Davis No. 2, with good ore. A. Limburger and partner are working on a lease on the Helvetia mine.

Prescott, Aug. 20.

The Empire mine, on Groom creek, 7 miles from Prescott, has a mill of ten stamps, of 1000 pounds weight each, and a cyanide plant; S. S. Jones, Supt.

The Jerome News learns that Jerome workmen receive high wages. At Morenci and Clifton miners and timbermen receive $3 for twelve hours work and the laborer $2 for twelve hours work. In Jerome the miners and timbermen are paid $3.50 for eight hours work, feeders $3.75 for eight hours, tappers $3.75 for twelve hours, and the lowest wages paid unskilled labor for a ten-hour day is $2.50.

YUMA COUNTY.

(Special Correspondence).—It is reported here that L. F. Bradshaw, one of the original locators of claims at Leadville, Colo., twenty years ago, has discovered a rich district of many veins, carrying gold, silver and copper.

Yuma, Aug. 20.

CALIFORNIA.

AMADOR COUNTY.

Ledger: At Jackson the force at the Argonaut mine has been reduced pending the result of present litigation.——At Amador development work at the Fremont and Gover mines continues.——At the Bunker Hill, Amador, cleaning out the old shaft and retimbering the same goes on.——The Peerless shaft will probably be sunk to a depth of 1000 feet before drifting or crosscutting is begun.——An upraise from the tunnel to the surface, 80 feet, has been made at the Kirkwood mine; it will form the upper part of the shaft, which is to be 5x14 in the clear, with two compartments and manway.

BUTTE COUNTY.

The rock in the tunnel being run by the Banner Co. to carry water from Cherokee is so hard that twelve men can only make 3 feet headway; two men can make but 6 inches in eight hours' time.

CALAVERAS COUNTY.

Work in the 1400-foot tunnel at the Melones mines, at Robinson's Ferry, is discontinued. The entire force has been put to work on the dam in course of contruction on the river a mile above.

CONTRA COSTA COUNTY.

The American Oil & Refinery Co. held its first annual election of officers on the 20th inst.: Prof. E. P. Heald of Heald's Business College, Harrison Barto of Geo. Spaulding & Co., printers, L. F. Haskell of San Rafael, Dr. J. C. Anthony and W. E. Holbrook of San Francisco, directors. After the directors organized the following officers were elected: W. E. Holbrook president, Harrison Barto vice-president, J. C. Anthony secretary. The president of the company stated to the stockholders that they had well No. 1 on the company's land down 1306 feet, and had found in the well a fine quality of oil; that they had built a tank 26 feet diameter, 16½ feet high; had placed in 2208 feet 2-inch pipe; that derrick No. 2 was up and completed, with sand reel, rig irons on the ground, awaiting the placement of engine and boiler; that they would push well No. 2 as fast as possible, and that they had hired a new superintendent for the ensuing year, who comes from Ohio, to take charge of the work within the next twenty days.

EL DORADO COUNTY.

Men are inspecting the Carey mine near Josephine.

Georgetown miners find ready employment at Long Canyon.

J. E. Shuttle is manager Chicago M. Co., near Nashville.

The new mill is expected to be in operation at the Expansion mine, 7 miles west of Placerville, this week. A 22 H. P. gasoline engine furnishes the motive power.

A San Francisco company has bonded and begun development work on the Monitor quartz mine, 6 miles south of Shingle Springs.

The Chicago M. Co. is sinking on the Chicago quartz mine, near Nashville.

A milling plant capable of working fifty tons of ore per day is to be built at the Crystal mine, 3 miles south of Shingle Springs.

At the Hart Con. a new tunnel is being driven in the mountain that will tap the four parallel ledges. The owners are arranging for a 10-stamp mill. The property is below the ditch system of the California Water Co.; 400 feet of pressure can be had for power purposes.

HUMBOLDT COUNTY.

The Orleans Bar G. M. Co. still has water enough to run its mine night and day, but must soon shut down.

INYO COUNTY.

At the Ballarat M. Co.'s property the superintendent says that in the main ore chute he has ore that shows $146 gold, fourty-four ounces silver and 8% copper, and a new shaft on the group has exposed 16 inches of ore which shows $313.75 gold per ton.

KERN COUNTY.

Last week was reported a decision of the Supreme Court ordering the county recorder to pay over to the county fees received for recording mining claims. An application is to be made for rehearing in bank in the case. Recorder Lee says if he were inclined to accept the late decision as final, he could not in fairness to those associated with him give up the contest until all legal resources had been exhausted. The recorders of all counties classed as mining counties are interested with him, and have been assisting him in carrying on the litigation. The question is as wide as the State. The amount of fees paid in and retained by Recorder Lee is at the present time $4893.

A. E. Walsh says that in the Garlock district there is base ore, but no smelter to treat it nor a railway within 20 miles of it —too far to haul and ship at a profit. Wood and water are abundant.

Goldsmith & Robb had thirty tons of ore crushed at the Kinyon mill which netted $25 per ton.

The Blue Chief mine has been incorporated by W. James, F. G. Munzer, H. I. Tupman, R. A. Edmunds, F. A. Brown, on Greenhorn.

MARIPOSA COUNTY.

Gazette: The Grant people are having 200 tons of ore, taken from the Mariposa mine, hauled to their mill at Princeton.

MONTEREY COUNTY.

(Special Correspondence). — P. Gillis found some nuggets in his claims on Spruce creek, one of several small creeks running from the Santa Lucia range into the ocean. F. Melville has been taking out nuggets from $1 up to $12 in value on the head of Spruce creek. Within the past two months Gillis has taken out hundreds of dollars in coarse gold, and with very poor appliances, much of the fine gold escaping. Thursday's yield was a nugget worth $250. Those who doubt the above statements can call on Marshall & Teggart, 306 Davis street, San Francisco, who have the nuggets consigned to them by Mr. Gillis, except the last and largest.

The Cruikshank mill has made two runs on good ore from two mines recently, and is about to make a run on ore from the Last Chance mine.

The last work done in the Grizzly mine showed ore that assayed $522 per ton.

Los Banos Mining District, Aug. 20.

NEVADA COUNTY.

(Special Correspondence).—Butt & Giffen are giving a half interest in their mine, the Pennsylvania, at the foot of Old Man mountain, to Mrs. Gay of Sacramento, in consideration of her putting up the old stamp mill formerly used by the Grant mine. They will concentrate their ore. Careful management ought to make this proposition pay.

Captain E. O. C. Ord, U. S. A., was here a few days ago and took up a mill site near the old place called Ossaville. He and his company have in contemplation the erection of a 10-stamp mill and will use the best concentrators to save the sulphide material.

Mr. Best of Los Angeles, who was here last fall and bonded some claims, writes that he is confident of getting his company together and making his first payment on Sept. 1st.

Both the above parties have some good prospects among their bonded properties, and if they go at it wisely they can not help winning success.

We dislike to see the disposition for one man to post notices on more claims than he can do the work. This has been the ruin of more camps than one, as it holds back the true prospector from his work.

Meadow Lake, Aug. 20.

From God's Country a 10-stamp mill will be moved from W. H. Mead's mine, down on the river near Maybert, for the company operating the Champion and Lindsay mines, who will locate the mill between the two properties, which will allow of ore from both being crushed.

C. J. Schuster, Supt. of the Grizzly Ridge mine, Columbia Hill district, intends putting up a small mill, "large enough for prospecting purposes."

PLACER COUNTY.

The J. D. Peters M. Co., at Green Valley, after running the lower tunnel 1000 feet, made an upraise of 110 feet and found gravel. They are putting in chutes to handle pay dirt through lower tunnel, using upper tunnel for waste.

The Boston News Bureau says "Pioneer has advanced from 15 cents to 25 cents on a report that its troubles are o'er or lack of ore is o'er."

PLUMAS COUNTY.

J. B. Ratliff, Supt. Bullion mine, Mohawk Valley, is about to sink the shaft 100 feet deeper.

The bond which A. B. Summers had on the Peter mine, Indian valley, is renewed for fifteen months. He is locally credited with intention to sink 500 feet deeper.

SACRAMENTO COUNTY.

The mining dredger at Sailor Bar, on the American river, is expected to start this week. The dredger has been built to order for the Boston company which bought Sailor Bar after prospecting the property. The locality is below Folsom, opposite Salisbury station.

The Key City Copper M. Co. has incorporated in Sacramento; directors—A. G. Folger, A. Wasson, W. K. Cothrin, E. H. McKee, W. McLaughlin; capital stock, $100,000.

SAN BERNARDINO COUNTY.

Virginia Dale district reports the sale of the Ivanhoe mine to Los Angeles men for $20,000. Four shafts have been sunk—one 200 feet in depth and the others about 135 feet.

The Needles Smelting Co. has incorporated at San Bernardino. The five directors are R. Charlton of Needles, C. H. Granger, K. S. and C. S. Corning of Pasadena, W. Rodman of Los Angeles; capital stock, $50,000; subscribed by C. S. Corning, $49,600.

SAN DIEGO COUNTY.

The cyanide plant at Julian is engaged on the tailings of the Stonewall mine.

J. M. Risher has bonded the properties of the Owens Con. M. Co. The price mentioned in the bond is $30,000, which D. Clark has assumed.

SAN JOAQUIN COUNTY.

Stockton reports that Eastern men will build a smelter there, and now have an option on a suitable site.

SHASTA COUNTY.

The Searchlight asserts that a 30-inch gauge railroad will be built from the mines to the Copper City smelter, and that the smelter is to be constructed on the site first chosen.

Free Press: The U. S. District Court has decided a case involving a point of great interest to mining men, to the effect that the often-heard contention that claims may be filed on mineral-bearing railroad land, whether patented or not, is invalid. If a patent has been issued to the railroad company claims cannot be filed upon the land. The case in which the decision was rendered was a suit for ejectment brought by the Mountain Copper Co. against Maginnis, Myers et al. The mining company purchased several parcels of patented land adjoining their Iron Mountain property from the railroad. Maginnis and the others located claims upon the land. The M. C. Co. brought suit in the Superior Court. The suit was transferred to the Circuit Court. It is stated that the defendants relied largely upon the clause in the patent issued to the railroad which specifies land "without minerals." The Circuit Court in deciding for the plaintiff holds that the clause referred to is meaningless, since otherwise no clear title could be conveyed by patent to the large acreage of land whose mineral or non-mineral qualities are open to question.

SISKIYOU COUNTY.

The failure of the Portland G. E. cyanide plant appears to have been caused by overestimating the amount of tailings on the dump and in inability to treat the sulphurets.

S. J. Fore, at Coles, has a 10-stamp mill on the Mt. Sterling mine. He says "the cost of mining and milling is only $1 per ton." He has bonded the Blue Jay mine and has built a $2600 wagon road to bring in a 10-stamp mill, and has a sawmill in operation. He will be ready for milling to begin next week. Eighteen men are at work. Development work consists of a 450-foot tunnel, another of 225 feet, a shaft 125 feet and a tunnel to crosscut the extension now in 200 feet.

TRINITY COUNTY.

The new stamp-mill machinery for the Brown Bear Co. at Deadwood is on the ground and the buildings being erected.

F. Hall has secured bond on the Driver placer mine, Oregon gulch, and three claims belonging to the Blake & Reed Co.

TUOLUMNE COUNTY.

The Mother Lode hears that Captain Nevills will resume charge of the Rawhide mine.

The Carters New Era says all the claims against the Temescal have been settled and operations resumed. F. P. Holling, secretary of the new company, arrived in Confidence this week and took charge of the property. Retimbering and enlarging the main working shaft at the Confidence is progressing; the mill is being given an overhauling. At the Grizzly the main shaft is 820 feet deep. When 20 feet more has been made, which will give 40 feet of sump room, sinking will be discontinued, a station put in at the 800 mark and the vein drifted on. A new hoist will be placed on the mine and electric power used, thus permitting the mine to be operated the year around.

At the Harvard mine, Supt. Munger says lack of water has compelled him to lay off twenty men.

Thomas C. Gorrie of Haywards has taken charge at the Santa Ysabel mine as superintendent. The mine will be unwatered.

The Shawmut G. M. Co. has returns of $1612 in free gold. The tailings, thought to be worth $4000, will be treated in the cyanide plant, capacity fifty tons daily, which will be completed Oct. 1.

Supt. Meighan has removed the office of the Boston & Tuolumne M. Co. to Groveland.

Magnet: At the Deadhorse, the deepest mine in Tuolumne county, they will soon close down. Then the shaft is to be retimbered and a powerful new hoisting plant put in preparatory to resuming sinking.

Independent: Near Sonora the Miller & Holmes mine is being unwatered.——Operations have been temporarily suspended on the Imogene property.——Owing to the lack of water for power, the Bonanza Co. have pulled out their pumps; the mine will fill with water.——A new property is being operated on the Comstock ranch, in the East belt, by the Golden West M. & M. Co. of San Francisco. The tunnel is in 850 feet; when 150 feet more is driven, a double compartment shaft will be sunk.——The Gagnere mine, Tuttletown, operated by the Tricolor Con. M. Co., is putting in a 12x18 duplex compressor; when completed, sinking in the three-compartment shaft will be resumed. This mine has a water supply the year round.

VENTURA COUNTY.

The deal whereby the oil lands of Senator Bard in Ventura county pass into the hands of Los Angeles men is $350,000. Development of the property will be on a scale proportionate to the magnitude of the enterprise.

The Frazier Borate M. Co. is developing a borax deposit near Giffin. Locations cover 2400 acres. All the local stockholders except Gail Borden have sold out to the Stauffer Chemical Co. of San Francisco and Thomas Thorkeldsen & Co. of Chicago. Christian De Guinge of San Francisco is president of the company and Gail Borden secretary. The veins vary in thickness, being in some places 12 feet wide. The mining is done by hand. The ore hauled 60 miles to the railroad is shipped to San Francisco and Chicago. The Frazier Company is shipping 150 tons a month. A railroad from Bakersfield will reduce the wagon haul to 30 miles, and then the Frazier Company will put in a traction road.

A find of boracic ore is reported from Seymour canyon, 6 miles from Lockwood valley, from which about fifty tons of ore a month can be hauled. The new mine is named the Nighthawk. The average borate of lime ores, such as colemanite and pandermite, do not yield more than from 40% to 50% for best and from 25% to 36% of anhydrous boracic acid for average ore. The gross value of ore running 40% would be about $88 per ton; from this would have to be deducted loss in reduction, charges for mining, hauling, freight, and cost of reduction. The quotation of 44% ore is about $35 per ton in San Francisco.

YUBA COUNTY.

Nevada City Herald: Poorman & Hastings have a pay channel in their gravel mine below the Delhi mine, on the Middle Yuba river. The gravel is worked by hydraulic elevator; have expended $15,000 on the property.

COLORADO.

ARCHULETA COUNTY.

(Special Correspondence).—The Denver & Rio Grande R. R. is completing its branch from its Durango line to Pagosa Springs, which opens up a section having good resources, including mineral, timber, grazing lands and hot springs.

Pagosa Springs, Aug. 17.

CHAFFEE COUNTY.

The Buena Vista smelter is running to its fullest capacity. In the twenty-four hours 180 tons of ore are run, and twenty-five buttons obtained, which average $30.

CUSTER COUNTY.

Silver Cliff reports the Bassick mine receiving new machinery.

The Tellurium M. & M. Co. has effected a reorganization, extending the articles of incorporation twenty years. This company owns the Poorman mine at Querida and intends to begin operations and keep the work going. This property is developed by a main shaft 300 feet deep. Considerable drift work has been done. The last work was done on the property seventeen years ago, at which time ore running ninety ounces silver and three ounces gold per ton was taken out.

Work is progressing on the Elmatah at Querida.

DOLORES COUNTY.

The News-Sun at Rico says an ore buyer has bought 1000 tons of zinc ore which will average 60% for the Nicholson spelter plant at Iola, Kan., and that that section of Colorado ought to be able "to compete with the zinc mines of Joplin, and furnish the zinc plants of Missouri and Kansas with the greater part of their ore for treatment."

W. E. Bennett of Telluride and F. Stampfel and associates of Rico have bought the cyanide plant at Ophir. The former will manage the plant.

GILPIN COUNTY.

Central City reports the sale to G. P. Walford of London the westerly 667 feet of the Carr lode mining claim, Gregory mining district, Bob Tail hill, for $40,000. Of its product 60% is smelting ore.

The Gold Mining Investment Co. has taken a lease and bond for two years on the West Calhoun mine in Leavenworth gulch; in the directory are Adlai E. Stevenson, ex-Vice-President, C. H. Eckels, ex-Comptroller of the Currency, Mr. Phelps, ex-Assistant Treasurer, and Mr. Calhoun, first Governor of Cuba. The 150-foot shaft will be sunk 150 feet deeper. J. F. Tully is manager.

GUNNISON COUNTY.

J. P. Smith will start the old Lewis mill at Elko.

Supt. Grafflin at Gunnison is pushing the Zoorah tunnel, 9 miles southeast of Gunnison. It is in 1800 feet. About 800 feet in a room 16x24x16 feet high has been cut for sinking. The shaft will be 4x12 feet in the clear.

LAKE COUNTY.

(Special Correspondence). — Leadville stocks have been active of late, the buyers being mostly local people. As an example, the Canterbury, having sixty acres of patented ground on Fryer hill, with a 150-foot shaft, sinking for the contact, has issued stock that has sold well.

The Tarshish lease on seven and one-half acres adjoining the Adams, on Stray Horse gulch, has a 660-foot shaft, having opened ore at first contact at 250 feet depth. Prospecting is being done for the sulphide contact at the bottom of the shaft. Stock in the company owning this lease has been in some demand.

The Valentine lease of 100 acres, in the southwest part of the district, has three shafts, the deepest being just over the contact at 500 feet depth. Stock in this company is selling at 10@18c per share.

The Home Extension Co., whose holdings comprise mineral rights purchased of lot owners west of the Home M. Co. group, are sinking a shaft between Chestnut and Second streets. Stock in this company has sold at 25@40c per share.

Stock in the Home M. Co. is held pretty close at $8.50@9.00 per share, there being outstanding a stock issue of 50,000 shares of the par value of $1 per share.

The Doris, owning ten acres in Iowa gulch, has been a shipper in the past and has planned of late for new development.

The Hummer, under bond and lease, has produced a large amount of lead ore, has good prospect of getting soon into the sulphide contact. This is on Little Ellen hill.

The New Monarch, which ships 1500 tons per month of rich sulphide ore, in which the gold values are prominent, has a stock issue which sells almost at par.

The California Gulch lease on two and one-half acres, on both sides of that gulch, in sinking its shaft 500 feet has got into the blue lime stratum in which the ore is expected to be found.

In the Sedalia a drift is being run from the 800-foot level to catch the ore shoot on its dip from the levels above. The Sedalia has a stock issue of 1,000,000 shares, par value $1 per share, which has sold at 25c per share.

The Resurrection is a close corporation, with no stock on the market, shipments from the mine amounting to 150 to 200 tons per day. WASCOTT.

Leadville, Aug. 16.

(Special Correspondence). — The Colorado & Southern Railway is changing its Leadville trackage from narrow to standard gauge, which will enable this company to handle standard gauge cars from various mines of the district to the Colorado Midland, now a part of the Colorado & Southern. This enables the road to ship cars of ore from Leadville to Denver and Pueblo smelters without sending them by way of Breckenridge and over Fremont and Boreas passes.

The Penrose shaft, on the Home group, has encountered a heavy flow of water, which is being readily handled. As depth is gained the bottom of the shaft continues in ore.

Leadville, Aug. 18.

On Little Ellen hill, Leadville gold belt, the Iszard, alongside the Little Ellen mine, is being worked by Hobart & Smith.

Miner: General activity in Leadville district has caused large demand for all kinds of mining machinery, especially small hoisting plants and boilers. If the present demand continues it would be a paying investment to purchase small 6x8 double hoisters and 25 to 25 H. P. boilers for rental purposes. A plant of this kind will cost new about $650 to $800 and will rent for $25 to $30 a month.

OURAY COUNTY.

(Special Correspondence). — The new mill of the American Nettie mine started up last week. It is equipped with plates and concentrators and has a capacity of sixty tons per day. The ore is transported from mine to mill over a wire rope tramway, 1700 feet long. The Nettie is a gold property in the main, much of the ore being free-milling and high grade.

Ouray, Aug. 17.

At Ouray the Camp Bird reports a strike in the west drifts, in the upper or old workings, where a crosscut 37 feet wide in pay ore fails to show the walls. The sale of the property is not yet consummated.

PITKIN COUNTY.

(Special Correspondence). — Smuggler mill No. 1 is handling about 165 tons per day, the product being about forty-five tons of silver-lead concentrates; Smuggler mill No. 2 handles 100 tons per day, which is reduced to about 15 tons of concentrates.

The Mollie Gibson and A. J. mill, equipped with seven Huntingtons, twenty-eight vanners, with crushers and rolls, averages about 200 tons per day, concentrated from six to twelve tons to one ton. The Mollie Gibson ore is distinctively a silver-lead ore, while the A. J. ore contains very little of lead. Ores from both mines carry a considerable quantity of lime, which is largely eliminated in concentrating, as the lime cannot well be saved without gathering with it too much of the silica.

In various mines of Aspen the lime product is an important factor in settlements with the smelters.

The Aspen mine ships about 100 tons per day. The district, as a whole, ships out about 5000 tons of crude ore and 3000 tons of concentrates per month. The concentrates run high in lead, probably from 30% to 60%.

The Colorado Midland is extending a branch 1½ miles up Castle creek to get access to the Newman tunnel of the Percy Con. and other properties on the Castle creek side of Aspen mountain.

A new pumping station is being put in at 1060 feet depth in the Mollie Gibson. Pumps from the old A. J. workings will be installed there. The workings of the two properties are connected underground by a well-equipped trolley line.

Aspen, Aug. 18.

SAGUACHE COUNTY.

At Crestone the Independent mine is credited with having considerable ore blocked out, and the company operating it talks of building a 100-stamp mill and ultimate plans embracing 600 stamps.

SAN JUAN COUNTY.

By Nov. 1 the 3200-foot tramway line between the American tunnel and Gold King mill, near Silverton, will be completed.

TELLER COUNTY.

(Special Correspondence). — Parties in control of the Colorado–Philadelphia Reduction Co. at Colorado City and of the National Gold Extraction Co. of Florence have plans made for the erection of a crushing and sampling plant near Victor, which will have four sets of 16x36-inch rolls and two 15x24-inch crushers, and to have a capacity of over 1000 tons per day. This sampler will be an adjunct of the reduction plants of the companies named. The reduction plant of the Colorado-Philadelphia Co. at Colorado City employs chlorination as a means of extraction, and has run steadily, handling about 350 tons per day. This is doubtless the only one of the large mills in the valley which has recently run steadily at full capacity. This company is completing a second reduction plant of same character at Colorado City, which will be in operation before the close of the year, making the combined capacity of the three plants of this concern nearly 1000 tons per day. It is claimed this milling concern has the contract to handle the output of Stratton's Independence mine—whose shipments now amount to 200 tons per day—for five years. It is also pretty well understood that the Portland G. M. Co. will erect a reduction plant at Colorado City to handle the ores from the Portland mine, which now ships 150 to 200 tons per day.

The growing importance of Colorado City as a milling point is the outgrowth of the construction of the Colorado Springs & Cripple Creek Railroad, in which enterprise many of the more extensive mine owners are interested as shareholders. This road is almost completed and will be in operation by the close of the year. It has very extensive trackage throughout the district, where it will be electrically operated; but it will be operated as a steam road from Cameron, at the foot of Bull, to Colorado Springs and Colorado City.

On milling rates for district ores there appears to have been considerable reduction, though it has been a matter of private arrangement rather than a general announcement. The railroad rates favor the mills rather than the smelters.

Ores running $15 to $30 per ton pay a $3 rate to the smelters; ores running same grade pay $1.50 to $1.75 per ton shipped to the mills in the valley.

The Economic Extraction Co., which handles the ores from those mines controlled by the Woods Investment Co., is milling from 100 to 150 tons per day at present.

Within a month the Strong mill will be shipping again, having been closed down several weeks putting in a plant of machinery.

Within the past few months a large area of land has been patented under mineral location, on the outskirts of the district, manifestly for the purpose of organizing companies and issuing stock to be sold in the East. The greater proportion of such ground is not known to possess any mineral value, as it lies outside the recognized limits of the known mineralized district.

Fifty tons per week are being shipped from the National, under lease to M. Finnerty. Thus far the ore averages about $47 per ton. At the 200-foot level the ore is 3 feet wide.

C. G. Jackson and others, lessees on the main workings of the Gold Sovereign, on Bull hill, have opened the ore shoot at 400 feet depth, which is 100 feet below the tunnel level. It is claimed the ore at 400 feet is as rich as that found at higher levels.

Victor, Aug. 18.

The control of the Matoa G. M. Co. has been sold to W. S. Stratton. The deal is for 501,000 shares of the capital stock; price, 50 cents per share. Mr. Stratton will follow out the policy formerly adopted by the management of this company and put the mine in good condition.

In Stratton's Independence, Baker and Drury, members of the board of directors, state that after fourteen months of development they are able to say that there is 250,000 tons of ore in sight, of a value of $14,400,000, exclusive of the 30,000 tons that have already been extracted, out of which there has been paid $2,000,000 in dividends since the English company took charge. They state that they deliberated a long time concerning the introduction of a chlorination works, but that such advantageous rates were made with one of the local mills for the treatment of the mill ores that they abandoned the project.

The Good Will tunnel is in nearly 3000 feet. The work of making a connection with the Anchoria-Leland is in progress.

At Cripple Creek, on the 16th, the explosion of 150 tons of giant powder wrecked the steam hoist plant and shaft house of the Eclipse No. 2 on the crest of Raven Hill. The blacksmith was sharpening tools in the shaft house, hot coals ignited the exposed powder, and it commenced to burn. The blacksmith then ran out and gave the alarm. The explosion took place immediately. Two men were badly hurt.

IDAHO.

LEMHI COUNTY.

The Montana & Idaho Copper Co. at Gibbonsville has decided to quit. "The properties assayed richly in chlorides of expectation, but development work showed nothing but sulphurets of disappointment. The ore found in the mines looked like copper, but proved to be iron."

WASHINGTON COUNTY.

Carruthers Bros. & Co., Cambridge, report ten carloads of ore being moved from the Old Peacock mine to their warehouse, to be shipped to Salt Lake for Manager Hancock. The men at the mine are sacking 100 sacks of ore per day.

R. H. Terhune of Salt Lake is in Weiser. The Signal says his mission is to investigate the possibilities of Weiser for a copper smelter.

ILLINOIS.

CHRISTIAN COUNTY.

(Special Correspondence).—You may be interested in the oil and gas excitement here. Shelbyville will be supplied with gas by the Great Eastern Oil Co., which is a successful competitor of the Standard Oil Co., having its headquarters at Bradford, Penn. They have option on about 5000 acres of land. This land was worth $5 an acre two months ago and is now worth $200 per acre, on the strength of having discovered and opened up one good oil well. It is thought that the coal beds here are indicative of oil and gas yet undeveloped.

Pana, Aug. 19.

MICHIGAN.

HOUGHTON COUNTY.

A mine is being opened on the Osceola amygdaloid lode. Five shafts, all sizes, are being sunk.

MISSOURI.

CAMDEN COUNTY.

(Special Correspondence).—There are good zinc and lead lands in this county. It is isolated from the railroad at present, but railroad will build through the county within the coming year. The Osage river furnishes means of transportation at present. Linn Creek is the town nearest this field.

Linn Creek, Aug. 20.

MONTANA.

DEER LODGE COUNTY.

The Mammoth mine at Coloma, sold under foreclosure sale and bought by A. H. Larabie of Deer Lodge, is to be worked again.

FLATHEAD COUNTY.

The Snowshoe mine at Libby will remain shut down until the fall rains; 200 tons of concentrates on hand at the mine are being shipped to the smelter at Great Falls.

GRANITE COUNTY.

W. H. Godfrey of Butte and D. A. N. Chamberlin have a bond and lease on the Shamrock, near Garnet, for eighteen months, the bond fixed at $60,000. The mine is developed by a shaft 350 feet deep; another 100 feet will be sunk.

JEFFERSON COUNTY.

Reed & Kennedy of Butte have a lease and bond on the Crystal mine at Basin, on the head of Cataract creek.

At the Eva May mine, Cataract district, a silver producer, are twenty-seven men.

LEWIS AND CLARKE COUNTY.

Butte men have bonded and leased the Copper King group, Cedar Plains mining district, which shows narrow ore seams, 10% copper, $8 gold.

E. T. Wright, manager Columbian G. M. Co., York, says he is mining ore from the Charm mine. The Charm vein is comparatively a flat one. The principal values are found in the fine stuff.

MADISON COUNTY.

C. H. Hand, consulting engineer of A. W. McCune's Watseca mine at Rochester, says the vertical shaft on the Watseca is down 200 feet; eighty men are engaged in development work. Work will soon begin on the old Goodale shaft, which is down 290 feet on the vein. This shaft will be developed an additional 100 feet. In July they produced 1000 tons ore. The mill will be remodeled and enlarged, cyanide tanks will be constructed and a Huntington mill placed in position.

At Pony, Ellis Bros., on the Fremont, near the A. & P. mine, have enough ore to warrant them in purchasing a gasoline engine and stamps. A tunnel is being started 1500 feet below the discovery, where there is a mill site and water for power. The ore is brown iron and jasper.

MISSOULA COUNTY.

In the Copper Cliff district, 8 miles from Garnet, a strike is reported in the Copper Cliff mine, owned by S. J. Ritchie of Garnet, Lienemann and Schmidt of Butte and Salt Lake men.

SILVER BOW COUNTY.

T. R. Hinds, appointed in 1898 receiver of the Boston & Montana Co., has filed final report in the district court and asked for his discharge and for an allowance of $400,000, his fees for acting as receiver, and for about $32,000—expenses, attorney's fees, etc. The supreme court has decided that the appointment of Hinds was wrongful, as he had never been in possession of the property. Among the items of expense is one for $14,000, which he agreed to pay an assistant receiver for the Great Falls smelter, and $15,500 attorney's fees.

NEVADA.

HUMBOLDT COUNTY.

C. M. Benedict, treasurer of the company recently formed in New York to operate the old Eagle mine in Spring valley, is in San Francisco. It is reported that the company has $100,000 to invest.

LANDER COUNTY.

The Morning Star mine, at Dean, is producing ore. There are forty men at work.

LINCOLN COUNTY.

Supt. J. A. Larsen, Independence mine, Stateline, says shaft on that property is 200 feet deep; for 60 feet the work has been upon ore showing values in gold and silver.

STOREY COUNTY.

The water in the C. & C. shaft at Virginia City is now 198 feet below the 1950 level, or over 400 feet below the Sutro tunnel. This is the lowest depth reached since the installation of the hydraulic pumping system.

Electrical engineers are arranging the wiring of the Gould & Curry mill and the C. & C. shaft. Everything will be in readiness as soon as the electric power is sent in from Floriston.

NEW MEXICO.

BERNALLILO COUNTY.

At the Iron King mine, at Bland, ore will be treated in the new mill at Woodbury.

COLFAX COUNTY.

Cimarroncite camp is 15 miles from the town of Cimarron. The Con. Verde M. & M. Co., composed of Lansing, Mich., men, R. S. Rose, general manager, is working men on its Thunder and other properties. It has completed a 4-mile wagon road at an expense of $5000. Two carloads ore shipped to Pueblo gave returns of $30 per ton.

LINCOLN COUNTY.

The shaft at the Old Abe mine, White Oaks, is 1200 feet deep and shows good ore. The property has a 20-stamp mill and a cyanide plant. It has the distinction of being the driest mine in the country: no water or even dampness has ever been encountered in it.

The Jicarilla Placer M. Co., which last spring transferred some 5000 acres of placer ground to the American Placer Co., backed by Cleveland, O., capital, has the hydraulic machinery, weighing 180 tons, on the way, and 4 miles of pipe. Numerous wells are being drilled over the property, some of them 1500 feet deep, upon which pumping machinery is to be placed. The placer ground has been tested and yields an average of 15 cents per cubic yard. The gravel deposit is 2 to 80 feet deep.

W. B. Bates, Supt. and manager Electric M. & M. Co.'s mines at Jarilla, says placer gold is being taken out, but that owing to the lack of water only about half of it can be secured.

RIO ARRIBA COUNTY.

The new concentrator plant at Rinconado is treating fifty tons of ore daily, concentrating ten tons into one. The Copper Hill M. Co., operating the plant, is also working four air drills and getting out $20 ore. The concentrates are hauled 11 miles to Embudo and sent to the smelter at Pueblo.

OREGON.

BAKER COUNTY.

The Magnolia mine, 4 miles north of Granite, goes back to its original owners, Coyle, Clonde & Jones. The $10,000 payment due Aug. 1st under the option by W. L. Vinson was not made. The English bonders invested about $50,000 in the property under the management of W. L. Vinson. It is locally reported that the owners will work the mine and build settling tanks for saving the fine gold. The Magnolia has a new 10-stamp mill. The mine is opened up by three tunnels, the lowest 700 feet, the second 600 feet and the upper 250 feet.

GRANT COUNTY.

Portland and Baker City men have an option on the Blank Elephant claim on Indian creek for $25,000. It consists of a lead of chrome iron.

JOSEPHINE COUNTY.

The Old Channel M. Co. have men enlarging and rebuilding their main ditch at Galice.

SOUTH DAKOTA.

LAURENCE COUNTY.

The North American Tin M. & M. Co. of Philadelphia, capital $1,500,000, has bonded ground in Bear Gulch district, 14 miles west of Deadwood, and it is locally asserted an average assay of 3% tin was obtained, some veins 17%.

UTAH.

JUAB COUNTY.

At Eureka surprise is felt at cessation of work at the Victoria, following the levying of a 4-cent assessment.

SANPETE COUNTY.

At Manti Manager J. W. Hoggan has men working at the Black Pine mine.

SALT LAKE COUNTY.

The Fortune M. Co. has finished surveying for a spur from the Fortune mill to connect with the Dalton & Lark tramway. The grade will be 10%. The spur will save the company 75 cents per ton as compared with hauling ore and concentrates to Sandy.

D. McLeod, former Supt. Old Jordan, is acting foreman Red Wing Extension Co.

The Last Chance, at Bingham, has resumed under the charge of Mr. Hodge, the owner of the properties.

TOOELE COUNTY.

The plant and properties of the Geyser-Marion M. Co. at Mercur have closed down. Manager Moon tells the Tribune work will not be resumed until the indebtedness of the company is discharged and means with which to prospect for new ore bodies are provided. In the close-down about fifty men are out of employment.

The Tribune says the output of the Con. Mercur mines has been swelled to over 1000 tons daily by Supt. Edwards.

The Hercules group, owned by the Cygnet M. Co. at Stockton, has ore that shows ninety ounces silver, 64% lead.

WASHINGTON COUNTY.

The Dixie group of copper mines and the smelter at St. George have passed into the control of W. F. Snyder, who has made payment of $40,000. Mr. Snyder says he will open up the group to a depth of 200 feet greater than at present. A tramway is projected between the mine and smelter, 12 miles.

WASHINGTON.

OKANOGAN COUNTY.

Brewster reports that E. R. Hurd of New York bonded a group of mines on Kruger mountain for $50,000. He proposes to start a tunnel into the mountain 1200 feet. The ore requires smelting.

SKAGIT COUNTY.

The Thomas Cruse Banking Co. of Helena, Mont., is reported to have bought 1000 acres of coal land in the Crow's Nest Pass mining region, and will put up coke furnaces to handle the product.

SNOHOMISH COUNTY.

Slate Creek has a dividend-payer in the Mammoth mine, which has cleaned up $3750 net, independent of the concentrates, in a twenty-day run of its 5-stamp mill, employing twenty-five men. The 10-stamp on the Eureka, near the Mammoth, is at work.

The Everett News says that a 16-inch vein of telluride has been found by the Northwest Con. M. Co. in the Monte Cristo mining district. Assays show $20 per ton gold in the telluride. The company is putting in a new ore dump and will build a tramway from the mine to the Everett & Monte Cristo Railroad.

YAKIMA COUNTY.

The Big Thunder Mountain Co., operating in the Summit district, has added five more claims to its holdings, the Tessa, May, Flora, Winiped and Gordon, formerly owned by J. L. Higgins.

FOREIGN.

AUSTRALIA.

The gold yield of New South Wales during July amounted to 53,464 ounces, valued at £181,743, as compared with 62,862 ounces, valued at £222,357, during July, 1899. The yield for the last seven months amounted to 209,820 ounces, valued at £728,606, as compared with 245,092 ounces, valued at £845,339, for the same period of 1899.

The Department of Mines reports that the value of the mineral products of New South Wales for the year 1899 amounted to £6,157,000, showing an increase of £1,290,000 as compared with 1898. The total number of miners employed was 40,133.

BRITISH COLUMBIA.

At Moyie, in July, the St. Eugene Con. M. Co. paid out in wages $25,400.

C. R. Hosmer, director Center Star and War Eagle mines, says a deal is on with the C. P. R. R. by which that company was to handle and smelt ore for the mines at a figure which is understood to be $2,000,000 annually. He says that shipments from both mines are being held, pending the signing of the agreement, by which the War Eagle would receive special terms for transportation and smelting. This, he says, would so reduce the cost of mining that it would be possible to profitably mine lower grade ore than had been done hitherto. Under this agreement, it was further added, the War Eagle and Center Star would ship a minimum of 1000 tons per day.

A New York paper says the Cariboo hydraulic gold brick, which recently arrived in that city, was so large that a special smelting pot had to be made for it. "Officials are not pleased with the size of the cone-shaped lump of gold, valued at $135,275, which was sent to the assay office recently, by the New York branch of the Bank of Montreal, to be smelted. The hydraulic miners of British Columbia made the lump so large that Supt. Mason of the assay office will have to order a special smelting pot, in order to have a receptacle large enough to hold this 'king' lump, while it is melted to be run into bars. The weight of the lump—7897 ounces—made the service of four men necessary to place the cone upon the scales."

The Canadian Pacific's smelter at Trail is to be enlarged to double its present capacity, making it able to daily handle 1500 tons ore. The improvements contemplated would cost $200,000. The additions to the plant stated include the following: Six straight-line roasting furnaces, with a maximum capacity on easily roasted ore of 150 tons daily; two lead furnaces, with daily maximum capacity of 250 tons each; one copper furnace, inside measurement 44x160 inches, capacity 300 tons per day; crushing plant to handle 1500 tons per day; buildings, power and blowing machinery, and incidentals.

At Greenwood work has started to brick in the 300-ton furnace at the B. C. C. Co.'s smelter. R. Liden, Asst. Supt., says that within six weeks after the delivery of the machinery he will have the smelter ready to be blown in. Three thousand feet of 8-inch piping will be laid to bring water from Copper creek to the smelter.

In the Atlin district the Willow Creek Co.'s clean-up July 31st was forty pounds of coarse gold, beside a quantity of amalgam. The Wright Creek Co. has shut down on account of lack of water. Spruce is the most generally worked creek in the camp.

The furnaces of the Granby smelter at Grand Forks were blown in this week. The sampling works has also begun operations.

MEXICO.

Three years ago the owners of the El Trianon mine at El Oro sold to the American M. Co. of the same place its property for $10,000. Since the American M. Co. purchased the Trianon property it was sold by J. B. Haggin to the Exploration Co. of London. Last March the former owners of the El Trianon Co. claimed that the sale of the mine was illegal and asked that it be cancelled. They now have decided to begin suit against the El Oro M. & R. Co. to cancel the sale of the Trianon property.

In the San Pedro district, Sonora, T. A. Kelley has the San Nicolas, Number Ninety-nine and the Cobriza under lease. He has 200 men taking out ore. He is taking out of the San Nicolas 450 tons per month. Smelter returns on this output are as follows: Sixty ounces silver, .09 ounce gold, 5% lead, 7% copper, 26% iron and 14% silica. He has a lease on the Ninety-nine prospect and is shipping fifty tons a month from it. Smelter returns are as follows: Forty-five ounces silver, .25 ounce gold, 4.5% lead, 16% copper, 22% iron and 21% silica.

The Durita is under lease to E. H. Wells. He has men producing 300 tons per month. His smelter returns are as follows: Fifty ounces silver, .09 ounce gold, 8.5% lead, 4% copper, 25% iron and 18% silica.

SOUTH AMERICA.

At San Diego, Cal., on the 22d, arrived the steamer Tanis with 6930 sacks of silver and lead ore from the Antofogasta, Chile, on its way to the smelter in Pueblo, Colo.

THE KLONDIKE.

From Dawson Wilson Foster writes the Victoria Times under date of July 30th regarding the new quartz strike in Indian River district: "I saw the samples and an assay certificate showing $2 per ton from one sample and $5 from another. It is now sixty days since the strike was made, and there is no shaft being sunk, not $100 worth of work done, even to serve as assessment work. It would be criminal to allow exaggerated reports of untold wealth in quartz finds to go abroad uncontradicted and cause another wild stampede of "Cheechakos" or "tenderfeet" into the Klondike. We have as many people here now as we need until more work has been done to develop this country. This is not a poor man's country. In fact the poor man has no country! As soon as a poor man strikes it rich he either goes insane, drinks himself and dissipates himself into an untimely grave, or becomes just as arrogant, greedy and insulting as his wealthy brothers in other camps, and tries to swallow up the whole creek, pay-streak, gravel and all. This is not a personal remark, and there are few exceptions to this rule. There are at least 1000 prospectors for quartz in the Klondike. The Alaska Exploration Co. has already spent $100,000 cash in quartz prospecting."

The statement that the Dominion Government had abolished the 10% royalty in the Yukon, substituting therefore a 3% tax establishing a compulsory assay office in Dawson, is officially denied by the Minister of the Interior.

Personal.

E. D. BOYLE of Nevada county, Cal., is visiting San Francisco.

S. T. MURCHIE has returned from Colorado to Nevada City, Cal.

ELMER DE VORE has returned from Joplin, Mo., to Cripple Creek, Colo.

VICTOR M. CLEMENT is examining mining property at St. Anthony, Idaho.

J. R. DELAMAR has gone to Paris and will return to California in November.

T. C. GORRIE has been appointed Supt. San Ysabel mine, Tuolumne county, Cal.

C. C. THOMAS, Supt. Sútro tunnel, is reported seriously ill at Los Angeles, Cal.

PAUL JOHNSON will return from Europe to the Greenwood, B. C., smelter Sept. 10.

W. H. WATTS will have charge of the $40,000 Risdon dredger at French Gulch, Mont.

A. J. BOWIE has returned to his Sansome St., San Francisco, office from the Klondike.

W. E. KOCH, general manager La Lustria M. Co., El Oro, Mexico, has returned from New York.

O. O. HOWARD, JR., has returned to California and will develop his Shasta county property.

F. W. KROGH has returned to San Francisco from his mining property in Plumas county, Cal.

SHERMAN BELL is appointed assistant manager Independence-Wilson Creek Con., Goldfield, Colo.

JNO. DERN of the Con. Mercur, Utah, sails from Hamburg, Germany, for Salt Lake on the 15th prox.

A. M. ROBESON succeeds the late Maj. Seymour as consulting mechanical engineer for the Rand Mines Co., S. A.

C. M. FASSETT left San Francisco on the 22nd to put in a cyanide plant for his cousin, J. Sloat Fassett, of New York, on the latter's Corean property

BEN STANLEY REVETT continues as general manager of the North American Dredging Co. at Breckenridge, Colo.

C. L. FREED has gone to Inyo, Cal., to take charge of the property of the Ballarat M. Co., recently acquired by him.

WM. MCKINLAY, SR., late Supt. Providence mine, Nevada county, Cal., will make his future residence in San Francisco.

HAROLD W. FAIRBANKS, Ph. D., has returned to Berkeley, Cal., from an extended geological reconnoissance through California, Oregon and Washington.

W. E. STOVER AND F. E. MANSFIELD of San Francisco and F. F. Sharpless, late of Madera county, Cal., are examining mining properties in the Oro Blanco, Ariz., district.

T. F. VAN WAGENEN has recently been making a professional examination of the new developments in the down-town region of Leadville, Colo., where he has some interests.

T. C. ARCHER, formerly Supt. Iron Mountain, Cal., mine, has returned to San Francisco from Alaska, and may return there to take charge of copper developments near Juneau.

H. D. SCRIBNER, contracting agent of the Westinghouse Electrical Co. of San Francisco, is in Spokane, Wash., promoting the project of electric power transmission from Post Falls to the Cœur d'Alene mining district.

A. F. WILLIAMS, a graduate from the College of Mining in the University of California in 1898, has been appointed assistant general manager of the De Beers Con. Mines, Ltd., Kimberly, South Africa, at an annual salary of $6000.

J. A. YERINGTON has been appointed Nevada's Industrial Agent for the Southern Pacific Co. His duties are "to inquire into the mineral resources of the State and arrange for transportation of ores at rates that will leave a profit to the shippers."

Obituary.

F. HOWELL, said to be the oldest miner in California, died at his home in Placer county on the 18th inst.

J. W. E. TOWNSEND, well known in almost every mining camp on this coast as a newspaper man of ability, and also as the editor of the Bodie Miner-Index, died at Lake Forest, Ill., Aug. 10th, aged 78.

GEORGE FERRIS, two-thirds owner Ferris-Haggerty copper mine, Battle Lake, Wyo., was instantly killed on the 18th in a runaway accident near the mine. He had been directing men fighting forest fires. Mr. Ferris was thrown to the ground with great force and his skull crushed. Recently Eastern men secured an option on his mine for $2,000,000, and on the day of his death he received word that a representative of the purchasers was en route to the mine to close the deal.

Commercial Paragraphs.

IT must have been a poor exhibit that could not take a prize at Paris. There were 2827 grand prizes, 8166 gold medals, 12,244 silver medals, 11,615 bronze medals and 7938 honorable mentions—a total of 42,790 awards.

THE Pacific Tank Co. of San Francisco and Los Angeles, Cal., has shipped a twenty-five-ton plant to Korea for the Oriental Con. M. Co., a fifty-ton plant to the Helena G. M. Co., Callahans, Cal., a fifty-ton plant to the El Dorado Cyanide Co., Browns Valley, and a carload of leaching tanks to the Mt. Lion G. M. Co. of Republic, Wash., and are constructing a twenty-five-ton plant for the Jersey Blue M. & M. Co. of Ohio City, Colo.; have under construction a chlorination plant for Bodie, Cal., and two ten-ton plants for Mexico, and are shipping this week a plant of thirty-five-ton capacity to the Athabasca M. Co., B. C. This plant is calculated to treat tailings direct from the battery, and consists of two large settling tanks, with automatic distributors, five leaching tanks and all necessary solution, sump, vacuum tanks, zinc boxes, etc.

Catalogues Received.

APART from the practical character of the catalogue on mining machinery recently sent out by the Edw. P. Allis Co. of Milwaukee, Wis., the style of its publication is good illustration of the advance in that kind of mechanical treatise. The engravings are of the same high-class grade one expects to see in the best magazines. Evidently the Allis people believe that if a thing is worth doing at all it is worth doing well, and a concern that goes to such expense in a trade treatise may justly claim favorable notice for what it makes for miners.

List of U. S. Patents for Pacific Coast Inventors.

REPORTED BY DEWEY, STRONG & CO.,
PIONEER PATENT SOLICITORS
FOR PACIFIC COAST.

FOR THE WEEK ENDING AUG. 14, 1900.

656,080.—PAINTING MACHINE — B. W. Augustine, Alameda, Cal.
655,921.—LOCK—P. V. Cornils, S. F.
655,924.—WEED CUTTER—J. G. Evans, Waitsburg, Wash.
655,859.—HARROW — J. F. Fay, Geyserville, Cal.
656,104.—MOTOR REGULATOR — J. D. Fricot, S. F.
655,864.—SELF-LIGHTING CIGAR — B. Heimann, S. F.
655,777.—ELECTRIC SIGN — A. Heiny, S. F.
655,868.—CUTTING METAL SHAVINGS—A. Holtgen, S. F.
656,118.—GAS LIGHTER — Jones & Barrett, S. F.
656,124.—DENTAL MALLET—U. G. Kinnison, Aberdeen, Wash.
655,793.—QUARTZ MILL—A. T. McMurtrey, Medford, Ogn.
655,906.—CLUTCH—J. A. Moore, Paauhau, Hawaii.
656,038.—EYE SHADE—H. E. Newton, Los Angeles, Cal.
655,888.—FLUSHING WASTE PIPES—W. T. O'Neil, Etna, Cal.
655,916. — TELEPHONE SYSTEM — W. Torst Jr., Los Angeles, Cal.
656,147.—AIR COMPRESSOR—J. W. Van Brocklin, Seattle, Wash.
655,842. — PREPAYMENT METER — F. Weegmann, S. F.
656,131.—ADVERTISING DEVICE—P. E. White, Los Angeles, Cal.
656,071.—R. R. RAIL JOINT—C. Whitmore, S. F.
655,747.—VACUUM APPARATUS—G. W. Winckfield, Alameda, Cal.
33,077.—DESIGN—U. E. Lemon, Fairfield, Wash.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

APPARATUS FOR CUTTING METAL SHAVINGS.—No. 655,868. Aug. 14, 1900. August Holtgen, San Francisco, Cal. One-half assigned to W. E. Hampton, same place. This invention is designed to cut sheets of metal into thin shavings. It consists of a journaled arbor with means for applying power to revolve it, means for securing one edge of the sheet of metal to the arbor so that the sheet may be coiled thereon to any desired thickness, a cutting tool, and means for advancing it parallel with the arbor so as to cut shavings from the end of the roll of metal. The tool-holder comprises two parts, one of which is slidable in guides parallel with the arbor and the material to be cut, and the other is screw-threaded, hinged and closable upon the first portion and also upon the feed screw which passes through the tool-holder. The end of the feed screw carries a ratchet wheel and a pawl is eccentrically mounted upon the arbor so as to turn the ratchet wheel at each reciprocation and thus rotate the feed screw and advance the tool-holder by small progressions so as to make a continuous cut of the metal coiled upon the arbor.

SELF LIGHTING CIGARS.—No. 655,864. Aug. 14, 1900. B. Heimann, San Francisco, Cal. One-half assigned to I. Dannenbaum, same place. This invention relates to a cigar carrying upon itself a means for its ignition without the use of matches. It consists of a specially prepared compound of ignitable material mixed into a paste and incorporated with the ends of the rolled leaves of the cigar so as to form an essential part of the structure. The cigar being rolled, this saturated end can at any time be ignited by rubbing it upon a surface prepared for the purpose, and which will through its chemical action upon the compound on the cigar cause the latter to ignite. It is very convenient for windy or difficult situations.

VINEYARD HARROW. — No. 655,859. Aug. 14, 1900. J. F. Fay, Geyserville Cal. Assignor one-half to W. S. Vaughan, same place. The object of this invention is to provide a harrow which is especially designed to be used in vineyards. For such purposes it is necessary that the side frames of the harrow carrying the teeth should be adjustable to stand at different angles with relation to the central support, and the ground over which they travel. For this purpose the harrow is constructed with a central longitudinal beam with draft attachments and two or more parallel toothed beams are located upon each side of the draft beam, and diverge from front to rear with relation to this beam. They are rigidly secured by angle plates at the front and transverse uniting plates at the rear. Loose link connections between the front and rear ends of these toothed beams and the draft bar allow them to tilt to suit the surface of the ground, and a lever fulcrumed at the rear of the draft bar is connected through transverse levers so as to raise and lower the tooth beams to stand at any angle with the draft beams. They can then be locked in any position of adjustment.

Latest Market Reports.

SAN FRANCISCO, Aug. 23, 1900.

SILVER—Per oz., Troy: London, 28¼d (standard ounce, 925 fine); New York, bar silver, 61⅜c (1000 fine); San Francisco, 61⅜c; Mexican dollars, 49¼c.

COPPER.—New York: Lake, 1 to 3 casks, 16.75 cash; carload lots, 16.50; Electrolytic, 1 to 3 casks, 16.62½; carload lots, 16.37½; Casting, 1 to 3 casks, 16.50; carload lots, 16.30. San Francisco: 17. Mill copper plates, 20c; bars, 22@23c.

Visible supply of copper in England on Aug. 15th was 32,460 tons—an increase of 3547 tons in the first half of the month. Supplies for the half month were 12,915 tons and deliveries 9368 tons. February 1st was the low point in supply this year, with 21,327 tons; it has increased steadily since to 32,460 tons Aug. 15th, or 11,133 tons in all since Feb. 1st—50%. The influence of the heavy American exports of copper evidently are telling on the building up of supplies. The supply Feb. 1st was down nearly to one month's consumption. Since then Europe has absorbed an immense amount of American copper. For the first seven months of 1900 no less than 101,903 tons have been exported from the United States—nearly two-thirds of the entire American production of 157,592 tons, against much less than one-third in the same period last year.

LEAD.—New York, $4.25; Salt Lake City, $4.00; St. Louis, $4.20; San Francisco $5.00, carload lots; 5½c 1000 to 4000 lbs.; pipe 6¾, sheet 7½, bar 6c. London, soft Spanish, £17 15s.

The Treasury Department reports that for the fiscal year ending June 30, 1900, the imports and exports of lead were as follows:

	Pounds.
Imports	196,378,961
Exports	166,254,778
Foreign lead remaining in U. S.	30,124,183
Lead in warehouses June 30, 1899	17,399,593
Lead in warehouses June 30, 1900	33,836,374
Increase in warehouses during last fiscal year	16,436,781
United States consumption of imported lead last year	13,687,402

In line with the A. S. & R. Co. the Guggenheims guarantee their sellers $4 per 100 pounds for all the lead they may produce for the remainder of 1900—the $4 rate to apply to all settlements that have been made since Aug. 1st, on which day the agreement with the A. S. & R. Co. went into effect.

Replying to a question asked by the Salt Lake Tribune as to the application of the agreement by which the lead producers of Utah are to receive $4 per hundred during the balance of the year for their product, Manager Jones of the A. S. & R. Co. said it was open to all who appear in the Salt Lake market, whether they come from Idaho, Nevada, Wyoming, New Mexico or Colorado, or from the Dominion of Canada on the north. What agreement, if any, is governing the market at other smelter points, Manager Jones did not know, as he was not supposed to be concerned in the affairs of those outside of his own jurisdiction, which is confined to the Salt Lake plants.

Messrs. Guggenheim will pay $4 per hundred pounds in every market entered by them, whether it be in Idaho or Montana, Nevada or Wyoming, Colorado or New Mexico.

J. H. Weddle, manager of the Arkansas Valley plant of the A. S. & R. Co., explains how the $4 per hundred rate was brought about: "For some time past the production of lead in this country has been very heavy. This naturally tended to send the price down considerably below $4, and the only way that the market could be sustained was to export the metal. This, of course, had to be done at a loss, in order to compete with the foreign market. Some time ago, at the instance of the big lead producers of the Cœur d'Alene country, a conference was held with the officials of the A. S. & R. Co., and a plan agreed upon for making a stable price. The lead miners generally throughout the West have accepted the proposition, and the result is that all lead purchased by the company will be paid for at the rate of $4, the agreement to last until the end of the year. It makes no difference what the market price is, the figures will remain the same to the miner. In order to bring about this the A. S. & R. Co. will have to export the lead at a loss of 12½ cents, the only way the company has of recouping being in case there is a strong advance. Had this arrangement not been made," Mr. Weddle continued, "the present price of lead would be about $3.50 or $3.60. Now, however, the miner is assured of a stable price at a steady figure, and a figure, too, which should enable all lead properties in the district to be worked to a profit. The miners have all accepted the proposition, for it certainly is a just and equitable one under the circumstances. The company simply assumes whatever loss there may be in exporting, and in this way the price is sustained. Otherwise it would certainly go down."

SPELTER. — New York, $4.15; St. Louis, $4.10; San Francisco, ton lots, 5½c; 100-lb lots, 5¾c.

ANTIMONY.—New York, Cookson's, 10¼c; Hallett's, 9½c; San Francisco, 1000-lb lots, 12c; 300 to 500 lbs., 13@14c; 100-lb lots, 15@18c.

IRON.—Pittsburg, Bessemer pig, $16; gray forge, $14.50; San Francisco, bar, per lb., 2¾c. in small quantities.

STEEL.—Bessemer billets, Pittsburg, $18.00; sheet bars, $22; San Francisco, bar, 7c to 12c per lb.

Structural material manufacturers at Pittsburg this week ordered a cut of $8 per ton in all shapes and sizes, effective at once. It is another move growing out of the Gates maneuver on steel and wire. It was learned that some of the big combinations had broken into the structural material trade. The minimum of the structural schedule was $1.90 for 15-inch beams and under, but the material that was competing with the pool was selling for $1.30 for similar sizes. Should the others meet the cut of the pool, there is no telling where the end will be, as the associated manufacturers are determined to maintain control of the product.

QUICKSILVER. — New York, $50.00; large lots: London, £9 5s; San Francisco, local, $48 ℘ flask of 76½ ℔s.; Export, about $45.

From July 1 to August 19 there were received at San Francisco 2042 flasks.

MAGNESIUM.—New York, $3.00 ℘ ℔.; San Francisco, $4.00.

ZINC.—San Francisco, 5½c; slab, 6c; bar, 7¾c.

SOLDER. — Half-and-half, 100-℔. lots, 21c; San Francisco, Plumbers', 100-℔. lots, 17¾c.

BABBITT METAL.— San Francisco, No. 1, 10c.

TIN.—New York, pig, $31.75; San Francisco, ton lots, 33c; 1000 ℔s., 33½c; 500 ℔s., 34c; less, 35c; bar tin, ℘ ℔, 40c.

ASSAY LITHARGE.—San Francisco, 10c ℘ ℔, small lots.

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 30c to 35c.

PLATINUM.—San Francisco, crude, $17 ℘ oz.; New York, $18.25; manufactured, $19.50@22.00.

BISMUTH.—New York, ℘ ℔., $1.60 50-℔ lots; San Francisco, $2.50 to $2.75 ℔ lots.

NICKEL.—New York, 50@60c ℘ ℔.

TUNGSTEN.—New York, ℘ ℔., 95c; San Francisco, $1.15.

FERRO-TUNGSTEN. — New York, 37%, 35c; San Francisco, 65c (60%).

FERRO-MANGANESE. — Pittsburg, 80%, domestic, $85, large lots.

CHEMICALS.—Cyanide of potassium, 98%-99%, jobbing, 32½@34½c ℘ ℔.; carloads, 31@32c; in 10-℔. tins, 40c; sulphuric acid, 66% B, 2c ℘ ℔.; soda ash, $1.60 ℘ 100 ℔s. 58%; hyposulphite of soda, 2¾@3c ℘ ℔.; blue vitriol, 5½@6c ℘ ℔.; borax, concentrated, 7@8c ℘ ℔.; chlorate of potash, 12@13c; roll sulphur, 6c; alum, $1.90@2.00; flour sulphur, French, 2¼@2½c; California refined, 1¾@2c; nitric acid, in carboys, 8c ℘ ℔.; caustic soda, in drums, 3@4c ℘ ℔.; Cal. s. soda, bbls., $1.00; sks, 95c ℘ 100 ℔s.; chloride of lime, spot, $2.50@2.60; nitrate of potash, in kegs, 8c; caustic potash, 10c in 40-℔. tins.

OILS.—Linseed, pure, boiled, bbl., 79c; cs., 84c; raw, bbl., 77c; cs., 82c. Deodorized Stove Gasoline, bulk, 16c; do., cs., 22c; 86° Gasoline, bulk, 21c; do., cs., 27c; 63° Naphtha or Benzine, deodorized, in bulk, per gal., 15½c; do., in cs., 21½c; Lard Oil, Extra Winter Strained, bbl., 60c; cs., 65c; No. 1 bbl., 49½c; cs., 54½c; Neatsfoot Oil, coopers' bbls., 60c; extra bbls., 55c; cs., 60c; No. 1 bbl., 52½c; cs., 57½c.

POWDER.—F. o. b. San Francisco: No. 1. 70% nitro-glycerine, per ℔., in carload lots, 15¼c; less than one ton, 17¼c. No. 1*, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1** 50%, carload lots, 11¾c; less than one ton, 13¾c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9½c; less than one ton, 11½c. No. 2** 30% carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9, in lots not less than 1000.

FUSE.—Triple tape, $3.60 per 1000 feet; double tape, $3.00; single tape, $2.65; Hemp, $2.10; Cement No. 2, $3.00; Cement No. 1, $2.65, in lots of 3000 feet and up.

PHOSPHORUS. — F. o. b. New York or Philadelphia, 45@50c ℘ ℔.

CANDLES.—Granite 6s, 16 oz., 40s., 12½c ℘ set; 14 oz., 40s., 11½c.

COAL. — San Francisco, coast, yard prices: Wellington, $9; Seattle, $7.00; Coos Bay, $5.50; Southfield, $9.00. Cargo lots, Eastern and foreign: Wallsend, $8.00; Brymbo, $7.50; Pennsylvania, hd., $14.00; Scotch, $8; Cumberland, $12; Cannel, $9.50; Welsh Anthracite, $12.00; Rock Springs, $8.50; Colorado Anthracite, $14.50. Coke, $16 per ton in bulk; $18 in sacks.

San Francisco Stock Board Sales.

SAN FRANCISCO, Aug. 23, 1900.

9:30 A. M. SESSION.

100 Challenge	23c	300 Overman	07c
100 C. C. & V.	$1 35	600 Savage	11c
200 Crown P't.	14c	200 Sierra Nev.	38c
50 H. & N.	20c	300 Silver Hill	42c
1100 Justice	03c	300 Y Jacket	30c

2:30 P. M. SESSION.

100 Ophir.	53c	50 Confidence	76c
50 B. & B.	17c	150	75c
100 C. C. & V.	$1 30	200 Julia	01c
200 Potosi	22c	400 Silver Hill	38c
100 Y. Jacket	26c	200 Challenge	21c
500	25c	300	20c
500 Union	20c		

Recently Declared Mining Dividends.

Buffalo Hump M. Co., Idaho, 1%	Sept. 1
Standard Con. M. Co., California, 10 cents per share	Aug. 23
Gold Coin M. Co., Colorado, 2 cents per share, $20,000	Aug. 25
Con. Gold Mines, 1 cent per share, $10,000	Aug. 25
Smuggler M. Co., Colorado, 3 cents per share	Aug. 18
Homestake M. Co., South Dakota, 25 cents per share and extra dividend 25 cents per share	Aug. 25
National Lead Co., N. Y., quarterly dividend 1¾%, preferred stock	Sept. 1
Mammoth, Utah, 5 cents a share, $20,000	Sept. 1
Breece M. Co., Colorado, 5 cents per share, $10,000	Sept. 1

WANTED.
A Rich Placer proposition, adapted to working by Railroad Steam Shovel, or Dry Land Excavator. Description, with price and terms, to receive attention must be accompanied by reliable reports and references.
Address: EDWARD N. BREITUNG,
MARQUETTE, MICH.

Quicksilver
—FOR SALE BY—
The Eureka Company,
OF SAN FRANCISCO.
ROOM 1, - - 320 SANSOME STREET,
SAN FRANCISCO.

Quicksilver
For Sale in Lots to Suit.
REDINGTON & COMPANY, Wholesale Druggists, 23-25-27 Second Street, San Francisco.

SPIRAL SAND PUMPS.
For Pumping Sand, Slimes, Tailings and Crushed Ores.
The Cheapest and Most Durable Pump on the Market. Manufactured by J. H. Frenier & Son.
Represented by M. S. HAUSER,
12 Front Street,............San Francisco, Cal.

WE BUY very rich Ores, Dental Scraps, Tellurium Ores, Mill Wastes, Jewelers' Sweeps, Gold Retorts, Old Iron Retorts, Base Amalgam, Quicksilver, Amalgamated Plates, Gold and Silver, Old Slags.
A. M. DONALDSON & CO.,
ASSAYERS AND WASTE PRODUCT SMELTERS,
1661 Larimer St., Denver, Colo.
Donaldson's Assayers' Slag Hammer { 1 lb......$1.10 / 1 lb. 3 oz. $1.25 }

MILL PLANS.
Cyanide, Concentration, Smelting, Sampling.
F. D. BAKER. Mech. Eng., DENVER.

FRED C. MILES,
CISCO, PLACER CO., CAL.
COPPER AND GOLD PROSPECTS.
A GOING GOLD PROPERTY.

SITUATIONS WANTED.

Position as chief engineer at mines. Go anywhere. Have family. Long experience with mining machinery. R. J. Blackwell, Temescal, Riverside Co., Cal.

WANTED.—SITUATION BY A COMPETENT and experienced millman on concentrators or battery frame. Highest references. Address L. W., 509 Kearny street, room 2, first floor, San Francisco, Cal.

WANTED.—SITUATION AS MANAGER OF producing or developing property. Twelve years' experience in gold mining and milling, copper mining and smelting. Address C. H., care of Mining and Scientific Press.

FOR SALE.

FOR SALE.—Ten mines, forming a group (gold and silver), with mill site and water power. Acultapilco Mining District. Ore assaying from 30 ozs. to 100 ozs. to the ton; gold, ½ oz. Address to LIC. ELIAS GALINDO, P. O. Box 26, Tepic, Mexico.

FOR SALE --- Developed Zinc-Lead-Silver Property. Texas.
Two trunk lines. 700 acres. 8100 feet on vein. Splendid concentrating proposition. 1500 feet development. Mine average: Zinc, 17.66%; lead, 9.57%; silver, 7.35 ozs.; gold, .04 ozs. Price, $30,000. Principals only. H. B. RUNKLE, El Paso, Texas.

FOR SALE.
AIR COMPRESSORS.
6x8 and 10x12 Knowles, belted, straight line, high duty Air Compressors.
THE S. H. SUPPLY CO.
WRITE FOR CATALOGUE OF MINING MACHINERY AND SUPPLIES.
22nd and Larimer Sts., DENVER, COLO.

Hydraulic Pipe FOR SALE CHEAP.
1500 feet of 10⅝-inch Casing weighing 27 lbs. to the foot, with Flanges, or Screws and Sockets; in lots to suit. Immediate delivery. Correspondence solicited.
C. J. TALLON,
308 Market Street,........San Francisco, Cal

ASSAY OFFICE FOR SALE.
An old established and completely equipped Assay Office and Chemical Laboratory, doing a good business in Denver, Colo.; power plant with crushing and grinding apparatus in connection. Good business reasons for selling. Bargain if sold at once. Address Q 641, Mining and Scientific Press.

BENJAMIN T. LLOYD,
STOCKS, BONDS AND MINES.
Have immediate customers for well-developed Gold and Copper Properties.
P. O. Box 608, SALT LAKE CITY, UTAH.

WANTED.

WANTED.—A COMPETENT AND RELIABLE man to take charge of a gold quartz mine and stamp mill in Sinaloa, Mexico. Must understand assaying and have business qualifications. References as to ability and honesty required. Address C. L. Merry, Pres. H. G. M. Co., Kansas City, Mo.

TO MINING EXPERTS.
WANTED.—A proposition containing magnetic pyrites (Fe_7 S_8 to Fe_{11} to S_{12}).
Address THOS. L. NEAL, Attorney, Lankershim Block, Los Angeles, Cal.

Experienced Coal Miners
can secure steady employment either on contract or by day's work at the TESLA COAL MINES, Tesla, Alameda County, California. Good wages guaranteed, also good board. Good climate, and also good accommodations and houses for families.
For further particulars, please apply to the Superintendent at the Mines, or to the Company at 328 Montgomery St., San Francisco, Cal.

WANTED.
An Ore Tramway—Bucket or Jig Back—Cable and Terminals.
Must be in perfect order for use in central Arizona. Length 1700 feet. Grade 24%. Daily capacity 80 to 100 tons. Address "TRAMWAY," 406 Rookery Building, Chicago.

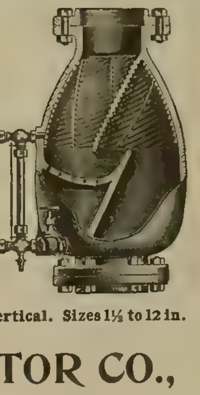
REFRACTORY ORES
WANTED.
1000 TONS or more which will assay $75.00 Gold per ton and over, delivered free of charge at San Francisco, Cal. Correspondence solicited.
C. J. TALLON,
308 MARKET STREET, SAN FRANCISCO, CAL.

We Guarantee Capacity.
The actual capacity of Cross Oil Filters is guaranteed as rated. No 15-gallon price on a 10-gallon Filter. Remember this when making comparisons.

The Cross Oil Filter
Is the least expensive when actual results are considered.
Sent on approval and freight paid both ways if they do not fulfill our guarantee to save 50 per cent.
Catalogue 38.
THE BURT MFG. CO.,
Akron, Ohio, U. S. A.
Largest Mfrs. of Oil Filters in the World.

ERICSSON SWEDISH TELEPHONES
Seem to possess almost human intelligence. They respond to every requirement in a smooth, positive fashion that shows what a perfect telephone can do. Besides this they have unequalled strength and durability. Their reputation as "STANDARD OF THE WORLD" is built on merit. Is the best too good for you?
ERICSSON TELEPHONE CO. 296 BROADWAY NEW YORK.

Butting Your Head Against a Rock
is a poor way to make gravel, but it's on a par with the principle of wasting the energy of good steam by allowing it to pound against water in the engine cylinder.
Wet steam is more than a nuisance—it's dangerous.
Austin Separators
deliver dry steam, increase the efficiency of your engine and save money. We demonstrate this at our own expense. Let us send you one on approval. Freight paid both ways if not satisfactory.



Vertical. Sizes 1½ to 12 in.
AUSTIN SEPARATOR CO.,
27 W. Woodbridge St.,
Detroit, Mich., U. S. A.

UNION IRON WORKS,

★ ★ 222 Market Street, San Francisco, Cal. ★ ★

Manufacturers of All Classes of MINING MACHINERY.

COPPER AND LEAD-SILVER SMELTING PLANTS,

Latest Improved Water Jacket Furnaces,

CONVERTERS AND ROASTING FURNACES,

Hoisting and Pumping Machinery,

AIR COMPRESSORS,

Stamp Mills and Concentrating Plants,

HIGH GRADE ENGINES AND BOILERS.

STEAM LOCOMOBILE FREIGHTING TRAIN.

CAPACITY OF WAGONS 16 TONS EACH, or total freight carrying capacity of train 50 tons.

CAPACITY OF ENGINE, 50 H. P.

THESE WAGONS ARE ESPECIALLY DESIGNED FOR STEAM FREIGHTING.

CAPACITY OF TRAIN, 50 TONS.

"The Daniel Best" 50-Horse Power Traction Engine.

The most powerful and only Successful and Practicable Road Engine in the world. Eighty of them in use on this Coast. They are being Successfully and Profitably Employed in Hauling Logs, Lumber, Ore, Salt, Borax and other kinds of freight.

The work is being done **FIFTY PER CENT** Cheaper than it is possible to do with Animal Power. They can be operated over any ordinary road where it is practicable to use mules or horses, doing the same work. They can ascend grades as much as 10% to 20%, hauling their loads of 35 to 40 tons, depending upon the condition of the roads; loads may be increased to even greater amount on a firm and moderately level road.

Send for descriptive Circulars and Price List of Engines and Wagons. We solicit correspondence. No trouble to answer questions.

Estimates made for complete Steam Freighting Outfits. Address

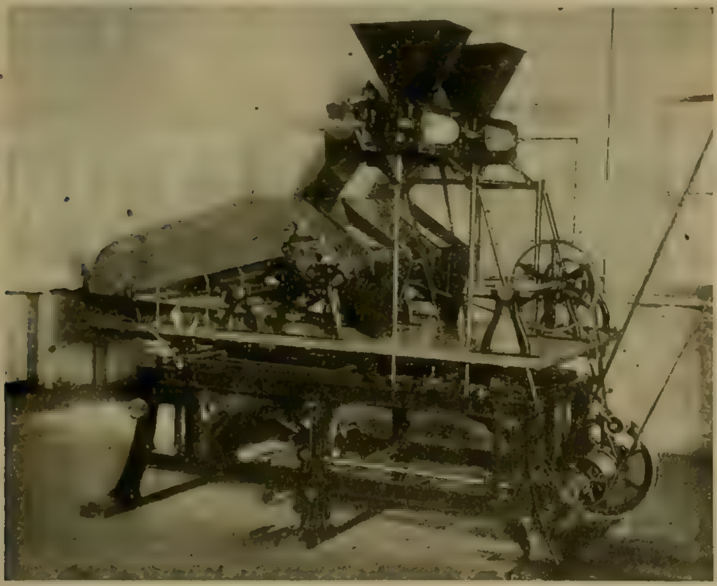
THE BEST MANUFACTURING CO.,

San Leandro, Cal., U. S. A.

CROWN GOLD MILLING CO.

Manufacturers of the "CROWN" CONCENTRATOR and CROWN ORE SIZER. A dry process of sizing and concentrating ore, sand or gravel. Designed to accord fully with the laws of specific gravity, and especially adapted to refractory ore or localities where there is no water.

The chief claims for the Crown Concentrator are that it occupies less floor space and has nearly four times the capacity of any wet concentrator; that it will concentrate ores containing base and refractory metals that ordinarily slime and carry off values; that it effects a saving of values far above the ordinary methods of concentration.



We have, now in operation, a complete plant for crushing, sizing and concentrating ores by the

Crown Dry Milling Process.

Mine owners desiring tests made can forward us, freight prepaid, not less than 1000 lbs. nor more than 4000 lbs. of sample, for which a charge of $20 will be made. (This amount includes assaying, etc.)

Ores for which this process is adapted and of which consignments are solicited are any concentratable ores, pulps, tailings, or sands, carrying sufficient values, whether they have heretofore been profitably concentrated or not.

* * * *

Office,............................230 Post St.
Works,..................23 Stevenson St.
SAN FRANCISCO, CAL.

THE FULTON VARIABLE MOTION CONTINUOUS FLOW MINING PUMP.

Delivers a continuous stream with absolutely no water hammer so common with all other makes of pumps. Is particularly adapted to be driven by electric power, for the reason the resistance to motive power is almost uniform. I manufacture the **FULTON PUMP** in four sizes, ranging from 10 H. P. work to 50 H. P. work.

WRITE ME FULL PARTICULARS IN REGARD TO YOUR REQUIREMENTS.

The above cut is made from a photograph taken of a No. 3 FULTON PUMP at work on the 600 ft. level in the Tesla Mine at Tesla, Alameda Co., Cal.

Read what MR. O. NEWHOUSE, Consulting Engineer of the S. F. & S. J. Coal Co., has to say in regard to it.

OFFICE S. F. & S. J. COAL CO., TESLA, ALAMEDA CO., CAL., July 13, 1900.

Mr. A. T. Ames, Galt, Cal.—DEAR SIR: Replying to your favor of recent date, regarding the working of the Fulton Pump bought of you, will say: The pump is one of your No. 3 pumps, working in connection with a Fulton Double X, double plunger cylinder 5 in. diameter by 110 in. long; stroke of each plunger 2 ft. This pump is installed in our mine on the 600 ft. level, directly over our sump, and is forcing the water to the surface at one lift. We drive the pump with an electric motor, 30 H. P., connected direct to the pump with gear and pinion, and I am pleased to submit the following statement of duty:

Length of 6 in. column leading up incline to surface	805 ft.
Perpendicular head	640.88
Gauge pressure, actual	275 lbs.
" " theoretical	278.14 "
Barometer at pump	29.58 in.
" point of discharge	28.95 "
Temperature air	58 deg.
" water	76 "

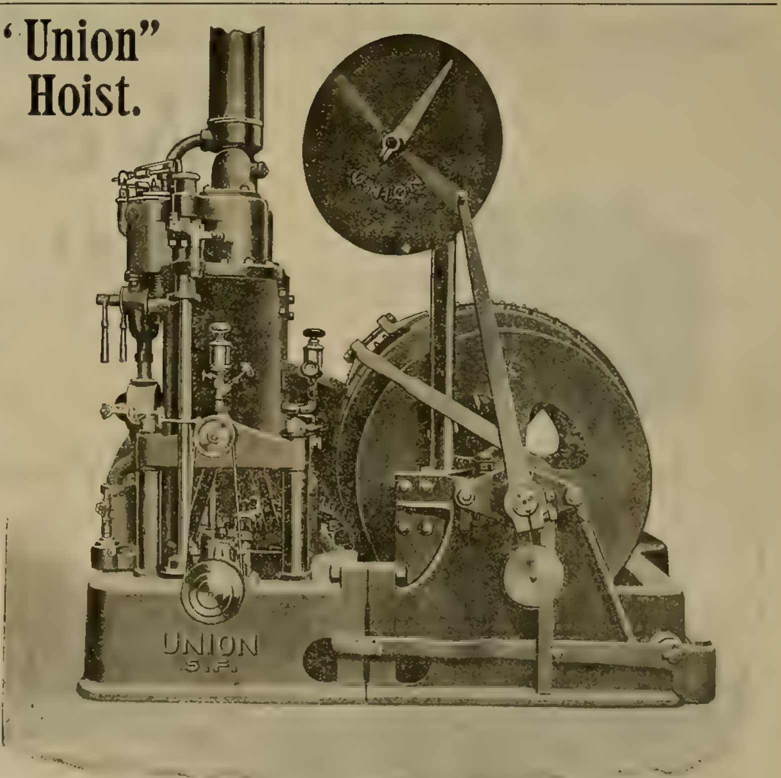
Strokes double per minute, 2 ft	25
Discharge, measured by box center thereof, under 5 in. head, equal to 1⅙ cu. ft., equal to gallons per hour	4725
Diameter of pump cylinder	5 in.
Net area of pump cylinder after deducting area of piston	17.868 sq. in.
Efficiency of pump when working under above conditions	84.80 per ct.

To say that we are highly pleased with our pump expresses it very mildly.

Signed, O. NEWHOUSE, Consulting Engineer S. F. & S. J. Coal Co.

Manufactured and Sold by A. T. AMES, Galt, Cal.

"Union" Hoist.



The above illustrates the 25 H. P. double cylinder, single drum "Union" hoist, with all the latest improvements.

THE UNION GAS ENGINE CO.

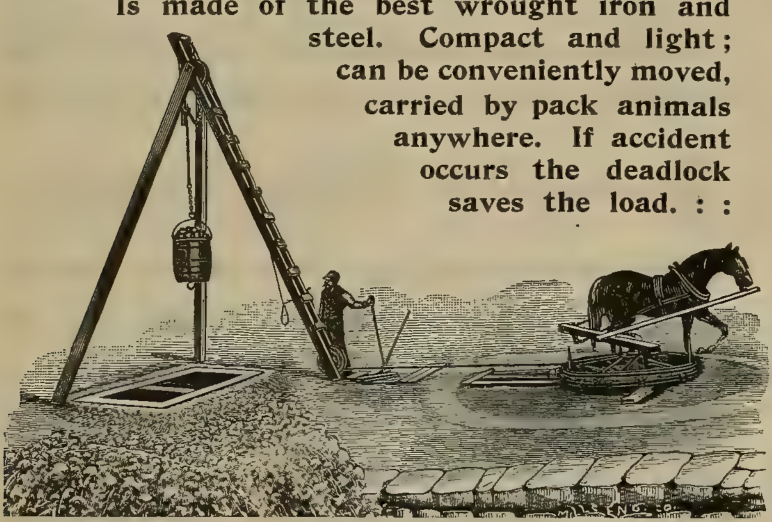
—BUILD THE—

"Union" Gas Engines,

Which use either MANUFACTURED or NATURAL GAS, ORDINARY STOVE GASOLINE (NAPHTHA or BENZINE), DISTILLATE or KEROSENE.

STATIONARY ENGINES for All Kinds of Work in Sizes from 8 to 300 h. p in actual use.
"UNION" COMBINED HOISTS in Sizes from 2 to 130 h. p. in actual use.
"UNION" COMBINED COMPRESSORS—20, 30, 40 h. p.
HOISTS and COMPRESSORS Can Be Built in Larger Sizes to Order.
"UNION" MARINE ENGINES, 4 to 200 h. p., of Single, Double and Four-Cylinder Types.
FIFTEEN YEARS' EXPERIENCE Building Gas and Oil Engines.
"UNION" ENGINES Are In Use All Over the United States.
"UNION" ENGINES Are Simple, Durable and Economical.

Office, 248 First Street. Works, Corner First and Clementina Streets. SAN FRANCISCO, CAL



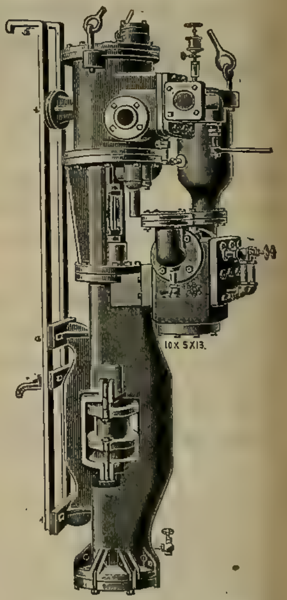
THE COMMON SENSE WHIM

Is made of the best wrought iron and steel. Compact and light; can be conveniently moved, carried by pack animals anywhere. If accident occurs the deadlock saves the load. : :

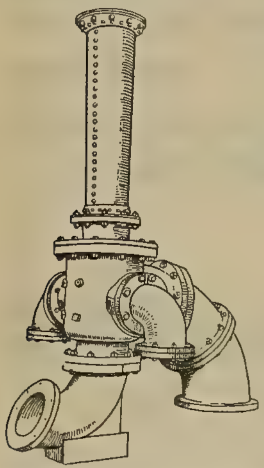
SINKING PUMPS,

Indispensable in sinking mining shafts or pumping out flooded mines. Easily raised or lowered by cable or rope. Equipped with outside packed plungers. Handles gritty or dirty water. Operates bolted to shaft timbers or only suspended by cable at any angle. Packing glands external. May be adjusted while in motion. Removable parts hinged. Steam movement positive and simple.

THE RISDON IRON WORKS,
MANUFACTURERS,
SAN FRANCISCO, CAL.



SEND FOR CATALOGUE.



THE EVANS HYDRAULIC ELEVATOR,

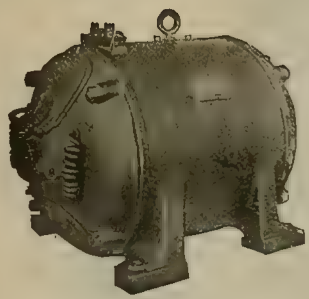
MANUFACTURED BY

RISDON IRON WORKS, San Francisco.

Used in Unwatering the Comstock Lode.

SEND FOR CATALOGUE NO. 5.

The cheapest and most efficient Water Elevator made.
It will do more and better work than any other Gravel Elevator.
It is fully protected by United States and Canadian letters patent.



Westinghouse D. C. Dust Proof Motor.

Westinghouse
Dust Proof Motors

Absolutely proof against dust, especially adapting them for operation in mills and mines.

Westinghouse Electric
& Manufacturing Co.

All Principal Cities
in U. S. and Canada.

Pittsburg, Pa.

65f

THE HALLIDIE ROPEWAY

For Transporting Ore, Fuel, Earth, Sugar Cane, etc., by Wire Ropes.

SIMPLE, ECONOMICAL, PRACTICAL, DURABLE.

LOADS MECHANICALLY. DUMPS AUTOMATICALLY.

WIRE TRAMWAYS (Single and Double Rope Systems),

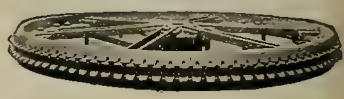
Cableways, Transmission by Wire Ropes,
Incline Planes, Cable Grips,
Logging by Cables, Automatic Loaders,

PLOWING, SCRAPING AND TRANSPORTING by Wire Ropes,

DESIGNED, SUPPLIED AND ERECTED. Estimates Furnished.

Improved GRIP PULLEY.

Patents Nos. 483,442; 610,353.



EFFECTIVE, SIMPLE, AUTOMATIC.

Saves Wear on Wire Rope and Cable.

Send for Illustrated Pamphlet.
Correspondence Solicited.

CALIFORNIA WIRE WORKS, - 9 Fremont St., San Francisco, Cal.

California Vigorit Powder Co.

—Manufacturers of—

Dynamite High Explosives and "Vigorit Low" Blasting Powder.

OFFICE: 208 CALIFORNIA STREET,
SAN FRANCISCO, CAL.

WORKS: POINT ISABEL,
CONTRA COSTA CO., CAL.

SULPHURIC ACID

MANUFACTURED BY
THE WESTERN CHEMICAL CO.
DENVER, COLO.

For Chlorination, Refining and other processes. Also Muriatic and Nitric Acids, Blue Vitriol, Copperas Commercial and C. P. Our chemically pure Acids and Ammonia are guaranteed perfect.

NO TROUBLE TO OPERATE--A BOY COULD RUN IT.

TO ASSAYERS:

This is our DOUBLE MUFFLE FURNACE, No. 37. The lower muffle is 10x16x6 inches, and will hold eight 20-gramme crucibles. The upper muffle is 6x12x4 inches.

One Cary burner, size 2 1-4 inches, heats both muffles simultaneously.

Starting with a cold furnace and burner, the first batch of eight crucibles can be poured in less than one hour from time of lighting match, and same cupelled in one hour and a half.

When furnace has become thoroughly heated, melts may be made every twenty minutes and cupellations every twenty-five minutes.

Further particulars on request to

F. W. BRAUN & CO.,
Modern Appliances for Assayers,
LOS ANGELES, CAL.

The Copper King, Limited.

Pacific Coast Smelting and Refining Works.

Works:
Seal Bluff Landing,
Cal.

Mines:
Fresno County,
Cal.

Purchasers, Samplers and Smelters
of
Gold, Silver and Copper Ores, and Furnace Products.

Offices:

222 Sansome St.,
San Francisco, California.

32 Old Jewry,
London, E. C., England.

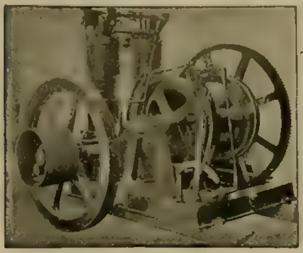
T.P. G.W.P. J.P. E.P.
PENNINGTON
TRADE MARK
SAN FRANCISCO, CAL.

OUR SPECIALTIES ARE:
**Hammered Steel Shoes and Dies,
Cam, Crank and Steamboat Shafts,
Rock-Breaker Plates,
Connecting Rods, Well-Boring Tools,
General Blacksmithing.**

Correspondence Solicited, and Circulars Mailed Upon Request.

GEO. W. PENNINGTON & SONS,
218 and 220 Folsom St.,............San Francisco, Cal.

THE BUCYRUS COMPANY,
DESIGNERS AND BUILDERS OF
DREDGES, STEAM SHOVELS, EXCAVATING MACHINERY,
WRECKING CARS, LOCOMOTIVE CRANES, PILE DRIVERS,
CENTRIFUGAL PUMPS, WITH SIMPLE, COMPOUND OR TRIPLE EXPANSION ENGINES,
MACHINERY FOR PLACER MINING.
SOUTH MILWAUKEE, WISCONSIN.



Mining Hoist.

THE GOLDEN GATE GAS ENGINE
Will raise more ore than any other **AT LESS COST.**
MANY IN USE, Giving Satisfaction.
Built for any Capacity and for any Purpose.
Pumping Water, Propelling Boats, Hoisting Ore, Machine Shop Power, Etc.

Send for Particulars and Catalogue.

ADAM SCHILLING & SONS,
213 & 215 Main St., San Francisco, Cal.

New Process of Copper Extraction.
CHEAP, CLEAN AND EFFECTIVE.
THE GARDINER LEACHING PROCESS
FOR COPPER ORES.
TESTS MADE ON ANY QUANTITY OF ORES AT REASONABLE RATES.
FULL PARTICULARS ON APPLICATION.
THE AMERICAN COPPER MINING & EXTRACTION CO., DENVER, COLO.

QUARTZ SCREENS

A specialty. Round, slot or burred slot holes. Genuine Russia Iron, Homogeneous Steel, Cast Steel or American planished Iron, Zinc, Copper or Brass Screens for all purposes. CALIFORNIA PERFORATING SCREEN CO., 145 and 147 Beale St., S. F.

PERFORATED SHEET METALS OF EVERY DESCRIPTION
GEO. WIMMER
WORKS 312 IOWA ST.

Mining Screens

A SPECIALTY.

Diagonal Slot,
Straight "
Burred "
Round Holes.

In American planished or Russian iron or steel for all purposes. GEO. WIMMER, 312 Iowa Street, San Francisco. Telephone Mint 1332.

—EASTERN PRICES BEATEN.—

SAN FRANCISCO
Pioneer Screen Works,
JOHN W. QUICK, Prop.

Improved Facilities! Finest Work! Lowest Prices!

Perforated Sheet Metals, Steel, Russia Iron, American Planish, Zinc, Copper and Brass Screens for All Uses.

MINING SCREENS A SPECIALTY.

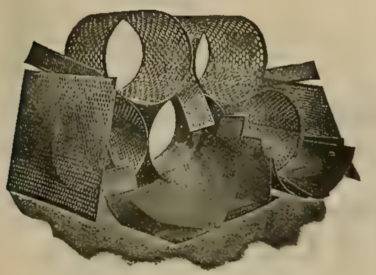
221 and 223 First Street, San Francisco, Cal.

For Best Satisfaction and Lowest Prices

—IN—

PERFORATED METALS

—AND—

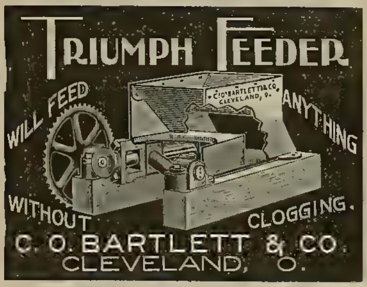


MINING SCREENS

PLACE YOUR ORDERS WITH

Fraser & Chalmers,
CHICAGO, ILL., U. S. A.

SEND FOR SAMPLES, MENTIONING THIS PAPER.



TRIUMPH FEEDER

WILL FEED ANYTHING WITHOUT CLOGGING.

C. O. BARTLETT & CO.
CLEVELAND, O.

C. O. BARTLETT & CO., CLEVELAND, O.

PRICE, $50.00.

Mining, Mill, Driving Lamps

—AND—

Locomotive Headlights.

◆◆◆◆◆◆

SIZES ON HAND:
24-inch,
20 "
17 "
14 "
12 "
10 "
8 "
6 "

Boesch Lamp Co.,

Pacific Lamp and Reflector Factory,
585 MISSION STREET, : : : : : SAN FRANCISCO.

DEWEY, STRONG & CO.
SCIENTIFIC PRESS PATENTS PATENT AGENCY
330 MARKET ST. S.F.

WHO BUILD THE BEST STAMP MILL?

FRASER & CHALMERS,

CHICAGO, ILL., U. S. A.
AND LONDON, ENGLAND.

The Bleichert Wire Rope Tramway,

Bleichert Tramway of the Cambria Steel Co., Johnstown, Pa., showing guard-bridge across Penna. R. R.

AND OTHER SYSTEMS OF AERIAL TRANSPORTATION,

MANUFACTURED BY

The Trenton Iron Co.,
TRENTON, N. J.

Engineers and Contractors, and sole licensees in North America for the Bleichert System. Also, Wire Rope Equipments for Surface and Underground Haulage, etc.

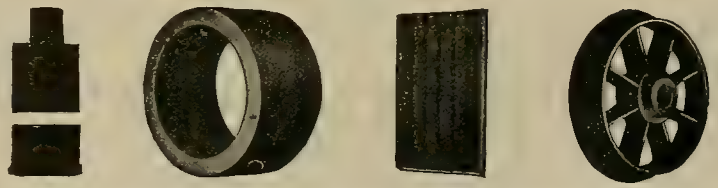
NEW YORK OFFICE—Cooper, Hewitt & Co., 17 Burling Slip.
CHICAGO OFFICE—1114 Monadnock Building.

For Particulars, Address

Newton M. Bell, Agent,
308 MARKET ST., SAN FRANCISCO.

A full stock of the Trenton Iron Co.'s Wire Ropes, made from "SPECIAL" Crucible and Plough Steel, carried in San Francisco.

HARD



TOUGH

TAYLOR IRON AND STEEL COMPANY,

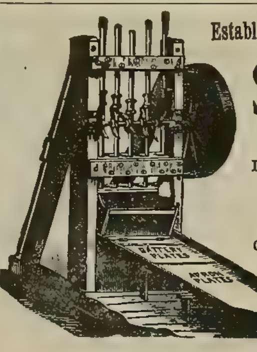
HIGH BRIDGE, NEW JERSEY, U. S. A.

Sole Licensees in America under the HADFIELD System and Patents for **MANGANESE STEEL,**

Best Metal Known for Roll Shells, Stamp Shoes and Dies, Crusher Plates and Side Liners, Toggles and Toggle Bearings, Gyratory Cones and Concaves, or Liners, Mine Car Wheels, Coal Crushing Rolls, Etc.

PACIFIC COAST PARTIES INTERESTED PLEASE ADDRESS PARKE & LACY CO., SAN FRANCISCO, CAL.

WRITE FOR INFORMATION AND PRICES.



Established 1865. **NOTICE TO GOLD MINERS.** Incorporated 1890.

Silver-Plated Copper Amalgamated Plates

FOR SAVING GOLD

IN QUARTZ, GRAVEL OR BEACH MINING. MADE OF BEST SOFT LAKE SUPERIOR COPPER.

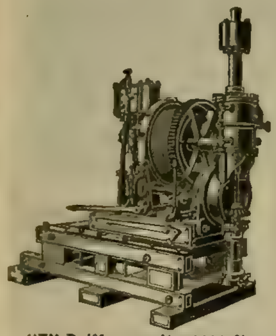
AT REDUCED PRICES.

Our Plates are guaranteed, and by actual experience are proved, the best in weight of Silver and durability. Old Mining plates replated, bought, or gold separated. THOUSANDS OF ORDERS FILLED.

SAN FRANCISCO NOVELTY AND PLATING WORKS,

☞SEND FOR CIRCULARS. Telephone Main 976. 68, 70, 72, 74 and 76 FIRST STREET, COR. MISSION, SAN FRANCISCO, CAL.

"GIANT" DRILLS AND COMPRESSORS
ARE THE BEST.
"GIANT" BABY DRILLS CHEAPEN MINING.
WRITE US FOR PARTICULARS.
THE COMPRESSED AIR MACHINERY CO., 11-13 First St., San Francisco, Cal.



SULLIVAN
Diamond Core Drills
FOR PROSPECTING. Catalogue 29.
The most extensive line of sizes and styles ever offered.
CONTRACTORS FOR PROSPECTING WITH DIAMOND DRILL.
ROCK DRILLS
FOR MINING. Catalogue 30.
Superior valve and ratchet motions. The highest possible grade.
Send for Our New Catalogues.
Sullivan Machinery Co.,
New York. Pittsburg. Claremont, N. H.
Main Office, CHICAGO......................54 to 60 N. CLINTON ST.
Western Office, DENVER..................332 SEVENTEENTH ST.
Pacific Agency, SAN FRANCISCO, HENSHAW, BULKLEY & CO.

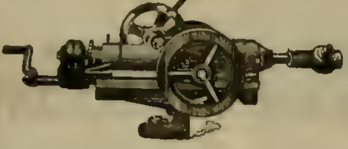
"N" Drill, capacity 2000 ft.
Cable Address, Diamond, Chicago.
Codes: A. B. C., 4th Edition. Postal Directory. Western Union. Liebers.

Established 1837.
I. C. Yawger,
Successor to VICTOR BISHOP & CO.
IMPORTER OF CARBONS FOR DIAMOND DRILLS.
21 Maiden Lane, - NEW YORK

DIAMOND DRILLS
FOR PROSPECTING.
AMERICAN DIAMOND ROCK DRILL CO.
120 LIBERTY ST N.Y.

THEODOR LEXOW, 14 JOHN STREET, N. Y.
......Importer of......
CARBONS
(BLACK DIAMONDS)
For DIAMOND DRILLS and all Mechanical Purposes.
HENRY DEMMERT.

RAND ROCK DRILLS and Drill Mountings.
HIGHEST DEGREE OF PERFECTION ATTAINED. ∴ INDISPENSABLE IN MINING, TUNNELING & EXCAVATING.
AIR -AND- Gas COMPRESSORS.
STANDARD TYPES! SPECIAL PATTERNS! ALL SIZES!
RAND DRILL CO., 100 BROADWAY, New York, U. S. A.
San Francisco Office: 223 First St.
1328 Monadnock Blk., CHICAGO, ILL.



THE JACKSON HAND POWER ROCK DRILL.
Works in Any Rock, in Any Position.
Write for Circulars and References.
THE JACKSON DRILL & M'F'G CO.,
1756 Larimer Street, DENVER, COLO.
Sole Licensees for all Foreign Countries and Eastern United States: THORNTON N. MOTLEY COMPANY (INC.), 43 John St., New York.
AGENTS: CHAS. B. BOOTHE & CO., 126 SO. LOS ANGELES ST., LOS ANGELES, CAL.

FIRTH'S DRILL STEEL.
USE THE BEST.
Has no equal in Hard Rock Drilling.
ABNER DOBLE COMPANY, GEN. AGTS.,
FREMONT AND HOWARD STS., SAN FRANCISCO.
Sold by Seattle Hardware Co., Seattle, Wash.

CANTON STEEL COMPANY,
—— Manufacturers of ——

CANTON DRILL STEEL.

UNEQUALED FOR TOUGHNESS AND ROCK-CUTTING QUALITIES. WRITE FOR 1900 STEEL LIST, CONTAINING ENDORSEMENTS AND USEFUL INFORMATION.
Works: CANTON, OHIO. Branch Warehouse: DENVER, COLO.

ANY BOOK
ON ANY SUBJECT
Connected with Mining, Metallurgical, Mechanical or Industrial Interests,
WILL BE SENT ANYWHERE, POSTPAID,
AT PUBLISHER'S PRICES.
SEND FOR CATALOGUE OF LINE DESIRED.
ADDRESS BOOK DEPT. MINING AND SCIENTIFIC PRESS,
NO. 330 MARKET STREET, SAN FRANCISCO, CAL.

BULLOCK DIAMOND DRILLS
If you are interested in prospecting send for our new Diamond Drill Catalogue (No. 33).
BULLOCK MINING MACHINERY
PORTABLE HOISTS—Send for our new Catalogue (No. 40). CHAMPION MINE VENTILATORS—Send for our new Catalogue (No. 35).
HOISTING AND HAULAGE PLANTS, ORE CARS, SKIPS, CAGES, ETC., ETC.
PARKE & LACY CO., Agent,
21 & 23 Fremont St., San Francisco, Cal.
M. C. BULLOCK MFG. CO.,
1172 West Lake St., Chicago, Ill., U. S. A.

The "Stop for Repairs" to Mining Machinery,

Especially if it is a conveying plant, is a considerable item of expense. Many of these expensive pauses are made to repair or adjust faulty belting. To economize in this respect, use the

LEVIATHAN CONVEYOR BELT.

It is not only adapted to the heaviest service, but will run under any conditions in underground, drippings, extreme heat or cold.

IT WILL OUTLIVE ANY OTHER BELTING.

MAIN BELTING COMPANY,

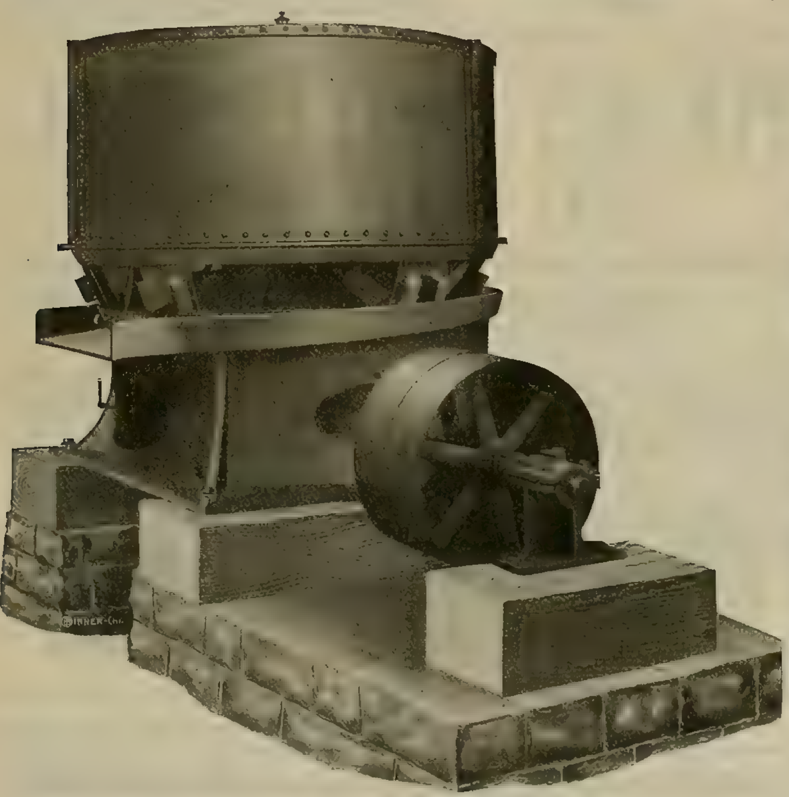
1225-41 Carpenter Street, Philadelphia.
55-57 Market St., Chicago. 120 Pearl St., Boston.

SEND FOR PRICE LISTS AND SAMPLE.

GATES IRON WORKS,

SOLE MANUFACTURERS OF THE

BRADLEY CHILIAN MILL,



Unsurpassed for regrinding tailings or for other fine pulverizing.
ALL KINDS OF HIGH GRADE MINING MACHINERY.
650 Elston Ave., CHICAGO.

P & B Building Paper..

A perfect insulation for cold storage houses and refrigerators.
Unequaled in residence construction.
A protection against heat, cold, dampness, dust, draught and vermin.
Demand it of your dealer — you need it in your buildings.
Paraffine Paint Co—116 Battery, San Francisco

SMOOTH-ON TRADE MARK CASTINGS.

An iron cement for repairing leaks or fractures in steam or hydraulic work. When hard it will withstand a red heat, steam, water or oil, and expands and contracts with heat and cold the same as iron, insuring a tight joint at all temperatures. Difficult flange connections can easily be made with Smooth-On, as it adapts itself to the flanged faces whether parallel or not. Connections are easily taken apart. Unequaled for boiler patching, and repairing blemishes in iron castings. Write for catalogue and prices. Sole proprietors and manufacturers: Smooth-On Mfg. Co., Jersey City, N. J., U. S. A.

MESSRS. MADISON, BRUCE & SELLERS,
24-36 STEUART ST., SAN FRANCISCO, CAL.......................AGENTS FOR PACIFIC COAST.

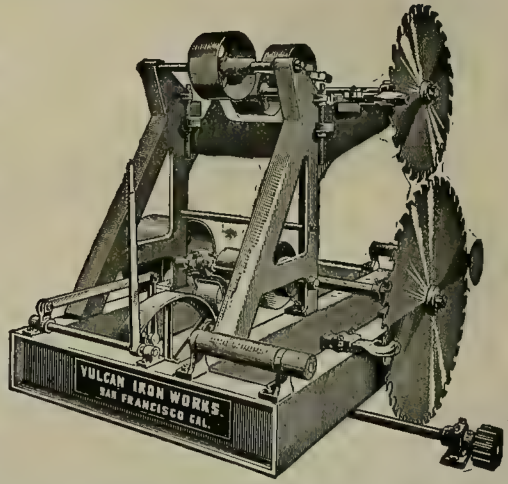
Portable Saw Mills.

No. 0
Single Circular.
4000-6000 feet per day.

No. 1
Single Circular.
8,000-10,000 ft. per day.

No. 2
Double Circular.
15,000-20,000 ft. per day.

No. 3
Double Circular.
20,000-25,000 ft. per day.


VULCAN IRON WORKS. SAN FRANCISCO CAL.

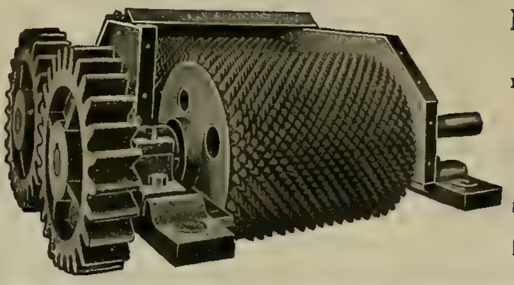
For
Mining
Companies
—OR—
Other Consumers
of Lumber at
Remote Points.

SEND FOR CATALOGUE.

Manufactured by

VULCAN IRON WORKS, Office, 505 Mission Street, SAN FRANCISCO, CAL.

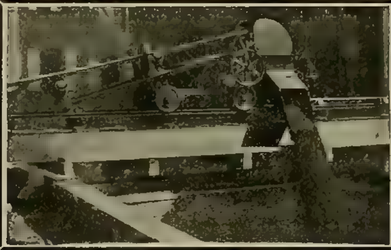
LINK-BELT ELEVATORS —AND— CONVEYORS.



BREAKER ROLLS,
PICKING TABLES,
MALLEABLE IRON BUCKETS,
SHAFTING, PULLEYS,
GEARING, CLUTCHES, Etc.

Catalogue Upon Application.

LINK-BELT MACHINERY CO.,
Engineers, Founders, Machinists,
CHICAGO, U. S. A.
DENVER, 1328 17th St.,
A. E. LINDROOTH, Manager.



ROBINS BELT CONVEYORS

HANDLE

ORE, GRAVEL, TAILINGS, DREDGINGS.

Cut shows conveyor elevating and distributing coal in storage.

New Catalogue Now Ready.

ROBINS CONVEYING BELT CO.,
Park Row Building, NEW YORK.

THE WM. HAMILTON MANUFACTURING CO.,
LIMITED,

MINING MACHINERY,

PETERBOROUGH, ONTARIO,

CANADA.

McFARLANE & CO.,

1734 FIFTEENTH ST., DENVER, COLO.

Mining and Milling Machinery.

STAMP AND CONCENTRATING MILLS BUILT AND ERECTED.

STEAM AND ELECTRIC HOISTS, CRUSHERS, ROLLS, REVOLVING SCREENS, JIGS.
ORE CARS, CYANIDE TANKS, CORNISH PUMPS, CORLISS ENGINES.

CARY SPRING WORKS,

240 & 242 WEST 29th STREET, NEW YORK, U. S. A.

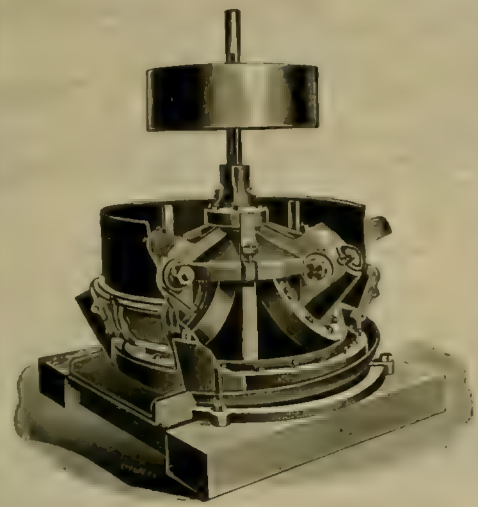
Telephone, 3346—38th St.

WIRE SPRINGS

OF EVERY DESCRIPTION.

MANUFACTURERS OF
All kinds of ROUND AND FLAT WIRE, TEMPERED AND UNTEMPERED.
SPRINGS
For Machinery, Rolling Shutters, Motors, Etc.

MUSIC BOX AND FINE SPRINGS OUR SPECIALTY.

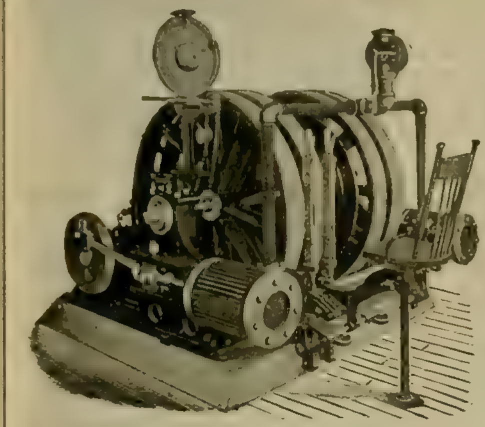


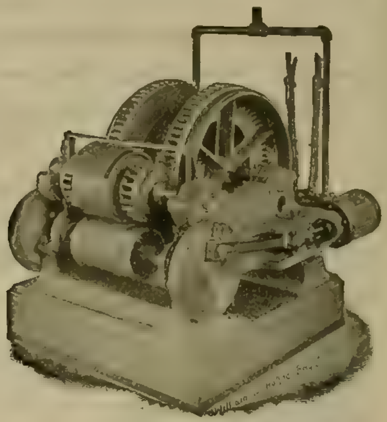
THE GRIFFIN
THREE ROLLER
ORE MILL.

The Griffin Three Roller Ore Mill is a simply constructed Mill, suitable for working all kinds of ores that require uniformly fine crushing by the wet process. This Mill is a modification of the well-known Chilian Mill, but the rollers run upon a crushing ring or die, which is inclined inwardly at an angle of about 30 degrees, the rollers themselves also being inclined to the central shaft of the Mill, thus utilizing the centrifugal force, as well as the weight of the rollers themselves as a crushing agent. The Griffin Three Roller Ore Mill is therefore a Mill of great strength, and has few wearing parts. We construct these Mills with extreme care, using only the best of raw materials, which are most carefully worked by men who are specialists as mill builders. We sell the Griffin Ore Mill on its determined merits, and will gladly supply full information regarding it to any one.

SEND FOR FREE ILLUSTRATED AND DESCRIPTIVE CATALOGUE TO

Bradley Pulverizer Co., Boston, Mass.





BOLTHOFF'S
HOISTING ENGINES
ARE POPULAR
Wherever Used
AND
Used Everywhere.

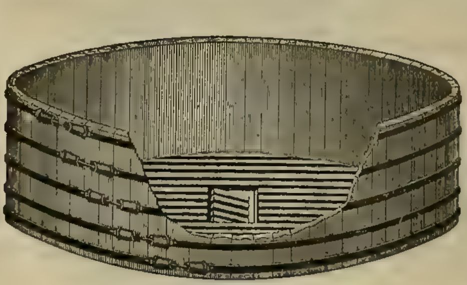
SEND FOR OUR SPECIAL HOISTING MACHINERY CATALOGUE.

The Hendrie & Bolthoff M'f'g & Supply Co.
No. 37. DENVER, - - - - - - COLORADO.

SHOES and DIES
of SUPERIOR quality and at prices 20 to 30% lower than any other maker.
FURNISHED BY
ARTHUR KOPPEL,
66 Broad St., N. Y. City.
Write for Particulars.

MINING CARS of every description.
PORTABLE RAILWAYS,
Rolling Stock, Railway Outfits for Mines of every description.
Export Work a specialty.
ARTHUR KOPPEL,
66 Broad St., N. Y. City.
Send for Catalogue and Estimates.

Pacific Coast Agents, BAKER & HAMILTON, SAN FRANCISCO and SACRAMENTO.

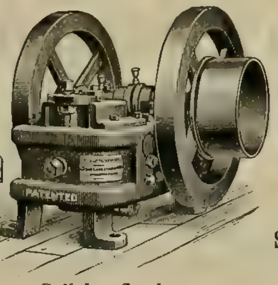


FOR CYANIDE PLANTS OR MINING—
TANKS
OF ANY DESCRIPTION.
Write to
PACIFIC TANK CO.,
348 E. 2nd Street, Los Angeles.
35 Beale Street, San Francisco.
Illustrated Catalogue Mailed Free.

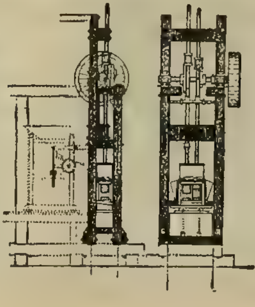
TANKS!
LUMBER AND HOUSE FINISH.
TANKS FOR WATER, WINE OR OIL.
Jig Frames, Jig Screens, Zinc Boxes,
and Tanks of Every Description for Mining Purposes.
WRITE FOR ESTIMATES ON YOUR WANTS.

C. A. HOOPER & CO., Agents,
204 Front Street, San Francisco, Cal.

THE EXCELSIOR REDWOOD CO.,
FOURTH AND CHANNEL STREETS,
SAN FRANCISCO, CAL.



The ONLY
FINE CRUSHER
OF HARD ROCK.
Reduces to Gravel and Sand.
Does as fine work as Breaker and two sets of rolls.
Roll Jaw Crusher.
STURTEVANT MILL CO.
113 CLAYTON ST.
BOSTON, MASS.
SEND FOR CIRCULAR.



MODERN MINING MACHINERY.
QUARTZ MILLS of any capacity,
IN UNITS OF TWO AND FIVE STAMPS.
Acme Amalgamators for CAPE NOME
and other placer mining. Successfully applied to quartz mills in addition to or displacing plates.
SUCCESSFUL GRAVEL MILL RECENTLY IMPROVED.
Special Gold Dredging Pumps and Machinery. Concentrators, Feeders, Rock Breakers and Power Plants.
Largest manufacturers of Irrigation and Reclamation Pumps in the United States.
Catalogues: No. 20, Pumps; No. 22, Cape Nome; No. 25, Mining.
KROGH MANUFACTURING CO.,
9-17 Stevenson St. and 134-136 Main St., SAN FRANCISCO, CAL.

HEALD'S

BUSINESS COLLEGE.

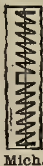
24 Post Street, - - - San Francisco.

MINING AND CIVIL ENGINEERING DEPARTMENT: Mathematics, Draughting, Strength of Material, Chemistry, Assaying, Blow-Pipe Analysis, Geology, Mineralogy, Surveying, etc., under the direction of Prof. O. H. Packer, an engineer of national reputation.

ELECTRICAL DEPARTMENT: Theory and Practice; Construction,

BUSINESS: Bookkeeping, Shorthand, Typing, Modern Languages, etc.

Twenty teachers; individual instruction; can enter at any time; Catalogue and Journal free.



Notice the Shape of

GLOBE BOX---THE BEST BABBITT.

Send for trial order, Ladle free.

The Globe wire lace makes the smoothest joint, runs the stillest and lasts the longest of any lacing. Sent on approval. Write us for booklet with instructions, etc. J. M. HAYDEN & Co., 58 Pearl St., Grand Rapids, Mich.

JEFFREY SPECIALTIES.

DUMP CARS.

We manufacture: Chains (Standard and Special), Sprocket Wheels, Coal Conveyors, Cable Conveyors, Coal Screens, Ore and Stone Buckets, Dredges, Hoisting Machinery, Sand Handling Machinery, Water Elevators, Spiral Conveyors, Dump Cars, Skip Cars, Clay Screens, Columbian Separator (for Treating Cement, Cement Clinkers, Ores, Marble, Quartz, etc.

Our Prices Will Interest You.

For Catalogue, Address

THE JEFFREY MFG. CO., Columbus, Ohio.

Western Branch, Equitable Bdg., Denver, Colo.

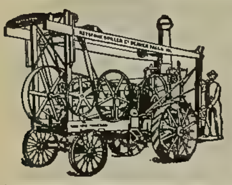
WEST COAST OF MEXICO.

WÖHLER, BARTNING Suc's, Mazatlan (Sinaloa), Mex.

Bankers, Importers, Exporters and Commission Merchants.

Representatives and Agents of the principal Mining Companies in the State of Sinaloa and the dependencies of the Pacific coast in the States of Durango, Chihuahua, Sonora, Lower California and Jalisco.

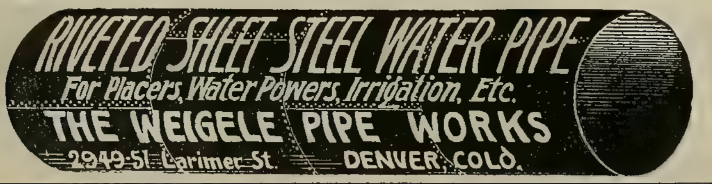
ORE BUYERS AND EXPORTERS. - MINING SUPPLIES.



Prospecting Machinery.

Multitudes in use for testing for minerals. Sizes and equipments to suit any and all conditions. Unexcelled for Placer Testing, Oil Wells, Water Wells, testing for Lead and Zinc, Iron and Coal; goes through anything; brings up everything. Large sizes drill as much as 1500 feet. In use all over the world. Every purchaser pleased. Used on boats for testing river and lake beds. Water no hindrance. No skilled labor required.

KEYSTONE DRILLER CO., Beaver Falls, Pa., U. S. A.



RIVETED SHEET STEEL WATER PIPE

For Placers, Water Powers, Irrigation, Etc.

THE WEIGELE PIPE WORKS

2949-51 Larimer St. DENVER, COLO.

Are You Confronted With a Difficult Ore-Separating Problem?

THE WETHERILL MAGNETIC SEPARATING PROCESS

may prove the solution. Apply to Wetherill Separating Company, 52 Broadway, N. Y

PIPE BARGAINS.

Suitable for Water Mains, Mining, Irrigation, Air, Oil, etc, etc. New Spiral Welded Asphalted Steel Pipe with any style coupling desired.

460 ft. 6-in. 3,480 ft. 10-in. 1,828 ft. 14-in. 1,077 ft. 18-in.
50,000 " 8 " 2,428 " 12 " 520 " 16 " 1,623 " 24 "

All Sizes Wrought Pipe, Well Casing and Straight Riveted Pipe in Stock. Equipment of All Kinds for Mine, Railroad and Contractors' Outfits. Write for Prices and Particulars.

BOWES & CO., 23 Lake St., Chicago, Ill.

Trommel Screens

THE ROBERT AITCHISON PERFORATED METAL CO.

303 TO 305 DEARBORN ST. CHICAGO, ILL.

GENERAL PHOTO-ENGRAVING CO.

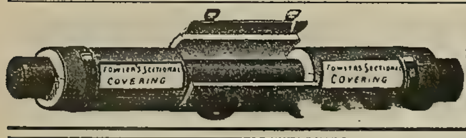
[SUCCESSORS TO DEWEY ENGRAVING CO.]

FINE ZINCOGRAPHS, HALF-TONES, AND DESIGNING.

ENGRAVINGS OF MACHINERY OUR SPECIALTY.

SEND FOR SAMPLES AND PRICES.
TELEPHONE BLACK 1466.

NO. 536 CLAY STREET,
SAN FRANCISCO, CAL



FOWLER'S AIR SPACE

and Asbestos Sectional Covering.

As a Non-Conductor, Unequaled.

Special Rates for Steam Boilers and Drums.

G. C. Fowler, 656-58 Howard St., S. F.

MINE BELL SIGNALS.

Adopted, Used and in Force in Accordance with Law.

We print in legal size, 12x36 inches, the Mine Bell Signals and Rules provided for in the Voorhies Act passed by the California Legislature. The law is entitled "An Act to Establish a Uniform System of Bell Signals to Be Used in All Mines Operated in the State of California, for the Protection of Miners." We furnish these Signals and Rules, printed on cloth so as to withstand dampness. **50 Cents a Copy.**

MINING AND SCIENTIFIC PRESS, 330 Market St., San Francisco, Cal.

STEEL RAILS, TRACK FIXTURES,

PRODUCT PENNSYLVANIA STEEL COMPANY.

BAR, SHEET AND BOILER STEEL,

STRUCTURAL MATERIAL,

Cold Rolled Shafting.

GEORGE W. GIBBS COMPANY,

33-39 Fremont Street, 38-40 Beale Street,

CORRESPONDENCE SOLICITED. SAN FRANCISCO, CAL.

OUR 24-INCH WRENCH IS ESPECIALLY ADAPTED FOR MINE WORK.

The Johnston Patented Pipe Wrench.

A Strictly High-Grade Tool---Drop-Forged---Warranted.

THE STRONGEST, SIMPLEST AND BEST.

Never Jams, Self-Adjusting, Self-Releasing.

MADE IN 3 SIZES:

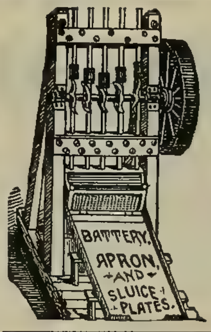
	10 in.	16 in.	24 in.
Pipe	⅛ to 1 in.	¼ to 1½ in.	½ to 2½ in.
List	$2 25	$3.00	$6.00

WM. B. VOLGER,

SOLE MANUFACTURER,

88 Chambers St., NEW YORK.

Agencies: THE MINE & SMELTER SUPPLY CO., Denver and Salt Lake City.



To Gold Miners!

Silver Plated Copper Amalgamating Plates

For Saving Gold in Quartz and Placer Mining.

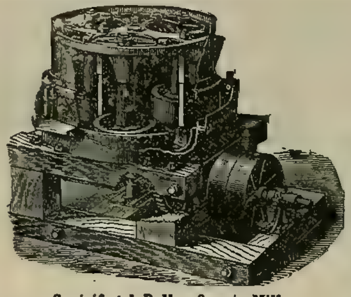
ONLY BEST COPPER AND REFINED SILVER USED. OLD MINING PLATES BOUGHT OR TAKEN IN EXCHANGE FOR NEW PLATES. GOLD EXTRACTED FROM OLD PLATES AT A MODERATE COST. OLD PLATES REPLATED. GOLD, SILVER, NICKEL, COPPER AND BRASS PLATING.

Denniston San Francisco Plating Works,

652 Mission Street, Cor. Annie, San Francisco, Cal.

E. G. DENNISTON, - - - - - - - - - - Proprietor.

—:Send for Circular.:—



Centrifugal Roller Quartz Mill.

F. A. HUNTINGTON,

—Manufacturer of—

CENTRIFUGAL

Roller Quartz Mills.

CONCENTRATORS and ORE CRUSHERS.

Mining Machinery of Every Description.

Steam Engines, Shingle Machines.

Room 1, 3d Floor, Mills Building,

SAN FRANCISCO, CAL.

TRADE MARK.

(M'ARTHUR-FORREST PROCESS.)

CYANIDE PROCESS.

The MacArthur-Forrest Cyanide Process is the Best

For the Treatment of Refractory and Low Grade Gold and Silver Ores and Tailings. We are the Originators of the Cyanide Treatment, and have kept up with the times in all Improvements in Cyanide Methods.

Successful Plants in Operation in all Western Mining States.

Samples Assayed and Fully Reported Upon. Properties Examined Designs Furnished. For Terms and Particulars, Address

The Gold and Silver Extraction Co. of America, Ltd.

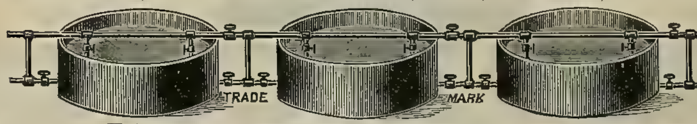
GEO. A. ANDERSON, General Manager,

Testing Works: 1716 Blake Street, Denver, Colo. **208-210 McPhee Building, Denver, Colo.**

ALMARIN B. PAUL, Agent, 27 Crocker Building, San Francisco, Cal.

"PNEUMATIC" CYANIDE PROCESS.

(Patented in U. S., So. African Republic, New Zealand, Victoria, New So. Wales, So. Australia.)



WILL DO IN 7 HOURS WHAT REQUIRES FROM 2 TO 6 DAYS BY OLDER METHODS.

SEND FOR PAMPHLET.

THE PNEUMATIC CYANIDE PROCESS CO., 306 Boston Bldg., Denver, Colo.

Aaron's Assaying, PARTS II and III.

THIRD EDITION --- REVISED AND REWRITTEN.

The Third Edition of Parts II and III of this great work on assaying is now ready; new type; new illustrations; new matter; better than ever; reduced in price to $1.50 postpaid to any part of America. The practical character of this book has made it the favorite everywhere in the mining world among men who want such a manual on assaying.

Address Book Dept. Mining and Scientific Press,
330 MARKET ST., SAN FRANCISCO, CAL.

SELBY SMELTING AND LEAD CO.,

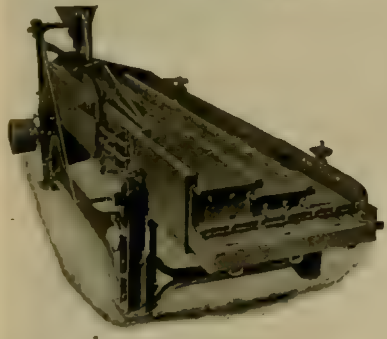
REFINERS OF GOLD AND SILVER BARS, GOLD DUST, ETC.

Buyers of Gold, Silver, Lead and Copper Ores, Gold Concentrates, Lead Bullion, Cyanide Product, Etc.

ORE AND BULLION ASSAYERS.

Works at VALLEJO JUNCTION, CAL. Office, 416 MONTGOMERY ST., SAN FRANCISCO, CAL.

THE IMPROVED BARTLETT CONCENTRATING TABLE.



The BARTLETT CONCENTRATING TABLE has been GREATLY IMPROVED recently by the substitution of iron in place of wood wherever possible. It is now built with SOLID IRON TOP, PLANED TO A TRUE SURFACE AND POLISHED; all parts are made by template and EACH PART BEING INTERCHANGEABLE. As now constructed, the table has no special wearing parts and will last for many years. It has a CAPACITY OF FROM FIFTEEN TO FORTY-FIVE TONS IN TWENTY-FOUR HOURS, according to the class of ore worked. It is the only table in the world which will take the place of jigs and do away with all costly and complicated machinery.

It is Especially Designed for Separating Zinc from Lead.

Send for our illustrated catalogue, containing all the latest information on the concentration of ores.

THE COLORADO IRON WORKS CO.,

Established 1860. DENVER, COLO., U. S. A.

CHAS. C. MOORE & CO.,

—ENGINEERS AND DEALERS IN—

MAGNOLIA ANTI-FRICTION METAL,

HAMILTON CORLISS ENGINES, N. Y. SAFETY AUTOMATIC ENGINES,
BABCOCK & WILCOX BOILERS, McINTOSH & SEYMOUR ENGINES,
GREEN'S ECONOMIZERS, HOPPES LIVE STEAM PURIFIERS,
WHEELER CONDENSERS, BARNARD-WHEELER COOLING TOWERS,
EDMISTON FEED WATER FILTERS, BUNDY STEAM TRAPS,
SNOW STEAM PUMPS, QUIMBY SCREW PUMPS,
GOUBERT FEED WATER HEATERS, STRATTON STEAM SEPARATORS,
SPENCER DAMPER REGULATORS, HYATT ROLLER BEARINGS.

Contracts for Installation of Power Plants, Any Capacity.

SEND FOR CATALOGUES AND FULL INFORMATION.

32 FIRST STREET, SAN FRANCISCO, CAL.

SEATTLE BRANCH..........313 FIRST AVE. SOUTH.
LOS ANGELES BRANCH.......103 SOUTH BROADWAY.

—THE—

Pelton Water Wheel Company

Gives exclusive attention to the development and utilization of water powers by the most modern, economic and improved methods. An experience of more than fifteen years, involving both the theory and practice of hydraulic engineering as relates to power development in its widest range of application, is at the service of its customers.

Nine Thousand Wheels Now Running,
Averaging some 700,000 H. P.

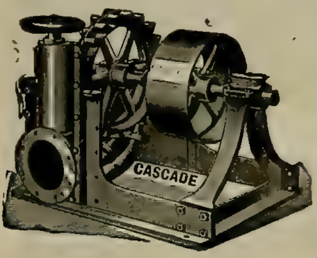
ELECTRIC POWER TRANSMISSION.

Pelton wheels afford the most reliable and efficient power for such service and are running the majority of stations of this character in the United States, as well as most foreign countries. Highest efficiency and absolute regulation guaranteed under the most extreme variations of load.

The Pelton Water Wheel Company,
121 & 123 MAIN STREET, SAN FRANCISCO, CAL.

TURBINE AND CASCADE WATER WHEEL

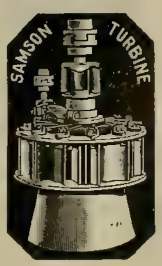
Adapted to all Heads from
3 Feet to 2000 Feet.

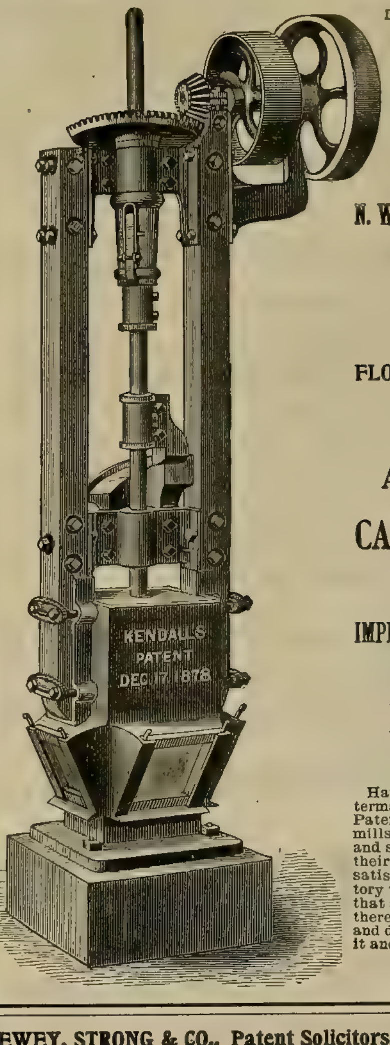


Our experience of 38 YEARS building Water Wheels enables us to suit every requirement of Water Power Plants. We guarantee satisfaction.

State your Head and requirements. Send for pamphlet.

JAMES LEFFEL & CO.
SPRINGFIELD, OHIO, U. S. A.





L. C. MARSHUTZ. T. G. CANTRELL.

NATIONAL IRON WORKS,

N. W. Cor. Main & Howard Sts., San Francisco.

MANUFACTURERS OF
STATIONARY AND COMPOUND
ENGINES,
FLOUR, SUGAR, AND QUARTZ MILL
MACHINERY.

AMALGAMATING MACHINES.

CASTINGS AND FORGINGS
OF EVERY DESCRIPTION.
All work tested and guaranteed.

IMPROVED PORTABLE HOISTING ENGINES

Sole Manufacturers of

Kendall's Patent Quartz Mills.

Having renewed our contract on more advantageous terms with Mr. S. Kendall for the manufacture of his Patent Quartz Mill, we are enabled to offer these mills at **Greatly Reduced Prices.** Having made and sold these mills for the past 16 years, we know their merits, and know that they have given perfect satisfaction to purchasers, as numbers of commendatory testimonials prove. We feel confident, therefore, that at the prices we are now prepared to offer them, there is placed within the reach of all a light, cheap and durable mill that will do all that is claimed for it and give entire satisfaction.

MARSHUTZ & CANTRELL

Send for Circulars and Price List.

DEWEY, STRONG & CO., Patent Solicitors, 330 Market St., San Francisco, Cal.

PROFESSIONAL CARDS.

R. H. POSTLETHWAITE, M.I.E.E.
Hydraulic Mining Engineer.
River Dredging for Gold a Specialty.
1315 Leavenworth St........San Francisco, Cal.

THEO. F. VAN WAGENEN, E. M.
Consulting Mining and Hydraulic Engineer.
1508 Fillmore St., DENVER, COLO.

D. B. HUNTLEY,
Mining Engineer and Metallurgist,
De Lamar, Owyhee Co., Idaho.

BERNARD MACDONALD,
Consulting Mining Engineer.
General Manager British America Corporation, Ltd., Rossland, B. C.

DRAPER & McLEOD,
Assayers, Chemists, and Mining Engineers,
1736 CHAMPA STREET,
DENVER.................. ....COLORADO.

JOHN DWYER, Mining Engineer,
MEXICO.
Address 762–17th Street......East Oakland, Cal.

Established 1879.
CHAS. B. GIBSON,
Chemist, Metallurgist and Mining Engineer,
81 CLARK ST., CHICAGO, ILL.

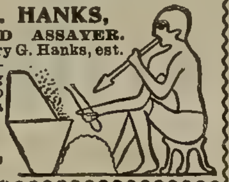
W. C. WYNKOOP, M. E.
Woodbury (Cochiti District),
New Mexico.
Economic Geology and Mine Examinations.

E. H. BENJAMIN, Mining Engineer.
A. M. HUNT, Mechanical & Hydraulic Engineer.
WYNN MEREDITH, Electrical Engineer.
C. L. CORY, Electrical & Mechanical Engineer.
EXPERT EXAMINATIONS. ADVISORY REPORTS.
CONSTRUCTION SUPERVISION.
331 Pine Street,...........San Francisco, Cal.
Telephone Main 1870. Cable Address "Edben."

JOHN W. GRAY,
Mining and Hydraulic Work.

Prospecting Operations and Exploration Work.
Examinations, Surveys, Development, Equipment of Mines, Gold-Bearing Gravels, and Water Supplies.
933 Linden St.,.................Oakland, Cal.
Cable "Espra." Correspondence invited.

ABBOT A. HANKS,
CHEMIST AND ASSAYER.
Successor to Henry G. Hanks, est. 1866. The supervision of sampling of ores shipped to San Francisco a specialty.
—531—
California Street,
San Francisco.



RICHARD A. PEREZ, E. M.
Assayer and Analytical Chemist,
120 North Main St., - Los Angeles, Cal.

S. W. TYLER,
Mining and Metallurgical Engineer,
6 Windsor Hotel Block.
Cable: Retyl, Denver. DENVER, COLORADO.

The SPOKANE BUREAU OF MINING,
N. E. LINSLEY, Manager.
SPOKANE, : : WASHINGTON.
Consulting Mining and Milling Engineer.
Will Examine and Report on Mines.

DANIEL G. JEWETT,
Metallurgist and Assayer.
Specialty: The Mining and Smelting of Copper or Lead Ores.
P. O. BOX 5, GUFFEY, PARK CO., COLO.

CLARENCE HERSEY,
Assayer and Chemist,
(Established 1879.) LEADVILLE, COLO.
Gold, Silver and Lead.................$1.00.
Any two of above 75c; any one of above 50c.
Copper analysis..............................$1.00.
Platinum, Nickel or Tin, each.............$5.00.

Twenty-one years successful experience in the mining metropolis of Colorado.

Write for mailing envelopes and price list.

ALMARIN B. PAUL, M. E.,
ROOM 27, CROCKER BUILDING, SAN FRANCISCO.
Will act as AGENT for the sale of RELIABLE Mining Property. SPECIAL AGENT FOR
MacArthur-Forrest Cyanide Process
for California north of and including Mono, Madera and Merced counties; also for State of Nevada. Will act as agent for Eastern parties owning mining interests in California.

F. H. HARVEY,
GALT, CAL.,
Mining and Metallurgical Work in All Branches.

Assays, Chemical Analysis of Ores and experiments on rebellious ores for treatment by cyanide or other processes. Surveys and reports upon mining properties.

Simonds & Wainwright,
Mining Engineers,
Assayers and Chemists,
159 Front Street,
NEW YORK.

HUDSON H. NICHOLSON,
Consulting Mining Engineer,
Rooms 216 and 217, Boston Building,
DENVER, COLO., U. S. A.

Cable address: Aichen, Denver.

Expert examinations of and advisory reports on mining propositions.

Specialty: The chemical treatment of ores

DAVIDGE & DAVIDGE, Attorneys and Counsellors at Law, Corcoran Building, Washington, D. C. Practice in the Supreme Court of the United States, the Court of Claims, the Courts of the District of Columbia, and the General Land Office. Western Union Code.

W. J. ADAMS, E. M.,
Mining Engineer and Metallurgist.
Graduate of Columbia School of Mines.
Author of "Hints on Amalgamation," etc., etc.
ROOM 14, 434 CALIFORNIA STREET,
SAN FRANCISCO, CAL.

R. J. WALTER,
1452 Blake St., DENVER, COLO.
Mining Engineer and Metallurgist.
Reports on mining properties.
Assay office and chemical laboratory. Established in Colorado 1879.

SAM'L A. RANK,
MINING ENGINEER,
U. S. DEPUTY MINERAL SURVEYOR.
Mine Examinations and Reports.
514 Cooper Building,
DENVER.........................COLORADO.

EDWARD L. HAFF,
MINING ENGINEER,
U. S. DEPUTY MINERAL SURVEYOR.
Mine Examinations and Reports.
National Annex Block,
P. O. Box 21. CRIPPLE CREEK, COLO.

FRANK C. MANDELL,
MINING ENGINEER,
U. S. Deputy Mineral Surveyor for Idaho and Oregon.
Mine Examinations, Surveys and Reports.
HAILEY, IDAHO.

ERNEST H. SIMONDS,
Late Instructor in Assaying, University of California.
ASSAYS AND ANALYSES.
LABORATORY TESTS OF ORES.
Special Attention Given to the Instruction of Students.
521 Sacramento St., Cor. Leidesdorff. S. F., Cal.

RALPH E. STEVENS,
ATTORNEY AND COUNSELOR,
43–44 Jacobson Building, DENVER, COLO.

Special attention to examination of titles. Corporation, commercial, mining law. Collections receive prompt attention. Notary in office. Refers to Denver representative of Mining and Scientific Press.

School of Practical Mining, Civil,
Mechanical and Electrical Engineering.
Surveying, Architecture, Drawing, Assaying, Cyanide Process and Metallurgy.
933 Market St., S. F., Cal. OPEN ALL YEAR.
A. VAN DER NAILLEN, President
Assaying of Ores, $25; Bullion and Chlorination Assay, $25; Blowpipe Assay, $10. Full course of Assaying, $50. Established 1864.
☞ Send for Circular.

FRED H. BROWN,
Electrical Mining Expert.

Inventor of the Electro-Geodetic Mineral Locator. Patented March 20, 1900.

Will electrically survey mines and lands for mineral; furnish charts showing run of ore, extensions, pay streaks, and their approximate depth from surface.

References include scientific men, and miners for whom we have located rich mines.

Address, 1025 West 7th St.,
LOS ANGELES, CAL.

Geo. W. Schneider, E. M.,
Mining Engineer,
U. S. Deputy Mineral Surveyor.
Mineral Properties examined and reported on.
Central City, Colorado.

A. F. WUENSCH, M. E.
Inspection and Valuation of Mines.
Ref. D. H. Moffat, Pres. 1st Nat'l Bank, Denver.
827 Equitable Bldg...................Denver, Colo.

WM. VAN SLOOTEN,
Consulting Mining Engineer and Metallurgist.
Cable address: "Yadoplata."
35 WALL STREET........... ....NEW YORK, N. Y.

HOWARD E. BURTON,
ASSAYER and CHEMIST,
111 E. Fourth St., LEADVILLE, COLO.

Specimen prices: Gold, 50c; Gold and Silver, 75c; Gold, Silver and Lead, $1.00; Silver or Lead, 35c; Copper or Zinc, $1.00.

Mailing envelopes sent to any address.

T. D. KYLE & CO.,
Assayers and Chemists.

Mill Tests of all kinds. Cyanide, Amalgamation and Concentration a specialty. Mail orders given prompt attention.

106 E. Fifth St., **Leadville, Colo.**

MINERS' ASSAY OFFICE.
(JNO. HARRIGAN)
10 Stevenson Street, - San Francisco, Cal.
Telephone Clay 972.

Assaying, Analyses, Sampling, Grinding and Pulverizing of all kinds.

Practical Working Tests of Ore by all Processes. Mining Machinery Bought and Sold. Check Assays. Instructions given in Assaying. All Work Guaranteed. Mines Examined, Sampled and Reported on by M. P. BOAG, M. E. and Cyanide Expert.

LOUIS FALKENAU,
STATE ASSAY OFFICE,
434 California St., near Montgomery.

Analysis of Ores, Metals, Soils, Waters, Industrial Products, Foods, Medicines, etc., etc.

Court Experting in all branches of Chemical Technology. Working Tests of Ores and Investigation of Metallurgical and Manufacturing Processes. Consultations on all questions of applied chemistry. Instructions given in assaying and all branches of chemistry.

RELIABLE ASSAYS.

Gold	$ .50	Gold and Silver	$ .75
Lead	.50	Gold, silver, copper	1 50

Samples by mail receive prompt attention.
Rich Ores and Bullion Bought.
OGDEN ASSAY CO.,
1429-16th St., Denver, Colo.

J. W. RICHARDS,
(Late of Aspen, Colo.)
ASSAYER AND CHEMIST. 1754 Champa Street, DENVER, COLO.
Ore Shippers' Agent. Write for Terms.

JAMES ANGUS SNEDAKER,
Mining Engineer,
721–722 Equitable Building, Denver, Colo., U. S. A.

Samples by Mail or Express Will Receive Prompt Attention.
ALBERT I. GOODELL,
ASSAYER AND CHEMIST,
1430 Stout Street.......................DENVER, COLO.

CHAS. BUTTERS & CO., Limited.
E. S. LEAVER, Manager.

Ore Testing Works, ❧ ❧ ❧
Chemical and Metallurgical Laboratory,
Assay Office, ❧ ❧ ❧ ❧

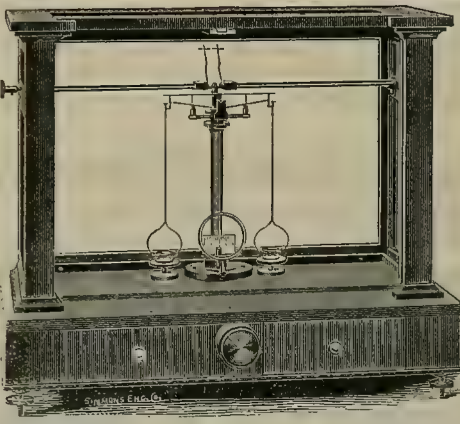
DOOLY BLOCK, - SALT LAKE CITY, UTAH.

Telephone, MAIN 5104.
Cable Address, LUCKWARD.
—◆ESTABLISHED 1869.◆—
A. H. WARD.

C. A. LUCKHARDT CO.,
NEVADA METALLURGICAL WORKS,
71 & 73 STEVENSON STREET, - - - - SAN FRANCISCO, CAL.
Assaying, Analyses, Sampling.
PRACTICAL WORKING TESTS OF ORE BY ALL PROCESSES.
STAMP MILL AND CONCENTRATOR IN OPERATION ON PREMISES.

Thomas Price & Son,
Assay Office, Sampling Works
And Chemical Laboratory.

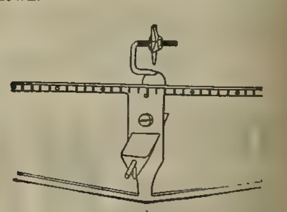
526 Sacramento Street, San Francisco, Cal.


SIMMONS ENG. Co.

No. 1 Special Button Balance with 5-inch beam. Sensibility 1-200 Milligramme. Made for particularly accurate and rapid work and is guaranteed to be the finest balance on the market. It is the balance used by Prof. Forsythe of the Lawrence Scientific School, Harvard University, for scientific research. Send for Catalogue A, illustrating and describing a full line of assay and analytical balances, to

All of our latest improvements are embodied in this instrument and it is the result of our 18 years' experience in building balances.

Among the noteworthy features in the make-up of this balance is the improved adjusting device, herewith shown.



The adjusting device will appeal to the assayer as the simplest and most convenient means of checking the beam, and consists of a star wheel on a threaded arbor, mounted on the center edge back of the beam.

By turning this wheel backward or forward, it is moved along the arbor and so adjusts the beam to equilibrium.

Wm. Ainsworth & Sons,
(Successors to WM. AINSWORTH.) DENVER, COLO., U. S. A.

F. W. Braun & Co., Los Angeles, Cal., Agents for balances and the Brunton Patent Pocket Transit.
John Taylor & Co., San Francisco, Cal., Agents for balances and the Brunton Patent Pocket Transit.
H. S. Crocker Co., San Francisco, Cal., Agents for the Brunton Patent Pocket Transit.
Pacific Optical Co., Los Angeles, Cal., Agents for the Brunton Patent Pocket Transit.

HERMANN J. VAN DIEREN,
Assayer and Metallurgist,
1407 Seventeenth St., DENVER, COLO.
Stamp Mill and Reduction Works: 19th St. and Platte River.

Buyer of every description of Ores and Precious Stones. Rights for sale for process of treating refractory gold ores; also process for treating low grade copper ores. Write for particulars.

Independent Assay Office.
ESTABLISHED 1886.
D. W. Reckhart, E. M., Proprietor.
Agent for Ore Shippers.
Assays and Chemical Analysis.
Mines Examined and Reported Upon.
BULLION WORK A SPECIALTY.
P. O. Box 88. Office and Laboratory:
Cor. SAN FRANCISCO & CHIHUAHUA Sts.
EL PASO, TEXAS.

HENRY E. WOOD,
ASSAYER,
1734 Arapahoe St., DENVER, COLO.
Ore Tested in Carload Lots.
Write for Circular.

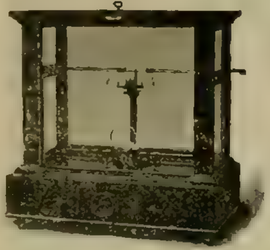
ALVIN PHILLIPS & CO.,
Chemists, Mining and Metallurgical Engineers,
1761 MARKET STREET,
DENVER, - COLO.

Complete Ore-Testing Works — capacity ten pounds to two tons. Modern Methods of Lixiviation, Cyanide and Chlorination. Concentration on Bartlett Table. Assaying and Bullion Refining. Chemical Analyses of Oils, Coal, Water, and all solutions. WRITE FOR PRICES.

Hoskins' Patent Hydro-Carbon Blow-Pipe and Assay Furnaces.

No dust. No ashes. Cheap, effective, economical, portable and automatic.

SEND FOR PRICE LIST TO
W. HOSKINS, 81 South Clark St., Room 55, CHICAGO, ILL.

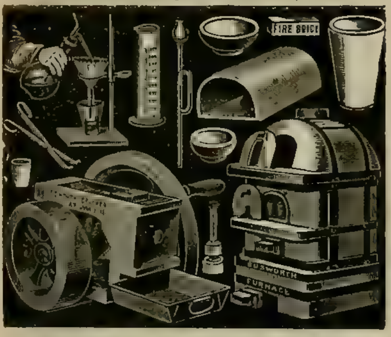


SMITH & THOMPSON,
Manufacturers of Fine
ASSAY BALANCES.
Write for Catalogue.
2219 Stout St.,
Denver, Colo.

THE ROESSLER & HASSLACHER CHEMICAL CO.,
100 William Street, New York.

CYANIDE
Peroxide of Sodium
Hyposulphite of Soda
Chloride of Lime
Sulphide of Iron
And Other Chemicals for Mining Purposes.

THE DENVER FIRE CLAY CO.,
1742 to 1746 Champa St., DENVER, COLO.



Manufacturers, Importers and Dealers in
Chemicals, Apparatus and Assayers' Supplies, Fire Brick and Tile.
Sole Agents for the "AINSWORTH BALANCES."
WRITE FOR CATALOGUES.

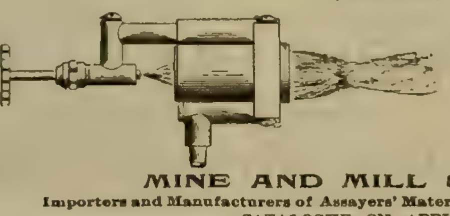
DEWEY, STRONG & CO.,
PATENT AGENTS, 330 Market St., S. F

Keep Your Boilers Clean While They Are New. You Know What to Use;

IF NOT, WRITE TO
DEARBORN DRUG & CHEMICAL WORKS,
Offices and Laboratories:
29, 30, 31, 32 and 33 Rialto Bldg. - - - CHICAGO, ILL.

Taylor's Coal Oil and Gasoline Burner

(PATENTED)



A new heating burner for Assayers and Chemists, or for brazing, in which coal oil at 33 deg. to 45 deg., Beaume and 150 deg. fire test, or gasoline at 74 deg. test can be used for fuel. Adapted to crucible, muffle and brazing work. Price $6. For sale by

JOHN TAYLOR & CO.,
63 FIRST STREET,
SAN FRANCISCO, CAL.

MINE AND MILL SUPPLIES.
Importers and Manufacturers of Assayers' Materials, Chemicals and Acids, Etc.
CATALOGUE ON APPLICATION.

IMPROVED BONE ASH.

It is 100% better than Bone Ash now being used; will absorb more lead, will never crack or split in the Muffle, can be dropped before or after using without breaking. Cupels can be made and used at once; no drying required. Excessive heat has no effect on them. Will stand shipping any distance. It takes up none of the precious metals in cupeling. Cupels much quicker. Once used always used. Sold under a positive guarantee or money refunded. Now being used by all smelters and assayers who have tried it.

Price of Improved Bone Ash, $60.00 per ton; $3.50 per 100 lbs.; or manufactured Cupels, $1.50 per hundred.

J. J. CUMMINGS & CO., Sole Mfrs.,
Telephone Clay 972. 10 STEVENSON ST., SAN FRANCISCO, CAL.
For Sale also by Justinian Caire Co., Dealers in Assay Goods and Mining Supplies, 521-523 Market St.

PIONEER REDUCTION CO.

Established 1858. Nevada City, Cal.

Buyers of Gold, Silver and Copper Ores and Concentrates.

HIGHEST PRICES PAID FOR COPPER ORES.
WRITE FOR RATES.

ESTABLISHED 1856.

Controls and Check Assays

(A SPECIALTY.)

MARINER & HOSKINS,
ASSAYERS AND CHEMISTS,
Mining Engineers and Metallurgists.
81 South Clark Street.
Rooms 51-55,
CHICAGO, ILLINOIS.

SEND SAMPLES BY MAIL OR EXPRESS.
MAILING SACKS ON APPLICATION. : :

ST. LOUIS SAMPLING & TESTING WORKS,
1225 and 1227 Spruce St.,
ST. LOUIS, MO.

The Largest and Most Complete Ore Testing Works in Existence for Making all Kinds of Practical Working Tests of Ore, etc., to Determine the Most Suitable Method of Treatment.

PLANT FOR COAL WASHING, COKING AND STEAMING TESTS OF FUELS. ASSAYS, ANALYSES, CHEMICAL AND PHYSICAL INVESTIGATIONS OF ALL KINDS. MINERAL PROPERTIES, MINES AND METALLURGICAL PROCESSES EXAMINED AND REPORTED UPON. CORRESPONDENCE SOLICITED.

AARON'S ASSAYING, PART I.

FOURTH EDITION.

Revised, Rewritten, New, Improved.

This practical treatise on assaying has long been the favorite among practical men. The new edition, just out, is up to date. Price $1, postpaid anywhere.

Book Dept., Mining and Scientific Press,
330 MARKET ST., SAN FRANCISCO, CAL.

Ammonia Process.

The practical success of this process is well known and is demonstrated chemically, technically and mechanically in every detail on a large scale. Refractory ores and tailings containing gold, silver, copper and zinc are extracted successful and profitable. Mail average sample and $10 and receive full report about the extraction.

Pocketbook, Ammonia Process, full description, $1.

Instructions in Chemistry and all successful and practical Lixiviation Processes

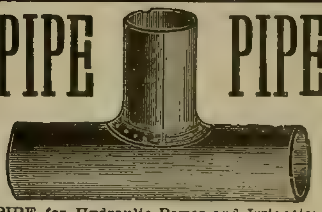
Office and Laboratories:
334 KEARNY STREET, SAN FRANCISCO, CAL.
H. HIRSCHING,
Mining Engineer and Chemist.

THE LITTLE ALASKA GOLD WASHER.

Price $6.
Saves the Gold.
Weighs only 7 1-2 Lbs.

After several years practical use in different fields, our washer has established its superiority over all placer or beach washers. It is just the washer for Cape Nome; it was used extensively in Alaska last year with every success. In working the operator does not have to wet his hands and can stand in an upright natural position. It is just the washer for the poor man who has not the money to put in expensive machinery. It will do the work of ten men with gold pans. It is just the washer for the prospector, being light and easy to pack. Don't fail to write us if in need of a washer; we can save you *time, labor* and *money.* RUSSELL & KINSEY, 1257 Magnolia Ave., Los Angeles, Cal.

PIPE PIPE



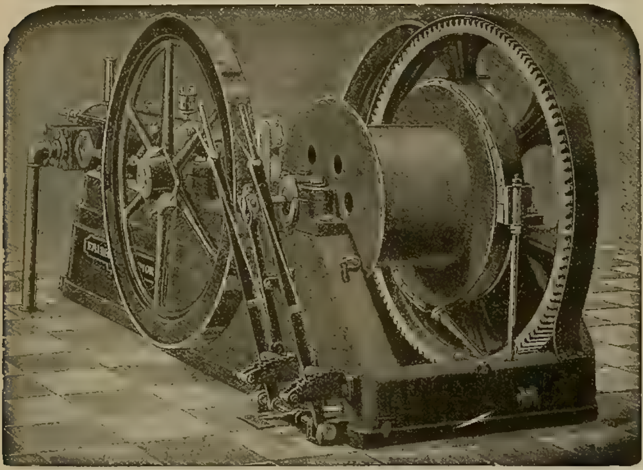
PIPE for Hydraulic Power and Irrigation.
OIL STORAGE TANKS.
GENERAL SHEET IRON WORK.
Lacy Manufacturing Co.,
LOS ANGELES.

PATENTS

Our U. S. and Foreign Patent Agency presents many and important advantages as a Home Agency over all others, by reason of long establishment, great experience, thorough system, intimate acquaintance with the subjects of inventions in our own community, and our most extensive law and reference library, containing official American reports, with full copies of U. S. Patents since 1872. All worthy inventions patented through DEWEY, STRONG & Co.'s Patent Agency will have the benefit of a description in the *Mining and Scientific Press.* We transact every branch of patent business, and obtain patents in all countries which grant protection to inventors. The large majority of U. S. and foreign patents issued to inventors on the Pacific Coast have been obtained through our agency. We can give the best and *most reliable* advice as to the patentability of new inventions. Our prices are as low as any first-class agencies in the Eastern States, while our advantages for Pacific Coast inventors are far superior. Advice and circulars free.

DEWEY, STRONG & CO.,
PATENT AGENTS,
330 Market Street, San Francisco, Cal.

INVENTORS, Take Notice!
L. PETERSON, MODEL MAKER,
544A MISSION STREET, bet. First and Second Sts., SAN FRANCISCO. Experimental machinery and all kinds of models. Tin and brasswork. All communications *strictly confidential.*



FAIRBANKS-MORSE
GASOLINE-DISTILLATE GEARED HOISTER.

An efficient and reliable combination of a Fairbanks-Morse Gasoline-Distillate Engine on the same base with a Friction Hoist. Modern and up to date. We publish a special catalogue describing our Hoister which we gladly mail prospective purchasers.

FAIRBANKS-MORSE GASOLINE-DISTILLATE ENGINES.

ALL SIZES UP TO AND INCLUDING 54 HORSE POWER.
For Pumping, Milling, Lighting, Air Compressors, Etc.

FOR CATALOGUES AND FULL INFORMATION, ADDRESS

FAIRBANKS, MORSE & CO.,

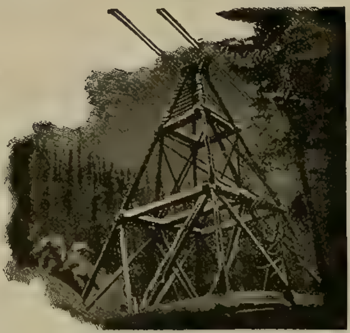
310 MARKET ST., SAN FRANCISCO, CAL.
201 N. LOS ANGELES ST., LOS ANGELES, CAL.
FIRST AND STARK STS. PORTLAND, OGN.
1600 SEVENTEENTH ST., DENVER, COL.
FRANKLIN AND MONROE STS., CHICAGO, ILL.

THE MINE AND SMELTER SUPPLY CO.,
DENVER, - - COLORADO.
Mining and Milling Machinery and Supplies.

We beg to call your attention to

THE FINLAYSON PATENT
WIRE ROPE TRAMWAY—

the latest and best system of double-rope automatic aerial tramway in the market.
If interested in the most economical system of transporting ores from mine to mill and to shipping stations, send for our special tramway catalogue.

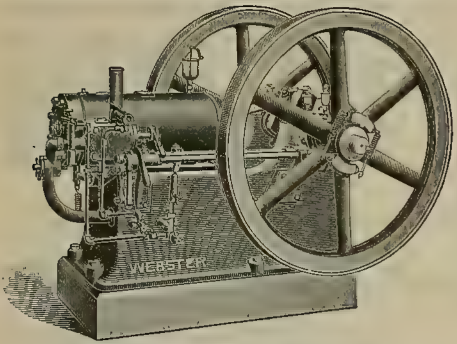


We carry a complete stock of Machinery and Supplies for immediate delivery.

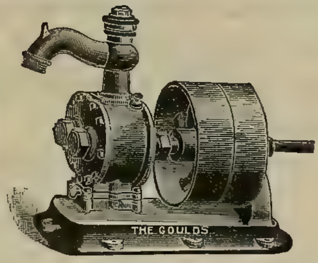
Send for our special catalogues on Mining Machinery, Milling Machinery, Wilfley Concentrators, Tramways, Power Transmission Machinery, Machine Tools, Etc.

THE MINE AND SMELTER SUPPLY CO.,....................Denver, Colorado
THE MINE AND SMELTER SUPPLY CO.,...............Salt Lake City, Utah
THE MEXICO MINE AND SMELTER SUPPLY CO.,
No. 16 San Francisco St., City of Mexico.

BOILERS, ENGINES, STEAM HOISTERS, ELECTRIC HOISTERS, ROLLS, CRUSHERS, WILFLEY TABLES, CARS, CAGES, ORE BUCKETS, RAIL, PIPE, FITTINGS, BELTING, ETC., ETC.



WEBSTER GASOLINE ENGINES.



ROTARY PUMPS.

Send for Our Large Catalogue, Mailed Free.

We carry a full line of Gasoline Engines.

Pumps for all depths of wells—for Hand, Wind Mill use, Power Pumps, Electric Pumps. Irrigating Pumps of all capacities. Mining Pumps. Tanks. Iron Pipes. Pipe Fittings. Brass Goods. Tools, Etc. Send for Catalogue, sent free.

WOODIN & LITTLE,
312-314 MARKET STREET,...SAN FRANCISCO, CAL.

ELECTRICAL

Standard of the World.

MINING APPARATUS.

HOISTS, — PUMPS,
LOCOMOTIVES.

MOTORS FOR STAMP MILLS.

Electric Mine Pump.

General Electric Company,

SAN FRANCISCO, CAL., Claus Spreckels Building. DENVER, COLO., Kittredge Building.
PORTLAND, OR., Worcester Building. SALT LAKE CITY, UTAH, Templeton Building.

ADAMANTINE SHOES AND DIES.

◆◆◆◆◆◆CHROME CAST STEEL.◆◆◆◆◆◆

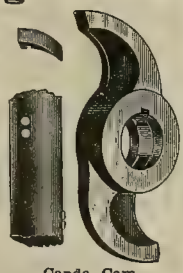
CANDA Improved Self-Locking CAMS.

TAPPETS, BOSSES, ROLL SHELLS AND CRUSHER PLATES.

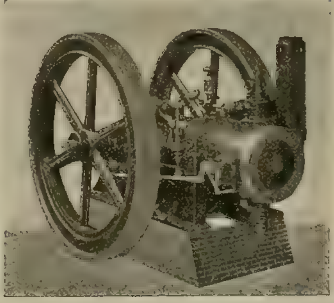
These castings are extensively used in all the mining States and Territories of North and South America. Guaranteed to prove better and cheaper than any others. Orders solicited subject to the above conditions. When ordering, send sketch with exact dimensions. Send for Illustrated Circular.

Manufactured by **CHROME STEEL WORKS,** Brooklyn, N. Y.

H. D. & H. W. MORRIS,
AGENTS,
Room 194 Crocker Building, San Francisco, Cal.



Canda Cam.



WE CAN SHOW YOU A
HERCULES
Gasoline Engine

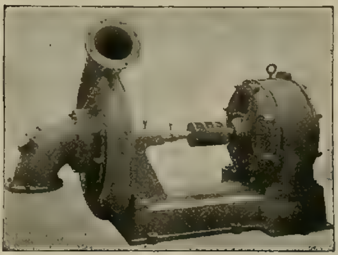
Running on less than ½-gallon of fuel per H. P. hour, with a speed regulation of 2½%.

JOHN WIGMORE & SONS CO.,
117-123 S. LOS ANGELES ST.,
LOS ANGELES, CAL.

MINING HOISTS.

Engines, Boilers,
Saw Mills, Hoe Saws,
Mill Supplies.

TATUM & BOWEN,
34-36 Fremont Street, San Francisco, Cal. 29-35 First Street, Portland, Or.

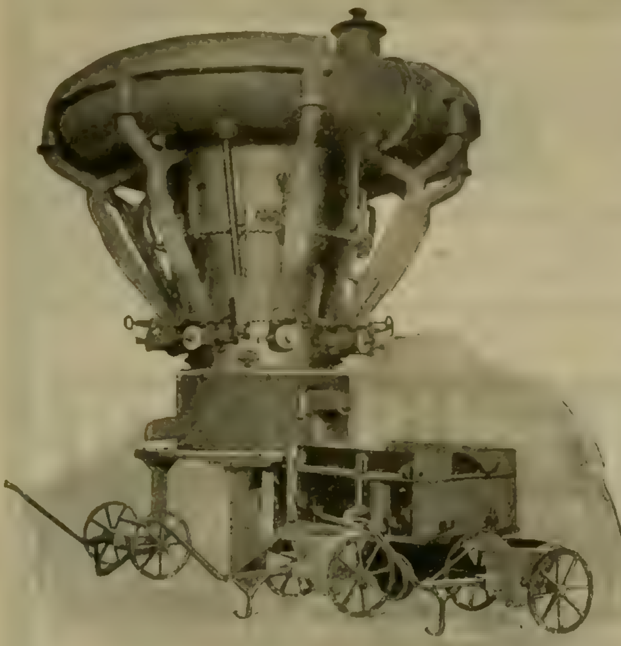


CENTRIFUGAL
PUMPS
—FOR—
Mine Draining or Hydraulicking.

WE DESIGN PUMPS FOR ALL CONDITIONS.

WRITE FOR CATALOGUE.

BYRON JACKSON MACHINE WORKS, - SAN FRANCISCO, CAL.



THE COPPER FURNACE

Here illustrated has OUR PATENT

WATER VAPORIZING ATTACHMENT.

Experience has proven this to be the best of all methods for applying water for the cooling of jackets. It has the further great advantage of using only about one-eighth the usual amount of water needed for that purpose, and all jackets are kept at the same temperature.

We Manufacture Smelting Furnaces and Equipments

FOR THE TREATMENT OF

GOLD, SILVER, LEAD, COPPER and NICKEL ORES.

of any desired tonnage capacity above forty tons per day, and put them into successful operation under guarantee. Write for catalogue showing different styles of furnaces.

We also design, manufacture and erect Smelter Sulphide Mills for crushing and sampling ores. We are the originators of the Narrow Face, Large Diameter, High Speed Crushing Rolls. A full description of our Crushing Machinery is given in a special catalogue, which will be sent on application.

THE COLORADO IRON WORKS CO.

ESTABLISHED 1860.

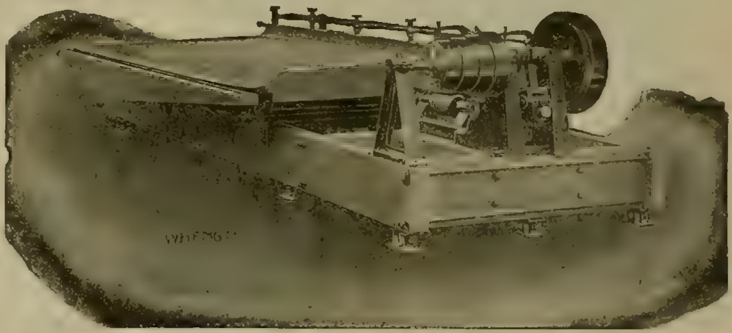
DENVER, COLO., U. S. A.

THE : CAMMETT : CONCENTRATOR.

Designed with some Regard for the Laws of Concentration.

From The Denver Evening Post, July 15th, 1900.

* * * "Now about concentrating tables. Here's a fellow who says there's nothing equal to the Wilfley, and I am trying to convince him that old man Woodbury over in California makes the finest table in the world." "No, sir," said his comrade, "you're way off. I've tried the CAMMETT too thoroughly to believe there's anything made to equal it."

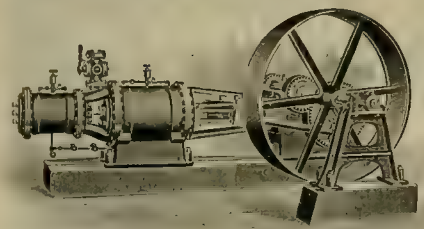


Manufactured Under U. S. Patent No. 632,892; Dated Sept. 12, 1899.

Denver Engineering Works,---Shepard & Searing,---Sole Manufacturers,

30th and Blake Streets, - - - - DENVER, COLORADO.

WHY NOT have our catalogues, specifications and prices before you purchase AIR DRILLS OR COMPRESSORS?



Our guarantees are strong; our customers are satisfied. We can satisfy YOU.

J. Geo. Leyner,

729 Seventeenth St.,

DENVER, COLO.

SCREENING MACHINERY FOR ALL PURPOSES.

VIBRATORY, SHAKING, REVOLVING, STATIONARY AND MECHANICAL HAND SCREENS FOR ALL MATERIALS.

SCREENS SPECIALLY ……ADAPTED FOR…… MINING PURPOSES.

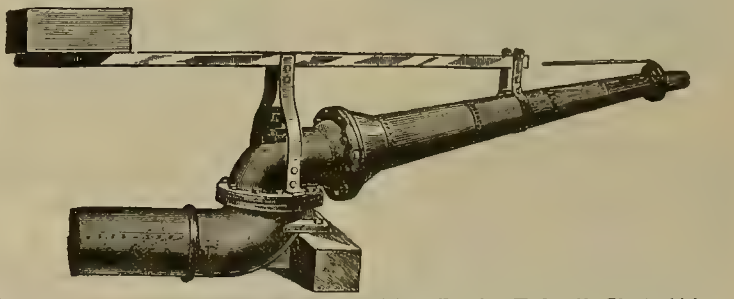
COMPLETE PLANTS ERECTED.

SEND FOR DESCRIPTIVE MATTER.

WESTERN MACHINERY & SUPPLY CO., Engineers and General Machinists,

161 La Salle Street, CHICAGO.

Double-Jointed Ball-Bearing Hydraulic Giants.



The above presents an improved Double-Jointed Ball-Bearing Hydraulic Giant which we build. The improvement consists of the introduction of a Ball Bearing by which the pressure of the water is reduced to a minimum and the direction of the nozzle changed at will with ease.

Catalogues and prices of our specialties of HYDRAULIC MINING MACHINERY furnished upon application. JOSHUA HENDY MACHINE WORKS, 38 to 44 Fremont St., San Francisco, Cal.

The Best MINE PUMPS in the World.

COMPOUND CONDENSING AND TRIPLE EXPANSION STATION PUMPS.

We carry in our Denver store a stock of Improved Pattern Sinkers and Duplex Station Pumps, with duplicate parts for repairs.

Write for Catalogue and Estimates.

Jeanesville Iron Works Co.,
JEANESVILLE, PA.

Western Office,
Columbia Hotel Building,
1328 17th St.
Denver, Colo.
Telephone 2298 A.
A. MIDDLEBROOK, Manager.

THE CAL. ANTI-CALORIC COMPANY,

Tel. Main 5752. Office, 217-219 Mission St., San Francisco, Cal.

Sole Manufacturers of CAL. ANTI-CALORIC SECTIONAL COVERINGS AND BLOCKS FOR BOILERS. PLASTIC (dry) for Steam Domes, Etc. Sole Agents for the Boston Asbestos Paper Co. Asbestos Goods of All Kinds. Send for Information. Factory, Potrero.

Founded by Mathew Carey, 1785.

HENRY CAREY BAIRD & CO.,

INDUSTRIAL PUBLISHERS, BOOKSELLERS & IMPORTERS,

810 Walnut St., Philadelphia, Pa., U. S. A.

☞ *Our New and Revised Catalogue of Practical and Scientific Books, 92 pages, 8vo; a Catalogue of Books on Steam and the Steam Engine, Machinery, etc.; a Catalogue of Books on Sanitary Science, Gas Fitting, Plumbing, etc., and our other Catalogues and Circulars, the whole covering every branch of Science applied to the Arts, sent free and free of postage to any one in any part of the world who will furnish his address.*

ASSESSMENT NOTICES.

AMERICAN OIL AND REFINERY COMPANY.—Location of principal place of business, San Francisco, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 21st day of August, 1900, an assessment of ten (10) cents per share was levied upon all the subscribed capital stock of the said corporation, payable immediately to J. C. Anthony, secretary of said corporation, at its office, at room No. 323 of the Parrott building, Nos. 825 to 855 Market street, in the City and County of San Francisco, State of California.

Any stock upon which this assessment shall remain unpaid on the 26th day of September, 1900, will be delinquent and advertised for sale at public auction; and, unless payment is made before, will be sold on MONDAY, the 29th day of October, 1900, to pay the delinquent assessment, together with costs of advertising and expenses of sale.

By order of the Board of Directors.

J. C. ANTHONY, Secretary.

Office—Room 323 Parrott building, Nos. 825 to 855 Market street, San Francisco, California.

GOULD & CURRY SILVER MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Virginia, Storey County, Nevada.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 6th day of August, 1900, an assessment (No. 91) of fifteen (15) cents per share, was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, room No. 69, Nevada block, No. 309 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 8th day of September, 1900, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 1st day of October, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

ALFRED K. DURBROW, Secretary.

Office—Room No. 69, Nevada block, No. 309 Montgomery street, San Francisco, California.

BEST & BELCHER MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Virginia District, Storey County, Nevada.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 3d day of August, 1900, an assessment (No. 71) of fifteen (15) cents per share, was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, room 33, Nevada block, No. 309 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 7th day of September, 1900, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on FRIDAY, the 28th day of September, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

M. JAFFE, Secretary.

Office—Room 33, Nevada block, No. 309 Montgomery street, San Francisco, California.

ALLIANCE EXPLORATION & MINING COMPany.—Location of principal place of business, San Francisco, California; location of works, Ophir, Placer County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 3d day of August, 1900, an assessment (No. 3) of five (5) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 236 Sutter street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 11th day of September, 1900, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 2nd day of October, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

S. GOLDSMITH, Secretary.

Office—236 Sutter street, San Francisco, California.

EUREKA CONSOLIDATED DRIFT MINING COMPany.—Location of principal place of business, San Francisco, California; location of works, Forest Hill, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 9th day of August, 1900, an assessment (No. 26) of one (1) cent per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 214 Pine street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 8th day of September, 1900, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on SATURDAY, the 29th day of September, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

GEO. W. DIXON, Secretary.

Office—214 Pine street, San Francisco, California.

SAVAGE MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Virginia, Storey County, Nevada.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 13th day of August, 1900, an assessment (No. 101) of ten cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Rooms 20-22, Nevada block, No. 309 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 18th day of September, 1900, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 8th day of October, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

JOHN W. TWIGGS, Secretary.

Office—Rooms 20-22, Nevada block, No. 309 Montgomery street, San Francisco, California.

MICHIGAN COLLEGE OF MINES.

An Engineering School with unique location, giving it unusual facilities. Distinctive methods of instruction. Special courses. For catalogue giving occupation of graduates, address

F. W. MCNAIR, President, Houghton, Mich.

DELINQUENT SALE NOTICE.

COLUMBIA ATHLETIC CLUB (INC.)—Location of principal place of business, San Francisco, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 4) levied on the 27th day of June, 1900, and payable Saturday, June 30, 1900, the several amounts set opposite the names of the respective shareholders, as follows:

Name.	No. Cert.	No. Shares.	Amt.
Daniel F. Crowley........... ...		15	$50 00

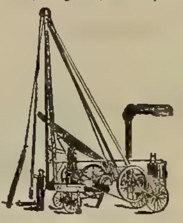
And in accordance with law, and an order from the Board of Directors, made on the 27th day of June, 1900, so many shares of each parcel of such stock as may be necessary, will be sold at public auction at the office of the club, 1200 Market street, San Francisco, California, on THURSDAY, the 30th day of August, 1900, at the hour of 12:30 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

JNO. H. EFFINGER, Secretary.

Office—1200 Market street, San Francisco, California.

A BORE HOLE

is the cheapest, quickest, most direct, and most effective way to test lands for minerals, oil, gas, salt, sulphur, borax, water, etc.



THE STAR DRILLING MACHINES

excel for these uses. They will drill a hole through anything to any depth from 250 to 2500 feet. The only machines made that are absolutely without annoying springs. They are simple, powerful and efficient. Easy to handle at work or on the road. Used in every State and Territory and in many foreign countries.

We also make full line of drill tool-bits, reamers, sand pumps, spuds, etc., etc. Write for illustrated free catalogue.

Star Drilling Machine Co.,

Akron, Ohio.

DENVER & RIO GRANDE R.R.
SCENIC LINE OF THE WORLD

The ∴ Mining Man's Favorite Route

BETWEEN

Denver, Colorado Springs, Pueblo and Florence, Cripple Creek, Leadville, Glenwood Springs, Aspen, Gunnison, Lake City, Creede, Durango, Silverton, Telluride and Ouray,

Reaching all the Mining, Milling, Cyaniding, Chlorinating and Smelting centers in Colorado and Utah, and all mining points in California, British Columbia and the Pacific Northwest by close connections and a perfect system of through car service.

Pullman Palace and Tourist Sleeping Cars between Denver and San Francisco and Los Angeles, and Pullman Palace and Tourist Sleeping Cars and Free Reclining Chair Cars between Denver and Portland. : : A Perfect Dining Car Service on All Through Trains. : :

For Illustrated Pamphlet, address

W. J. SHOTWELL,
G. A. D. & R. G. R. R.,
126 California St.,
San Francisco, Cal.

S. K. HOOPER,
G. P. & T. A.,
Denver,
Colo.

THE MINES OF

Eastern Oregon

Which are now attracting so much attention are reached only by the lines of the

OREGON RAILROAD & NAVIGATION CO.

For Descriptive Pamphlets, Through Rates, Etc., Address

E. C. WARD, Gen. Agt.,
630 Market Street, San Francisco.

COLORADO'S GOLD

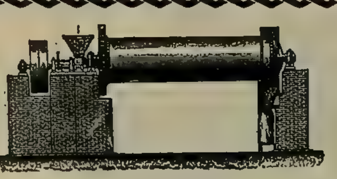
Output for 1899 is unequaled by any State in the Union. Cripple Creek, Leadville, and all the important mining towns are reached by

THE COLORADO & SOUTHERN RY...

For copies of our publications on the Swandyke and Pine Creek Gold Districts, or our pamphlet "Hints to Prospectors," address

T. E. FISHER, GEN. PASS. AGT.
DENVER, COLO.

DEWEY, STRONG & CO.
SCIENTIFIC PRESS PATENTS PATENT AGENCY
330 MARKET ST. S.F.



THE DAVIDSEN PATENT TUBEMILL.

FOR FINE GRINDING,

Uniformity of Output, Effectiveness, Simplicity, or Economy of Operation and Maintenance, "THE DAVIDSEN" HAS NO EQUAL.

ENORMOUS GRINDING SURFACE. ❧ SLOW SPEED. ❧ ANY DEGREE OF FINENESS.

WRITE FOR CATALOGS.

F·L·SMIDTH & CO
ENGINEERS
66 MAIDEN LANE, NEW YORK
COPENHAGEN, VESTERGADE 29.K. LONDON. 9 BRIDGE ST., S.W.

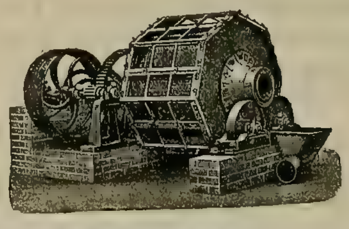
THE SMIDTH BALLMILL

Crushes, Grinds and Sifts in One Operation, Working Continuously.

AMONG ITS **SPECIAL FEATURES** OF MERIT ARE:

Maximum Output, Slow Speed, Low Horse Power, Absolute Uniformity, Ease of Access, Slight Cost of Repairs.

OUR AUTOMATIC FEEDER INSURES REGULARITY AND EFFECTIVENESS.



THE SMIDTH BALLMILL.

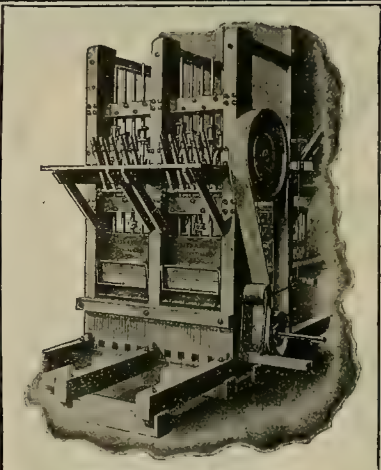
BEST.

CHEAPEST.

MOST SIMPLE.

THE EDW. P. ALLIS CO.,

MILWAUKEE, WIS.



TEN STAMP BATTERY.

Mining, Milling and Smelting Plants.

MINING MACHINERY OF EVERY DESCRIPTION.

HOISTING ENGINES

REYNOLDS CORLISS ENGINES.

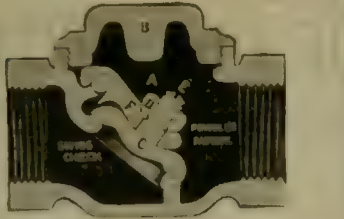
TELEPHONE MAIN 5303

Union PHOTO-ENGRAVING CO.

DESIGNING
HALF-TONES
ZINC ETCHING

523 MARKET ST
SAN FRANCISCO. CAL.

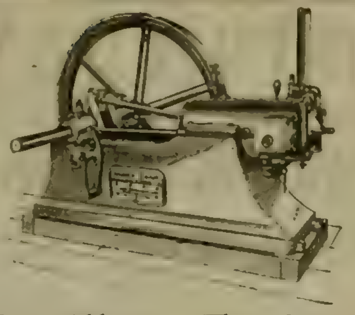
Powell's Patent Swing Check Valve.



SIMPLE, EFFECTIVE AND TIGHT.

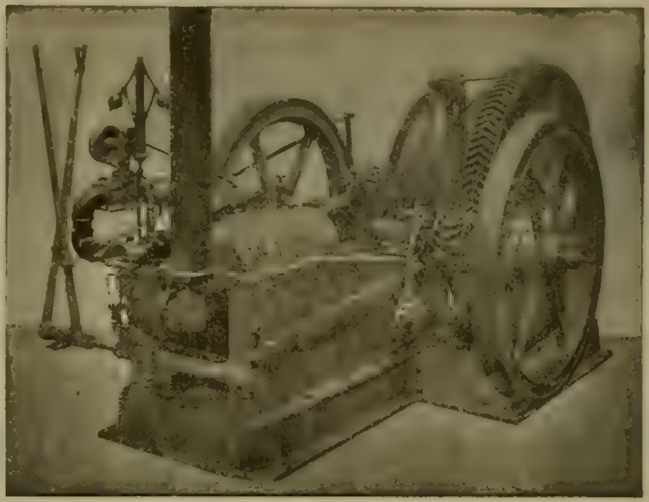
Can quickly and easily be reground at any time. Works equally well in either a horizontal or vertical position. Try them. Jobbers on the Pacific coast can furnish them. Manufactured by

THE WM. POWELL CO.,
CINCINNATI, O.



Distillate Engines and Hoists.
Air Compressors.
HADWEN SWAIN MFG. CO.,
215-217 SPEAR ST., SAN FRANCISCO, CAL.
CATALOGUES MAILED.

HERCULES HOISTS Are Sold the World Over.



Hercules Gasoline Hoist--Speed 385 Ft.; Load 2500 Lbs.
HERCULES GAS ENGINE WORKS,............141-143 FIRST STREET, SAN FRANCISCO, CAL.

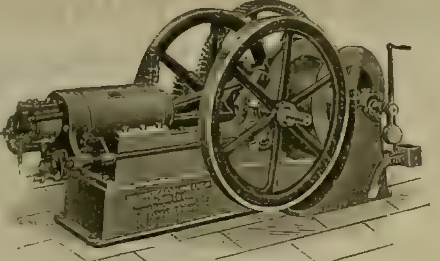
WITTE GASOLINE HOISTS
ARE MONEY EARNERS.

Made for use in places far from factory. Are built in parts and in duplicate. Renewals easy and quick to get. Strong, substantial and reliable.

Operate on GAS, GASOLINE or DISTILLATE.

There Are Others, but None as SAFE AND RELIABLE.

Write for Illustrated Catalogue G.



WITTE IRON WORKS CO.,
Hendrie & Bolthoff Mfg. & S. Co , Denver, Colo.
C. B. Boothe & Co., Los Angeles, Cal.
Tracy Engineering Co., San Francisco, Cal.
515 WEST 5th ST.,
KANSAS CITY, MO., U. S. A.

A GASOLINE OR OIL "HOIST"

that does its work without any fuss or bother is the "Weber." Correctly designed and built, in sizes from 6 to 150 H. P., with Single or Double Drum, for Gasoline, Gas or Distillate. Unexcelled for mining, quarry, or ship use. State sizes wanted and for what use.

WEBER GAS & GASOLINE ENGINE CO.,
430 S. W. Boulevard,
Kansas City, Mo.
See our PUMPING PLANTS.

THE MARION STEAM SHOVEL CO.,

Steam Shovels
Dredges and
Traction Dredges

Suitable for all kinds of **Excavating Work**, making a specialty of

PLACER MINING MACHINES,

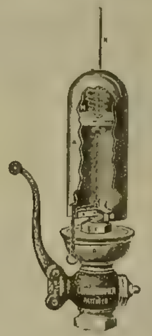
separate or self-contained, either as a **dry land excavator** or **floating dredge.**

The Marion Steam Shovel Co.
MARION, OHIO.

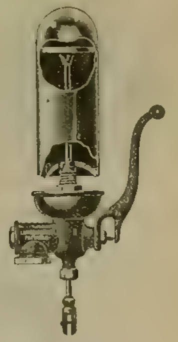
GEO. W. BARNHART, No. 4 Sutter St., San Francisco, Cal.

Plain Whistle.
1-10 in. Diam. of Bell.

Chime Whistle.
1½ 10 in. Diam. of Bell.



Mocking Bird.
2½ 6 in. Diam.



Fire Alarm.
2½ 8 in. Diam.

The Lunkenheimer Whistles are made to blow and are a "howling" success. Being made of best materials and properly constructed satisfy all users. If you want a good whistle specify "Lunkenheimer" make and order from your dealer. Catalogue and Model Diagram Chart, for analyzing the movements of the Slide Valve, free if you mention the Mining and Scientific Press.

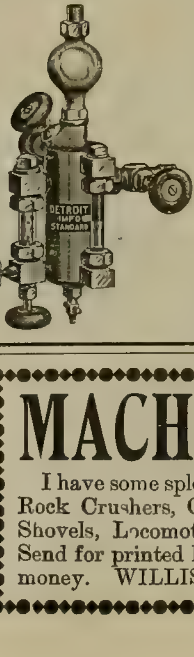
The Lunkenheimer Co.,
SOLE MAKERS AND PATENTEES,
Main Offices and Works,
CINCINNATI, O., U. S. A.
New York: 26 Cortlandt Street.
London: 35 Great Dover Street, S. E.

RIVETED IRON AND STEEL PIPE

FOR HYDRAULIC MINES, IRRIGATION AND POWER PLANTS. Manufactured from the best grades of IRON or STEEL by MODERN MACHINERY.

AGENTS FOR THE Celebrated CANTON STEEL.

Schaw, Ingram, Batcher & Co.,
539 Mission St., SAN FRANCISCO.
211 to 219 J St., SACRAMENTO.



ALL ABOUT
Sight Feed Lubricators.

Our new catalogue for 1900 is ready for distribution. It explains in detail the principles governing the operation of **Sight Feed Lubricators**, using sectional view to show the internal construction, and containing cuts of the different styles in parts before being assembled into the complete lubricators, thus enabling every one to understand their construction and operation thoroughly.

In addition it shows our full line of **Glass Oilers, Oil Pumps, Oiling Devices, Multiple Oilers, Valves, Etc.** It will be sent to any address on application.

DETROIT LUBRICATOR CO., DETROIT, MICH.

WE HAVE MOVED TO LARGER QUARTERS.

TRUAX

CARS ALWAYS IN STOCK TO FILL RUSH ORDERS

ORE CARS

WE MAKE CARS FOR YOUR CAGE AND SKIPS FOR YOUR INCLINE SHAFT.

SEND FOR PAMPHLET AND REFERENCES.

Truax Mfg. Co., 69 STEVENSON ST., S. F.

TO SECURE GOOD RESULTS BUY

JESSOP'S STEEL
FOR TOOLS, MINING DRILLS, ETC.

Chief American Office,
91 John St., New York, N. Y.

Wm. Jessop & Sons, Ltd.
Manufactory, Sheffield, England.

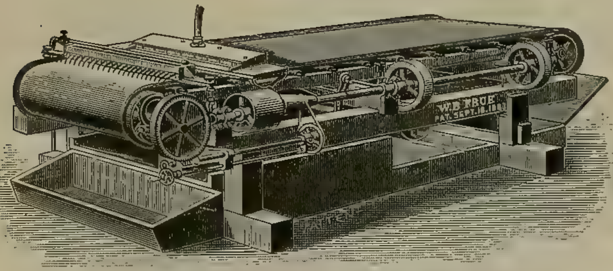
I. WILLARD BEAM, Agent,
29 MAIN STREET,
SAN FRANCISCO, CAL.

MACHINERY BARGAINS.

I have some splendid Air Compressors, Hoisting Engines, Rock Drills, Rock Crushers, Channeling Machines, Steam Pumps, Boilers, Steam Shovels, Locomotives and Relaying Rails, all in splendid condition. Send for printed list and specify your requirements. I can save you money. WILLIS SHAW, 627 New York Life Building, CHICAGO.

FOUR and SIX-FOOT FRUE VANNERS

With Brownell "Patent Lip" Flange Belts.



STANDARD MACHINE OF THE WORLD.

When a Concentrator like the Frue Vanner has been on the market nearly two decades, and the sales have constantly increased, it is safe to say it is the "Standard Machine of the World." More Frue Vanners have been sold during the last twelve months than for the same period at any time during the history of the machine. Practical mining men in all parts of the world where mining is carried on will testify as to its merits. It is the "standard" which all competitors are trying to imitate.

The results obtained by this machine are the "acme" of concentration, and several cheap and untried machines that have lately come on the market compare by it. The manufacturers will tell you that they are "just as good, and cheaper," etc. The facts are that no other concentrator made has an equal capacity, or will yield as clean a concentrate with as small loss in the tailings as the Frue Vanner. The amount saved from the lower first cost of an inferior machine counts little in the year's results, when compared with the increased output from a Frue. This machine not only gives better results at both ends of the belt (i. e., clean product and poor tailings), but is operated at less expense and requires less attention than any other machine on the market. At the Alaska-Treadwell mine, where they have ordered over 350 Frue Vanners, one man attends 48 machines for 12-hour shift.

FOR DESCRIPTIVE PAMPHLETS, ADDRESS

J. S. BROWNELL, Western Agent FRUE VANNING MACHINE CO.,
132 MARKET STREET, (Successor to Adams & Carter.) SAN FRANCISCO, CAL.

GEO. E. DOW PUMPING ENGINE CO.

(Successors to DOW STEAM PUMP WORKS.)

108-120 BEALE ST., - - SAN FRANCISCO, CAL.

MANUFACTURERS OF

DOW PUMPS

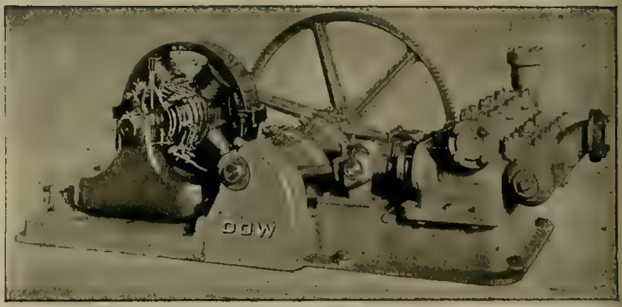
FOR MINING PURPOSES,

Operated by STEAM, AIR, ELECTRIC or WATER POWER.

VERTICAL SINKING PUMPS, BUCKET OR DOUBLE PLUNGER PATTERN.

DEEP MINE STATION PUMPS.

PUMPING MACHINERY FOR EVERY POSSIBLE DUTY.

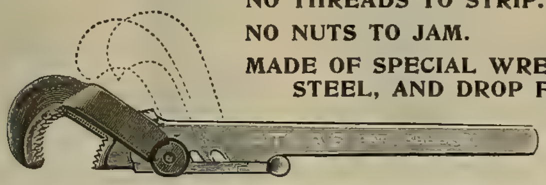


HOR. TRIPLEX MINE STATION PUMP WITH ELECTRIC MOTOR.

ATTENTION! USERS OF PIPE WRENCHES.

THE LATEST, BEST AND CHEAPEST PIPE WRENCH.

NO THREADS TO STRIP.
NO NUTS TO JAM.
MADE OF SPECIAL WRENCH STEEL, AND DROP FORGED.



The good qualities of Chain Pipe Wrench and Screw Pipe Wrench combined, without the faults of either.

Quick, effective and positive in adjustment. Cannot slip, crush or lock on the pipe.

Made in four sizes: 10, 18, 24 and 36 inches. Handling from ⅛ of an inch wire to 4½-inch pipe. Price no higher than other pipe wrenches on the market.

ATLAS PIPE WRENCH CO.,
Flood Building, SAN FRANCISCO.
NEW YORK OFFICE, 121 LIBERTY ST. WORKS, NEW HAVEN, CONN.

The Knowles Improved Steam Pumps.

Hoisting and Pumping Machinery.

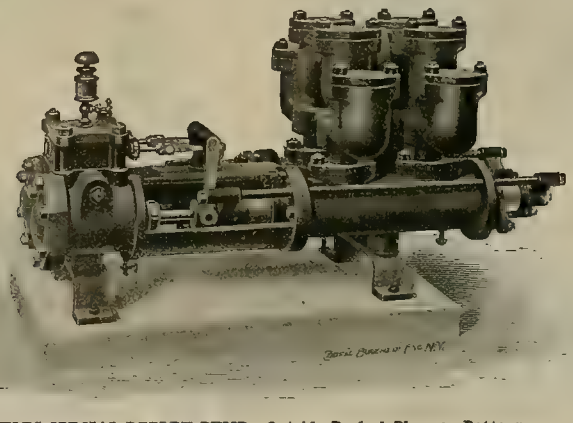
Mining Pumps,

Irrigation Pumps,

Artesian Well Engines,

Independent Air Pump and Condenser

For Stationary Engines or Steam Pumps.



KNOWLES SPECIAL DUPLEX PUMP. Outside Packed Plunger Pattern.

Power Pumping Machinery,

Speed Governors,

Balance Valves and Pressure Regulators

For Steam Pumps.

The Ingersoll-Sergeant Air Compressors and Rock Drills,
Bullock Diamond Drills.

PARKE & LACY CO., 21 & 23 FREMONT ST., SAN FRANCISCO, CAL.

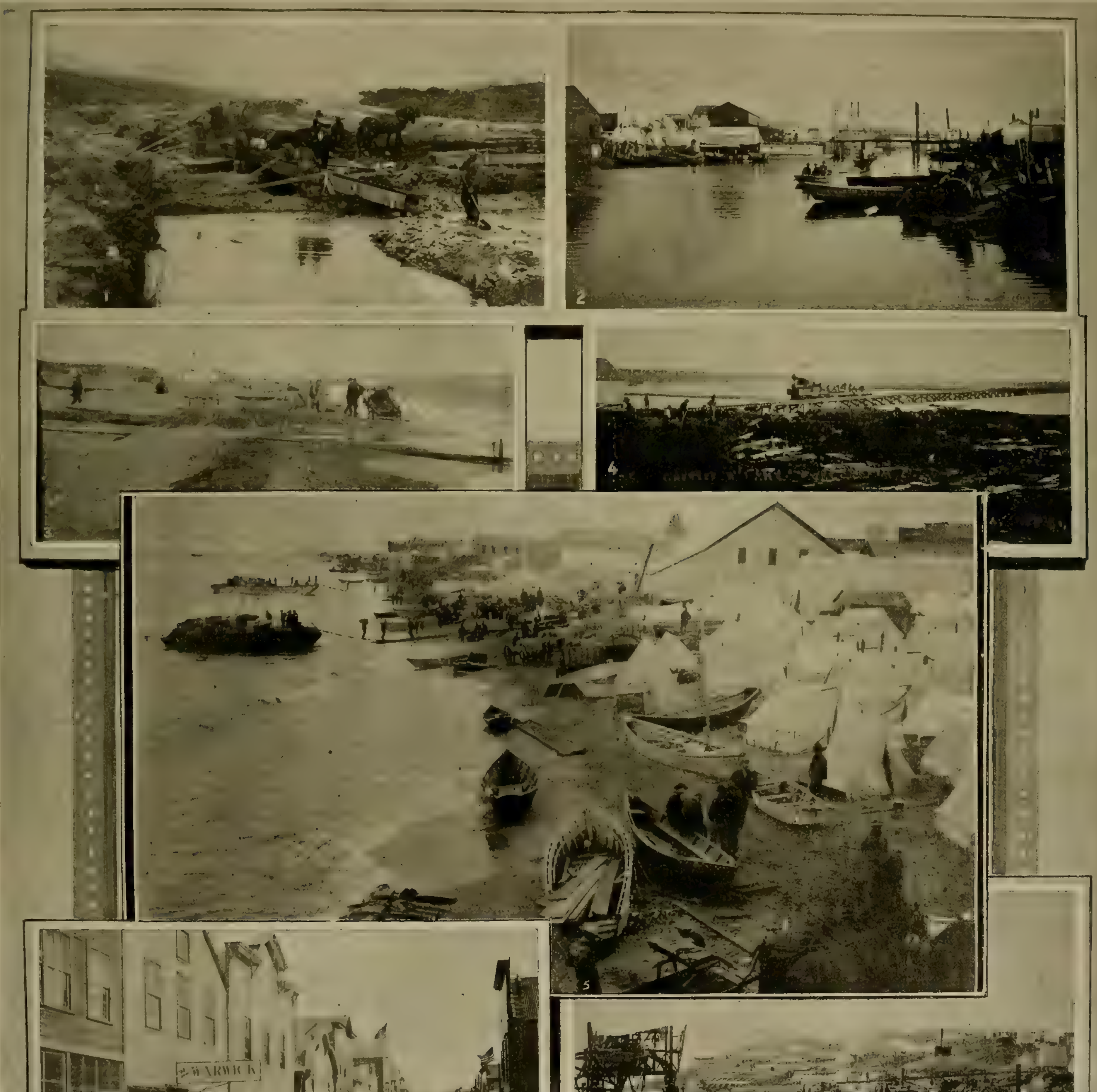
DEWEY, STRONG & CO., Patent Agents, 330 Market St., S. F., Cal.

CALIFORNIA STATE LIBRARY

This Paper not
to be taken from
the Library.

MINING AND SCIENTIFIC PRESS.
AND PACIFIC ELECTRICAL REVIEW.

No. 2093.—VOLUME LXXXI. Number 9.
SAN FRANCISCO, SATURDAY, SEPTEMBER 1, 1900.
THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.



SCENES AT CAPE NOME, ALASKA, AUGUST, 1900.

o. 1.—Discovery on Anvil Creek (Showing Flat Ground and Lack of Dump). No. 2.—Toll Bridge and Ferry. No. 3.—Mining on the Beach. No. 4.—C. D. Lane's First Railway Train on the Way to Anvil. No. 5.—The Beach at Nome, From N. A. T. Wharf, Looking West No. 6.—Street Scene in Nome. No. 7.—Beach Scene West of Nome, Aug. 5. **(See Page 253).**

MINING AND SCIENTIFIC PRESS.
ESTABLISHED 1860.
Published Every Saturday at 330 Market St., San Francisco, Cal.

ANNUAL SUBSCRIPTION:
United States, Mexico and Canada........$3 00
All Other Countries in the Postal Union........4 00

Entered at the S. F. Postoffice as second-class mail matter.

J. F. HALLORAN........Publisher.

Special Representatives:
EASTERN.
E. H. HAVEN........150 Nassau St., New York City.
MIDDLE WEST.
CHAS. D. SPALDING........153 La Salle St., Chicago, Ill.
INTER-MOUNTAIN.
W. A. SCOTT........43 Jacobson Building, Denver, Colo.
SOUTHERN CALIFORNIA.
W. D. CURTIS........223 W. Second St., Los Angeles, Cal.

San Francisco, September 1, 1900.

TABLE OF CONTENTS.

ILLUSTRATIONS.—Scenes at Cape Nome, Alaska, August, 1900, 245. Head Gear at tne Lowell & Arizona Copper M. & S. Co.'s Mine, Bisbee, Ariz.; General View Lowell & Arizona Copper M. & S. Co.'s Mine, Bisbee, Ariz., 249. Latest Mining and Metallurgical Patents, 250-251. Feeder for Crude Ore; Ericsson Telephone Co.'s Exhibit, 252. The Aultman Balanced Screen, 253.
EDITORIAL.—Profit in Mining Investment; A Diatribe Against American Mining Engineers; Great Year for the Prospector; Miscellaneous, 246.
MINING SUMMARY.—255-256-257-258.
LATEST MARKET REPORTS.—259
MISCELLANEOUS.—Concentrates, 247. Charcoal Precipitation from Cyanide Solutions; Colorado Smelting Methods, 248. Lowell & Arizona C. M. & S. Co.'s Plant, Bisbee, Ariz.; Silver Smelting in Mexico, 249. Latest Mining and Metallurgical Patents, 250-251. A Crude Ore Feeder; Rand Mines During the War; Exhibits of the Ericsson Telephone Company, 252. The Tropenas Steel Process; At Cape Nome, Alaska, 253. Siberian Gold Fields; Regarding Final Prcofs; A Balanced Shaking Screen; Liable to Lead Poisoning, 254. Personal; Commercial Paragraphs; List of U. S. Patents for Pacific Coast Inventors; Notices of Recent Patents; Recently Declared Mining Dividends; Books Received; Catalogues Received, 258-259.

AT the Paris Exposition the United States wins pre-eminent recognition in mining and metallurgy.

THERE seems to be a hopeless difference of opinion between the Boston & Montana M. Co. and its receiver, Thos. Hinds. The latter asks for $400,000 for his services and $14,000 for an assistant. The company proffers Mr. H. $50 for a receipt in full, and is willing to pay the assistant $20. Incidentally the company also asks the attorney appointed by the receiver to take $200 for his bill for $15,000 and call it square. The value of the services of a mining engineer is also a subject of question, the company scaling the fee asked by Mr. Brown from $1000 to $25, and curtly claiming that the latter sum represents the full value of such services.

IN an account of the burning of the Weldon mine plant at Leadville, Colo., this week, is the usual statement that the engineer stuck to his post until all the men were hoisted from below: then he got out so badly burned that he is not expected to live. In battle, in the fullness of his pride and strength, the soldier bravely faces death, upheld by the contagious courage of his comrades. He is deified as a hero in song and story, and deservedly. No less heroic, rather more, is the brave man who, alone, amid falling timbers and roaring flames, stands at his station and saves the lives of his fellow workers in the mine who depend upon him for succor. All honor to the engineer of the Weldon mine and such dauntless souls as his, who deserve recognition for heroic devotion to duty!

THE mutual relation of a profitably producing mine and a profitably operated smelter is aptly illustrated by going into some figures produced by the News Bureau concerning the operations of the Centennial-Eureka mine, Tintic district, Utah, for the first six months of the year. During that time the mine produced $722,655. There were mined and shipped 20,000 tons ore, which yielded 1,148,455 pounds copper (2.87% to the ton); 14,628.081 ounces gold (0.731 ounce per ton); 384,638.27 ounces silver (19.23 ounces per ton). The smelter to which the ore was shipped deducted 1.3% of the copper contents, and made further deduction in calculating the price paid, making it net about 13 cents per pound. For the gold the smelter paid $19 per ounce; for the silver, 95% of the assay value. This, with the regular smelting charge—a total of about $13 per ton—would bring the smelting charges to about 40% of the value of the ore.

Profit in Mining Investment.

There is a present inequality of conditions that could be mutually improved. Money is so plenty, and rates of interest consequently so low, in the East that the United States is lending money to England, the late British loan being largely taken in New York. Call money is 1½%, and 3% securities are at a premium. In this west half of the same country are opportunities for profitable investment of this surplus idle wealth. The mineral industry of this region could be exploited to the common profit of all, the country built up and the millions begging for investment made to yield satisfactory returns. With better understanding of the facts this could be brought about. With idle millions seeking 2% investments and idle mines capable of producing 20% profit, the times seem propitious for "getting together." One obstacle to such mutual gain is the ill will and distrust that arise from ignorance of the facts. There is considerable ancient prejudice still existing east of the hundredth meridian regarding mining, which is still considered a game of chance instead of one of skill. Eastern people do not realize that in no other branch of industry has there been such advance as in the mining industry in the last ten years. Improved and economical mining and metallurgical mothods have made possible profit where formerly existing facts precluded successful working. It is to be said that in many cases sad experience has deterred further investment. But were that to count, nobody would do anything in any line of business. Lack of knowledge and absence of ordinary business judgment are fatal to success in any commercial pursuit, and mining is now made just as legitimate a form of business as anything else. Rightly managed, with due attention to business requirements, any business should prove reasonably profitable, the advantage in the mining business being that the customer seeks the producer; the demand is constantly commensurate with the supply; the destructive competition existing in other lines is notably absent, and many of the vexatious problems attendant upon other forms of commercial activity do not arise. There is plenty of capital awaiting profitable investment in the East for honest, legitimate mining, but none for boom deals or wildcat schemes. How to induce the profitable investment of that capital is a subject on which much has been said, some of it unwisely. The business of enlisting such capital is legitimate, honorable and necessary, and should be so conducted to secure success. There should be truthful statement, time given for investigation, prices made commensurate with value, and constant recognition of the fact that in these things honesty is not only the best but the only policy. Of course, there are always timid and distrustful souls who fear to pay $19 for a $20 gold piece, but, apart from these, there are plenty Eastern people who want profitable investment for their surplus money, and who have nerve and intelligence enough to buy what will yield such return if its worth can be satisfactorily shown to them.

When such statements as the above appear editorially in the MINING AND SCIENTIFIC PRESS, the usual result is a host of replies from Eastern readers, which, summed up, are about like this: "If in your 'west half of America' exist such valuable mining property as you say, why don't some of your wealthy residents take such good things themselves? Why should Eastern or foreign capital be sought?" implying that Western residents take the good things and want to unload the refuse on the unknowing alien. The answer in short meter is that the area and extent of such possible investment with profit exceed the financial ability of any limited class. Thousands of men resident in "the west half of America" have grown rich in mining, and invested their surplus in other mining projects; but were their number increased a thousand fold, and their investments correspondingly augmented, the area of probable profit-producing mining investments would not be materially curtailed in scope or extent.

THE increasing importance of the oil industry of California makes prominent the question of transportation. The one plan that at once suggests itself is the piping system, which has been carried to proficiency in the Eastern oil fields. In a limited way piping of oil has been done in California, but the fact that the conditions in California are different from the Eastern States does not warrant the idea that a great system of distribution and transportation of oil can be as readily produced here as in the Central States. There are different oil gravities in different districts, and in some instances the oil is of so low a gravity as to preclude successful prosecution of the plan. The question of getting the oil from the well to the consumer is of immediate commercial importance. Probably one of the first steps will be the adoption of a system of grading the oils and the gradual extension of the present pipe lines.

THE London Mining Journal of the 4th ult. has a page communication, a diatribe directed against American mining engineers, anonymous, and betraying a bitterness that precludes discussion of the facts. According to the anonymous correspondent of the London Mining Journal, American mining engineers are everything that they should not be, which is not a flattering comment on the business judgment of the British mine owners who have been all along eager to secure the services of American mining engineers in positions where skill, experience, ability and all the other elements that go to make up a successful mining engineer are required. The fact that the directors of many of the most reputable British mining companies made wise selection of American managers with great financial success, militates against notice of the charges of the anonymous British critic, whose hostility may come from the envy sometimes engendered in the breast of the unsuccessful. There are two kinds of people in the world—men who do things, and men who tell how things should or should not be done. The American mining engineer well represents the former class; the London critic as fittingly represents the other. Nothing is so cheap as a sneer, and sneering critics are usually found among the ranks of the unsuccessful. The American mining engineer needs no champion; he began to labor in the South African gold fields ten years ago, and out of the chaos of 1890 raised the industry to the prosperity it enjoyed just before the present war. The attack noticed is not the first of the kind, and those things need not be taken seriously. The American mining engineer made the Rand what it is; dominates the Rand to-day, and now having shown how the work should be done (it having become a manufacturing and mechanical proposition), probably less valuable men can continue on the lines indicated, for a time at least. Any answer to the attack referred to can best be left to those best competent to judge—namely, the directors and owners of the mines—the criterion being success.

THIS last year of the century is a great one for the prospector. He is out everywhere prospecting for gold and copper. Thousands of him have gone beyond the Arctic circle, past bleak Cape Nome, across to Siberia, through the hermit kingdom of Korea, along both shores of Bering sea and across British Columbia. Others have scattered with profit over a more attractive area in this west half of America that was ridden over years ago by horseback prospectors who announced that there was "nothing in it." More accurate attention to detail proves to their successors that there is a good deal in it. Like all connected with the mining industry prospectors are learning, a good deal of the old self-sufficiency has gone, and they are not above taking points from the experience and knowledge of others. The prospector of 1900 knows better than any of his predecessors the nature of gold, its peculiarities, where to look for it and how to get it when found. He no longer devotes all his time to quartz, but tests other formations known to be gold bearing. The prospector is the avant courier of the miner; he is as "the voice of one crying in the wilderness make straight the way of the Lord"; he rarely makes a good miner, and a good underground miner as rarely makes a good prospector; his mission and function is to scout ahead of the regular army, discover and explore, indicate where lies the treasure and leave to others the work of exploitation and development. With him lingers what is left of the picturesque in mining.

AT 16 cents per pound there is found a profit in importing copper coins from India and melting them for commercial use, being worth more that way than as coins.

Concentrates.

THERE is no premium on any U. S. gold mint coinage.

ANY U. S. mint will pay $18.60 per ounce, standard, or gold 900 fine.

LEACHING low grade copper ore was technically dis-ussed in the issue of Aug. 27, '98.

THE practical limit of height to which water may be fted by a syphon is about 27 feet.

REAL syenite contains but a very small percentage of uartz and rarely more than 50% silica.

ONE POUND lifted 1 foot in 1 minute is a "foot pound." Vhat is still called a "horse power" is 33,000 times that.

A FAIR average allowance for loss of mercury in a 10-tamp gold mill would be about fourteen pounds per nonth.

COLORADO gilsonite contains about 94% carbon, of vhich 40% is volatile. Utah gilsonite contains about 88% arbon.

THE Pacific system of the Southern Pacific Co. has a nileage of 5452 miles and operates 753 locomotives and 9,098 cars.

THE number of men employed in the mines of Butte, Montana, underground, is about 6000; 1200 are employed s surface men.

THERE may exist such a thing as a successful electric nelting furnace; but, if so, it is also successful in eludg public notice.

"THE deepest mine on the coast" (if eastern Nevada an be counted in) is the Union Con., Comstock lode, Virinia, Nev., 3350 feet.

GRAPHITE may be brazed by the dipping method, or liquid brazing," as it is called, with economy of operaon and efficient result.

A 500-ACRE RESERVOIR would require an inflow of war of 3.5 cubic feet per second to maintain loss by evapation, at a temperature of 60° F.

EXHAUST STEAM can not well be utilized to heat the linder of an engine, the temperature of exhaust steam ing lower than that of live steam.

EVERY application for a U. S. patent to mining ground ust show that $500 worth of work has been done on the aim, or for (not on) each claim if locations are ouped.

TELEPHONE service is of everyday use in many mines d effective. The primary cost is necessarily greater, the fittings need to be better than ordinarily supplied surface service.

REGARDLESS of its size, the annual required assessent work on an unpatented placer mining claim is $100. ork done on a ditch or canal to develop the claim could considered assessment work.

THE most recently added 520 stamps at the Alaska-readwell property each weigh 1050 pounds. The heavit stamps "Concentrates" ever heard of are at the Big anyon mine, El Dorado Co., Cal.—1400 pounds each.

A 4-INCH iron tube, .13 inch thick, tensile strength ,000 pounds, strength of weld 75% of solid plate, will quire 2437 pounds to burst it. For ordinary lengths in e in tubular boilers its collapsing pressure is 2080 unds.

IT is difficult to determine "how long woven wire reens ought to last in a stamp mill:" probably through e milling of 250 tons ore. Care in feeding and in seeing at they are kept clean and free will prolong their useness.

"ACHICAR" is a Mexican mining term meaning what S. miners call "unwatering." A "barra" means a are in a mine. Old Spanish law considered a mine vided into twenty-four parts, and each part was a barra."

A 900-LB. STAMP dropping 100 times a minute will reire 2 H. P.; that is, a 10-stamp mill would need at least a H. P. engine for the stamps: each stamp requires out 75 gallons of water per hour: each concentrator out 250 gallons.

THE Cape Nome boom for the transportation comnies having been worked for all it was worth, Bristol y and Golovin bay will probably be dangled as seducte bait. The fate of so many in Cape Nome should be fficient warning.

A CEMENT that will resist the action of water and is nsequently non-poisonous is made as follows: Four rts pure gelatine dissolved in fifty parts water; add % concentrated solution bicromate of potash; the mixre to be kept in the dark.

LARGE mining corporations find it commercially profite to employ a "geologist," just the same as a chemist metallurgist or consulting engineer. The Anaconda , at Butte, Montana, and the Calumet & Hecla, Michi-, are among such concerns.

CHROME ORE is found in various parts of California l has been mined with profit. It is used in the manuture of chrome salts and for linings of furnaces. Its ap importation precludes present possibility of profit marketing the domestic product.

THE objectionable smoke in flashlight photography be lessened by the use of ammonium nitrate. A xture of two parts magnesium and one of ammonium rate gives the same illumination as a mixture of one part of magnesium and three-fourths part of potassium permanganate. But equal parts of magnesium and ammonium nitrate show 2½ times the actinic power of a mixture in which three of magnesium and one of ammonium nitrate is used.

THE assay ton contains 29,166.6 grams. There are 29,166.6 ounces in one ton avoirdupois; if one assay ton of ore when assayed gives a resultant button of 10 milligrams, the assay value of the ore is ten ounces per ton. One ounce per ton is 0.00343%.

LIQUID CHLORINE is furnished by Mariner & Hoskins, 81 Clark St., Chicago, for chlorination plants. It is transported in strong steel cylinders, each containing about 115 pounds, equivalent to 610.6 cubic feet of the gas at ordinary pressure and temperature.

THE 50th anniversary of the discovery of gold in California was celebrated in San Francisco, in January, 1898, with great splendor. The celebration on the 9th, 10th and 11th inst., in San Francisco, will be the 50th anniversary of the admission of California into the Union.

IT is altogether practical to build a good-sized dam, even to the height of 100 feet, of material transported and deposited in place by flowing water, or "ground sluicing," but from start to finish the work should be controlled and superintended by a competent engineer.

PROBALY the highest in altitude of any smelter in the world is the smelting plant of the Backus & Johnson Co., Casapalca, Peru, on the Oroya Railway, in the Andes mountains, 13,606 feet above the sea, and about 100 miles inland. Nearly 500 men are employed, and the annual profit is said to be about $100,000.

THE trend of training for mining engineers is to make mining more mechanical and ore treatment more chemical, introducing order and system and occasioning more economical working methods. There is also a tendency toward a general interchange of opinion and a realization of the futility of attempts at secrecy in metallurgical processes.

A TOOL SHARPENER says for picks he has a box that holds about 200 pounds dry sand, which is always kept dry. After dressing the pick he allows it to cool about an inch, then sticks it down in the sand and leaves it there until it is nearly cold, and the sand will do its work. He asserts that picks thus treated are tough and will give satisfaction.

PART of the duty of the manager of a considerable mining property is to see that a complete and accurate system of mine cost accounts is kept, and nothing in its way is more conducive to economy and profit. Such cost sheets secure and make necessary close attention to detail and show where the little leaks are that in the aggregate so often drain off possible profit.

A PROMINENT mining engineer, in sending a communication of practical value, says: "This is a matter of reciprocity. I have received so much real information tersely given in 'Concentrates' that I feel impelled to make some return." A good many whose opinions are worthy of notice are pleased to say that they feel indebted to this page for much of value in their work.

ABOUT as near to a feasible plan of "co-operation" in actual mining work as most people usually get is where mine leasers pay a royalty on ores produced. There are other methods, feasible and commendatory, as where a prospector is grubstaked, or where promising property is developed, or where practical miners make a good mine by common effort (as in the case of the W. Y. O. D., Nevada Co., Cal.).

SOME up-to-date users of machinery now consider that the best way to use a tool is to work it for all it is worth; put as few repairs on it as possible, and drive it to death, the increased product justifying the rapid depreciation. They figure, too, that a tool or machine likely to become obsolete is not to be cared for or kept too long, but to be discarded for improved makes as soon as necessary, and that it is "cheaper" to throw out a machine and get a better one if the latter can produce more work, this as a matter of shop economy.

MOLYBDENUM in its chief ore, molybdenite, resembles in appearance "black lead" or graphite. The mineral contains 59% molybdenum and 41% sulphur; it is brittle, difficult to fuse, specific gravity 8.62, and is converted into molybdic acid by boiling with nitric acid; it is used in the determination of phosphoric acid, in the preparation of blue carmine for coloring porcelain, and as a substitute for tungsten in making hard, brittle steel. The market for it is very limited and uncertain and can be easily oversupplied.

IN preparing drills from hammered steel much depends upon the heating for temper. The drill should be sharpened to as acute an angle as will stand up to the rock to be worked. To avoid breakage, heat slowly to cherry red, getting an even heat on cut of bit, then with clean, soft water dip slowly, taking out drill in time to leave sufficient internal heat to start the temper and toughen the bit, leaving it a light straw color. There is a difference between a brittle-hard and a tough-hard. If you chill in water without starting the temper you get a brittle-hard.

IF a vein enters a side line and departs out of the same side line, the miner has no extralateral right whatever, but is confined solely to his intralimital right of mining within his lines entirely. If a miner locates along the course of his ledge 1500 feet, he can have only one dip right; he may discover a ledge that runs across his location, but he can not follow it on its dip beyond his end lines. But if he mistakes the course of his vein in making his location, his end lines will become his side lines, and then he will have the right to follow the ledge on its dip beyond his new side lines, which were originally his end lines.

SIMPLE fire extinguishers can be made for use around a mill or mining plant: twenty pounds common salt, ten pounds sal ammoniac (nitrate of ammonia), are to be dissolved in seven gallons water. Put the solution into thin glass quart bottles, cork tightly and seal to prevent evaporation; set around where they will be handy, yet not in the way. In case of fire, throw so as to break in or near the flame. If the fire be in cotton or other soft stuff that will not admit of the bottle breaking, knock off the neck and scatter the contents. The breaking of the bottle will liberate a certain amount of gas, and the heat of the fire will generate more that will choke and stifle the flame.

CONCERNING the "purple of Cassius" test for gold, previously mentioned, an expert in metallurgy writes: "With regard to the chloride of tin test for gold, it is utterly unreliable and uncertain in the presence of cyanide of potassium. The solution must first be evaporated to dryness with a little aqua regia to destroy the cyanide before the test is applied, and then on diluting the residue with a little water the test may be applied. But it is much better to evaporate a 100 cc. in a lead tray and cupel the residue and determine the gold quantitatively, or else evaporate 10 A. T. with litharge and run it through the crucible assay and cupel the button. It is very much more satisfactory and not much more trouble."

OSMIUM is the heaviest and most infusible of the metals. Osmiridium is a natural alloy of osmium and iridium. This metal, or alloy, has been found in various placer mines in California, particularly in the northern part. Owing to its high specific gravity, in washing sand and gravel it concentrates with the gold. It can be easily distinguished by its bright metallic color and flat, scaly appearance, is insoluble in acid, and can not be melted by ordinary furnace heat. The shape of grain is irregular, has a ragged edge, and varies in size from that of fine to coarse sand, and often larger. As the market for osmiridium has been limited, little attention has been paid to it on this coast, but it is believed considerable quantities may be found if miners will turn their attention in that direction. Should anyone find any of this metal, the Selby Smelting & Lead Works, 416 Montgomery St., San Francisco, will be pleased to quote rates on receipt of sample.

THE appearance of a halftone engraving in the issue of Aug. 18, from a photograph taken by moonlight, has elicited several letters, some saying they did not believe that a photograph could be taken by moonlight, others citing similar instances of successful moonlight photography, and others asserting that there exists a process of photography without light, though there is no justification for the use of such a contradiction in terms, as any one successful in securing pictures "in the dark" has simply succeeded in demonstrating that light exists in places and substance where it has not hitherto been recognized. If uranium is placed on a photographic plate in what appears to be perfect darkness, and allowed to remain for some days, the plate is acted upon as in ordinary photography. Mercury, magnesium, nickel, pewter and ten other metals give off rays capable of reproducing an image on the substance on a photographic plate without the assistance of a light in the ordinary sense of the word. A polished piece of zinc, if laid on a highly sensitive plate in a dark cupboard, will, even in four or five hours, produce a complete picture of the zinc, showing the scratches or any ruled lines or pattern drawn on it.

IN the case of the Marburg lode mining claim at Pueblo, Colo., the Secretary of the Interior has this week made a decision of importance to miners everywhere. He says: "When the right to a patent to a mining claim has been fully acquired the equitable title in the purchaser is complete and there is no obligation on his part to make further expenditure in labor or improvements on the claims under Section 2324, Revised Statutes, and no interests can therefore be acquired by relocation or otherwise against him. The annual expenditure of $100 in labor or improvements on a mining claim, required by Section 2324, Revised Statutes, is solely a matter between rival or adverse claimants to the same mineral land and only goes to the right of possession, the determination of which is committed exclusively to the courts. It is a matter with which the Land Department has nothing to do and hence can make no determination with respect to it; and the failure of an applicant for patent to a mining claim to prosecute his application to completion by filing the necessary proofs and making payment for the land within a reasonable time after the expiration of the period of publication of notice of the application, or after the termination of adverse proceedings in the courts, constitutes a waiver by the applicant of all rights obtained by the earlier proceedings upon the application. Where an adverse claim is filed during the period of publication it shall be upon oath of the person making the same, and shall show the nature, boundaries and extent of such adverse claim and all proceedings except the publication of notice, and making and filing the affidavit thereof shall be stayed until the controversy shall have been settled or decided by a court of competent jurisdiction or the adverse claim waived."

Charcoal Precipitation from Cyanide Solutions.

TO THE EDITOR:—Has anything of technical value recently been published concerning the use of charcoal in gold precipitation from cyanide solution? You used to publish a good deal on this subject.
Los Angeles, Cal., Aug. 25.

Several questions similar in character to the above have been lately received. Much on the subject has appeared herein. Probably the latest most extended discussion of the subject is contained in a paper read by Jno. I. Lowles before the Institute of Mining and Metallurgy. In that monograph "On Charcoal Precipitation from Auro-Cyanide Solutions," Mr. Lowles says on the subject of the precipitation of gold from cyanide solutions by means of charcoal, that outside of Victoria it is but seldom employed, but there it is used to the almost total exclusion of any other method. The number of cyanide plants, small and large, throughout the colony is very great, owing to the numerous heaps of tailings on living mines and on abandoned properties, accumulated during the forty odd years of the existence of the quartz mining industry in Victoria. In the greater number of these installations the charcoal method is employed, in many cases probably in imitation, rather than with any definite grounds for its superiority over the zinc process.

The methods are, of course, identical down to the extractor house, which in a large plant there, a typical case, contains 198 tubs, each 2 feet 4 inches high, 2 feet 1 inch in diameter at the top and 1 foot 9 inches at the bottom. In the center of the bottom of each tub are two small wooden cleats, 4 inches apart, on which rests a glazed drain pipe, 4 inches diameter, flanged end downwards. The center pipes and tubs are filled with charcoal, coarse for 6 inches from the bottom and medium size to within 6 inches of the top of the center pipe, with about 3 inches outside and 5 inches inside the tub of coarse charcoal again. On the top of the charcoal, in the tub itself, i. e., all round the pipe, is a wooden lid to keep the charcoal from floating and blocking up the outlet pipe.

Another form of filter tub much used has no center pipe, but there is a false bottom covered with a filter cloth, above which is charcoal, and on top a hinged lid, kept locked, with the feed pipe led into it. The solution leaves the tub under the false bottom by means of a siphon pipe to the next tub.

The preparation of the charcoal is important. Impurities are prejudicial and wasteful. Fine stuff is objectionable, as it will pass through the sumps with the solutions (and, incidentally, decompose the KCy), besides making a bad filtering medium when closely packed. Heavy, compact charcoal, again, is not nearly so efficient as that which is soft and porous. Gold is deposited throughout the whole of light charcoal, so that compact material offers far less surface. Moreover, it would take longer to incinerate. Accordingly the charcoal is ground and sieved to three sizes: coarse (about ½-inch), medium and fine, which last is straightway rejected. The other sizes are thrown into separate tanks of water and washed; the compact coal sinks, the light, porous stuff of both sizes is skimmed off and allowed to dry before being used. About 30% of the original quantity of charcoal is lost by this treatment.

The tubs in these works are arranged in two groups, the first of 144 filters, in twenty-four sets of six each for strong solution, and the second of fifty-four filters, in eighteen sets of three each for alkaline wash (containing 0.04% KCy) and weak solution.

The solution passing through a 1-inch branch from a 3-inch main travels down the center pipe of the top filter in each set, coming up on the outside over the lid, and through another 1-inch pipe to the second filter, and so on, finally passing away by an iron-lined launder (a tile lining would be better) to its own particular sump, whether alkaline, strong or weak. The top of each of the last five filters of a set is placed 3 inches lower than the top of the preceding one. The top filter naturally catches most gold, and when fairly charged is removed, and each of the remaining five tubs of the set is moved up one step, bringing second filter into first place, a tub with fresh charcoal being put into sixth position. The filter removed is relieved of some of its solution (to save loss during moving), and emptied into a large box with a filter bottom, when what solution there is in the tub drains away to the strong solution sump, leaving the auriferous charcoal ready to be shovelled out and taken to the furnace room. Every day eight top-strong solution filters are emptied in this way, so that a tub occupies first position during three days. The flow of solution from the intermediary tanks to the filters is regulated by valves in the main, and an ingenious arrangement prevents that flow being exceeded. At the junctions of the mains with the distributing pipe a small open glass tube is inserted, in which the solution under the right pressure rises to a certain height. A very slight excess over the proper pressure will cause this tube to overflow, obliging the attendant to pay strict attention to the amount of solution he allows to pass through.

The absence of iron in the filter tubs constitutes a slight advantage over zinc boxes, where the iron sieves at any rate do not improve the solutions.

The launders from the filters are connected with all the sumps, so that, if necessary, any one solution can be passed over the whole of the filters, but as a rule the filters are worked in two groups, as shown above, and then about 400 gallons of strong solution per hour pass through 144 tubs, and 300 gallons of weak or alkaline through 54 tubs.

The efficiency of the precipitation of the gold by the charcoal is of course an important point. Zinc does not seem to act rapidly enough, or, indeed, quite effectually, on very dilute solutions, whence arose the usefulness of the Siemens-Halske and other electrolytic processes, but with charcoal the strength of solution does not seem to affect the percentage of precipitation at all, which remains uniformly high. At one large works the solutions going out into the launders from the tubs rarely show more that 3½ grains gold per ton. Solutions down to 0.04% KCy are successfully precipitated at this establishment.

The gold caught by the top filter of a set is considerably purer than that caught in the lower ones. Frequent tests show this to be quite characteristic, steady diminution in the value of the gold taking place downwards through a set, till in the bottom tub it is nearly pure silver. However, as the filters are shifted from the bottom upwards, they all contain about the same quality gold when burnt.

The reason for this peculiarity is, no doubt, owing to the gold being precipitated first and other metals afterwards.

No doubt experiments might be usefully made as to the desirability and economy of keeping the contents of the top filter separate from the rest, as containing very pure bullion, requiring little or no refining. With six filters in each strong solution set, the two top filters might be allowed to remain stationary until well charged, the "step-up" process being confined to the lower four.

The exact action of the charcoal has, so far as the writer knows, never been experimentally demonstrated. Rose, discussing the question in connection with its use in the chlorination process, states that the prevailing opinion is that the hydrogen and hydrocarbons remaining in the charcoal are the active agents in the precipitation. No doubt this would apply also in precipitation from cyanide solutions, the result being the formation of hydrocyanic acid and free gold. This HCn itself represents a certain amount of loss of an active agent.

It is an accepted fact that the prolonged contact of cyanide solutions with charcoal causes a loss of cyanogen. This undesirable condition obviously obtains, as the same solution (of course strengthened as and when required) circulates for months between the leaching vats and the filters.

Park instances the case of the Kapai-Vermont Works, New Zealand, where the ore was kiln-dried before being sent to the pulverizers. Here it paid to employ labor to pick out the lumps of charcoal and partially carbonized wood rather than sustain the loss of cyanide (and gold, also, in the leaching vats), which neglect of this precaution involved.

In the daily trials of the solutions the loss from this cause would not seem to be great. In one case where a 0.25% strong solution is used, it titrates 0.11% after use, and the major part of the 0.14% difference must be accounted for by the gold dissolved.

From the filter house the auriferous charcoal is conveyed to the furnace room. At the same works, whose extractor plant has been described, there are four reverberatory furnaces, each 10 feet long. The charcoal is charged in through side doors, of which there are six to each furnace, each perforated with a number of holes to admit air to assist in burning off the carbon. The furnaces are arranged in pairs, with a stack to each pair. When charged, a wood fire is lighted in the firebox until the charcoal is well alight, when the dampers are closed and it is allowed to slowly burn itself out. This it does not do completely, so it is sieved in a trommel of 900-mesh, contained in an iron box, what remains in the trommel being returned to the furnace with the next charge. The fine stuff in the box is called "ash." Every twelve pounds of ash carries from nine to ten ounces of gold. This ash is mixed with borax (in the proportion of three parts borax to one and a half ash, with one of dried and washed tailings, when the ash is alkaline), and smelted in graphite crucibles. The pots are filled and placed in the furnace, the slag skimmed from time to time, and fresh charges of "ash" added, till sufficient gold has accumulated in one pot, or the latter shows signs of wear, when it is poured into a mould. It is certain that some appreciable loss must take place during this operation, owing to the numerous small quantities of valuable ash which are dealt with. Some of the stuff is almost impalpable dust. When charging redhot crucibles, it is apparent that many fine articles are carried away by the expansion of air in the neighborhood of the crucible.

In spite of some very strong points in its favor, it is doubtful if these are sufficient to cause the charcoal method to supersede the better-known zinc process. The writer thinks that the following advantages deserve careful consideration: (1) A high-class bullion is produced. One well-known mine there receives $19.45 per ounce for its cyanide gold. At any rate the bullion does not have a detrimental constituent, such as zinc, introduced into it by the necessities of the method used, and is of a nature easily refinable. (2) The percentage of the precipitation extraction is high; and this is, so far as the writer knows, regardless of the strength of the solution. (3) In spite of the large quantity of auriferous charcoal to be dealt with, a great part of the waste in it is so easily got rid of (by simply letting it burn itself out), and the resultant "ash" is so directly and easily smeltable, that this disadvantage is almost, if not quite, counterbalanced. There is no necessity, as with zinc slimes, for careful oxidizing roasts (with some unavoidable loss), or treatment with strong acids.

The one great disadvantage of the method seems to be the greater chance of loss through the immense bulk of stuff handled, and higher cost of the operation itself. Minor points are a somewhat greater outlay for plant and buildings. The effects of the decomposition of the solutions by the charcoal have not yet been very well defined.

At one of the large Australian works, 700 ounces of gold are deposited per month on 10,000 pounds weight of charcoal. W. M. Davis, in the chlorination process, found that 240 parts of charcoal were required for the precipitation of 19¼ parts of gold. It will be seen that the proportion is about the same as with cyanide solutions.

Theoretically, one ounce of zinc should precipitate six ounces of gold, but in practice from four to twelve ounces of zinc are required for every ounce of gold. Allowing eight ounces Zn for one ounce Au, 350 pounds Zn would be required to precipitate 700 ounces of gold. The cost of charcoal precipitation works out (with charcoal sold at 9d for forty pounds) at 4.29d per ounce of gold, or, at these works, 0.545d per ton of stuff treated. Zinc precipitation (with Zn at 4½d per pound) would cost 2.25d per ounce of gold, or 0.275d per ton of stuff. The labor necessary must also be considered. In these works two men at 7s each per diem are kept constantly employed in the extractor house. This works out at 0.760d per ton of stuff treated. With zinc extractors the work could be done by the foreman, or even allowing one man at 7s the cost would be reduced by half, that is, to 0.382 per ton.

To recover the gold from the charcoal "ash" costs at these works 1s per ounce of bullion 900 fine, exclusive of labor. This is accounted for by the large quantity of stuff to be smelted, with a consequent large expense for fluxes, fuel and pots. In some works in New Zealand and South Africa, the cost of the recovery of the gold from zinc slimes is as low as 2d per ounce, though probably it would not average more than 800 fine.

This particular item does not of course make much difference when spread over a number of tons of low-grade ore, for the total cost at this particular plant, with cyanide at 1s 2d per pound, is only 2s 3d per ton.

Considering these works particularly with reference to loss through the large bulk of stuff frequently handled, we see 10,000 pounds of charcoal transferred from 208 filters (i. e., eight filters per day twenty-six days a month) to the draining box, divided among four furnaces for incinerating, and finally smelted in charges of not less than twelve to fifteen pounds.

There remain the questions of increased outlay for plant and buildings, but these are not very serious.

Still considering the same works, each filter tub costs 25s complete, so that the whole 198 cost £247 10s. Zinc extractors of the necessary capacity, with trays, steel side launders, etc., cost £60.

Some expense on this head might be saved by the substitution of large shallow wooden tanks, such as are in use at the Mount Morgan chlorination works, though perhaps the thorough contact between the solution and the charcoal which is most favorable to successful precipitation would not take place in them as well as in the numerous small tubs.

The area of the building occupied by the filters and connections is fully 1000 square feet. Zinc boxes would require but a small portion of this.

Colorado Smelting Methods.*

Written by JAS. L. HODGES.

The Omaha & Grant Smelting Works at Durango, Colo., draws its supply of ore from all parts of the southern counties. At no other point in Colorado is the metallurgical problem quite so complicated as at this smelter. Large percentages of zinc, arsenic, copper and antimony are continuously present, and a very large proportion of the ore supply is received at the smelter in the form of concentrates, which have to be specially handled. The principal advances in smelter work have been in the line of mechanical improvements. Any device which shortens time in the preparation of the ore for the furnaces or lessens labor at some point at once becomes a factor in the economical treatment of the ore. A number of such factors have been introduced, some very interesting.

Beginning at the roasting furnaces: As fast as possible the fireboxes are being altered from the old method of direct coal burning furnaces to gas producers. The air is forced under the grates by a moderate pressure from a steam jet at each end of the firebox, the steam acting as an injector. A much poorer grade of coal can be used by this method of combustion. Instead of "slag roasting" the ores in these furnaces, the finish is given as a sinter roast, requiring much less heat than in slagging the ore, and becomes an important saving in fuel as well as of abor in crushing the slagged ore. At the slag tap of the furnace another improvement has been introduced, made possible here because of the topography of the ground on which the smelter is built. At the oot of the slag dump flows the Animas river, water from which is forced by powerful pumps to a point just below the level of the working floor of the urnace. As the slag runs out from a large separatng box, instead of into a slag pot, to be hauled away, t is allowed to fall through a hole in the iron floor nto a launder, at the end of which is a pipe conveyng a stream of water, under pressure from the pump above mentioned, which hits the stream of molten lag almost at right angles, and instantaneously slivers the slag into a granulated condition. The same tream which granulates the slag carries it by its orce down the launder and deposits it in the Animas iver, to be carried away. Experiments have shown hat this granulated slag, owing to its extremely harp edges, makes an admirable sand for mortar. The separating box referred to is very ingeniously arranged, so that it can be drawn away from the urnace by a cable attached to a hoisting engine, and when on the dump can be knocked down, the sides eing movable, leaving the mass of cooled slag at a onvenient point for further use, if needed.

---

*Treasury Report.

Other improvements have been introduced in sampling the ores, the main feature of which is that the large sample of ore, previous to being finally cut own, is deposited automatically in an iron hopper which travels on a crane to the dividing table and is here divided automatically. The portion saved for urther quartering is then in the same rapid manner ivided again upon small dividers. The whole work very rapid and accurate, and one man in the sampling room does the work of several men required ormerly.

owell & Arizona C. M. & S. Co.'s Plant, Bisbee, Arizona.

To the Editor:—I send you herewith two photoraphs of the Lowell & Arizona C. M. & S. Co.'s ant here, one a general view, the other a larger

Head Gear at the Lowell & Arizona Copper M. & S. Co.'s Mine, Bisbee, Arizona.

ew of the head gear or gallows-frame. You will te that it differs considerably from California and ontana make of head frames, and inclines more osely to the Colorado style. It was designed and ected by Arthur Neustaedter of St. Louis. The owell & Arizona C. M. & S. Co. is now shipping ore d have things working in good shape, with a force about sixty men. Their engine was built by the nion Iron Works of San Francisco and at the pres- t is the largest hoist running in the camp. They e using the Montana code of bell signals in their ne and they give entire satisfaction. The company s a day and night station tender, and no one is owed to touch the bell rope but the station tender. is insures economical work in addition to perfect ety. The company is sinking a shaft, now down 0 feet, and will go 900 before they stop, with the pes of finding water. If they find no water in the ne in sufficient quantities they will build their elting plant down on the San Pedro river, about miles from here. They will have a down-hill haul the railroad and can arrange for good rates, as railroad company hauls from twenty to thirty pty cars out of here every day.

There is great activity in northern Sonora, Mex, and several places are starting up.

The South Bisbee people here are now working two fts, and have some good ore. They have shipped a few cars and, I think, are arranging to ship on a much larger scale in the near future.

We have all been very short of water in Bisbee this season, and old-timers say that we never were without rain for such a long time. We have to condense water, and you will note in the picture I send, a long pipe running up the hill. This is the pipe which condenses the steam, and the exhaust from the engine runs into it. The engine has 14x16-inch cylinders, and they use when running steady only about 500 gallons of water per day. By condensing the steam they get a superior quality of water.

The Copper Queen people are adding another smelter to their already large plant. The new first-motion hoist for the Copper Queen—Spray shaft—will be here in about a month. Their gallows-frame and shaft house are of steel, and I understand that they are to use double-deck cages. This camp is prosperous and we expect to have a second Butte here.

Bisbee, Aug. 20.

Silver Smelting in Mexico.*

NUMBER VI.

In the case of excessive iron reduction, zincy matte segregates from iron matte, and, owing to its spongy condition and low specific gravity, floats on top of the slag, carrying sulphide of silver along, which accounts for the silver value of the slag. It is known that metallic iron decomposes sulphide of zinc and also sulphide of copper to some extent, but these reactions are never absolute, which explains the existence of zinc in the matte and of copper in the lead bullion. Cuprous sulphide, however, has the property to fuse together with zinc sulphide, and thus carry it into the matte, thereby cleansing the slag. This fact is made use of in cases where the lead percentage of the charge is insufficient to cover the silver. Sulphide of lead does not combine with zinc sulphide; it is, therefore, useless to increase the specific gravity of the matte, on that account, by driving lead into it.

Most smelters carry now enough copper on their charge to produce a first matte of from 8% to 12% of copper. To go beyond that is inexpedient, on account of the difficulty of keeping the syphon tap open. This difficulty renders the constant use of sledge and bar necessary—an operation which wears out and scares off the workmen.

The copious production of speiss is another sign of excessive reduction, hence unnecessary consumption of fuel. By continued cutting down of the fuel, a point will be reached when the production of speiss will cease altogether, and the matte will run up in lead. The bullion will deteriorate by taking up that arsenic which is not volatilized as arsenious anhydride or arsenious trisulphide. At the same time a copper speiss may be formed, which will incrustate the hearth and clog the syphon tap. The slag will also run up in lead, if not in silver. It is a matter of good judgment then to know how far it is prudent to go. I do not think it will pay to run the matte higher up in lead than 18%. A higher grade matte is also difficult to roast well. In order not to miss the proper point, it is necessary to take frequent samples of the matte—at any rate one a day from each furnace—assay them and regulate the fuel.

The cutting down of the fuel necessitates the raising of the blast, but this must not be exaggerated, otherwise the heat will rise to the top, the hearth will soon be chilled, and the furnace run slower.

If speiss be produced, it may be added to the ore charge again, when most of the arsenic will go off as sulphide by entering into union with the sulphur of the sulphides present. In the concentration of matte there is always some copper speiss obtained, which has probably been in mechanical admixture with the matte. Though copper speiss, if in large lumps, is hard to break, even by a drop weight, still, if resmelted in conjunction with sulphides, a foliated speiss with a reduced percentage of copper will result, which can be passed through rolls, if it is desired to roast it, in conjunction with sulphides, or broken with a hammer for addition to the charge.

Coke containing much gaseous matter will also resist reduction, even if added in excess. In this case the use of mixed fuel, i. e., charcoal and coke, is advisable. Fluorspar, which is not often found associated with Mexican ores, acts like cuprous sulphide on zincy matte, only in a different way. It renders the slag so hot and liquid that the zincy matte remains with the iron matte, and does not segregate as in the case of a slag of a lower temperature. One mine which produced ores with fluorspar gangue in notable quantities was the Veta Grande, near Parral, Chihuahua. Such ore permits a considerable reduction in fuel, and is also beneficial in the treatment of ores carrying barite. The separation of matte, speiss and slag, which are tapped intermittently from the furnace, is effected in a cast iron matte or overflow pot, and more frequently called settler, which is mounted on a carriage and placed under the flag spout. It is of conical shape, hemispherical towards the bottom, and measures 36 inches diameter at top by 22 inches in depth. It weighs over 600 pounds and holds about 580 pounds of matte and slag.

Matte, speiss and lead, if any, will sink to the bottom of the pot and separate there in strata, in the order of their specific gravities; while the slag, with the exception of the chilled crust serving as a cover for the matte, will overflow through a spot attached to the settler into a smaller pot—the slag pot—made of cast steel and also mounted on a carriage. When filled, this pot is removed, replaced by an empty one and allowed to cool down for a few minutes until top of slag is black. It is then taken to a dumping pit, where a workman, called the "picador," punches two holes in the top crust—one in front and one in the back—when it is emptied by the pot puller into large pots underneath, the slag running out from the front hole, while the gases escape through the other. The shells are saved for resmelting. This method is imperfect, but the use of the Devereux pot of the small dimensions, as they are locally made imperative, caused too much loss of time and had to be abandoned. The dumping pits are located between two slag hills, which were built up in an evil hour in front of and in too close proximity to the furnace shed. It is 3 feet 4½ inches deep, 6 feet 4 inches wide and 12 feet long, and is covered over with heavy cast iron plates, in the lengthwise center line of which a slot is left wide enough to pour slag from both sides into the pots underneath. There is room for four pots, so that eight slag pots may be emptied simultaneously into them. Each of these large pots—twin pots or double dumping pots, so called—is resting in a rotatable frame attached to a railway truck, a device which is patented by the Colorado Iron Works, Denver, and known as the Nesmith truck.

General View Lowell & Arizona Copper M. &. S. Co.'s Mine, Bisbee, Arizona,

A railway track of 36-inch gauge extends from the pit on an ascending grade to the edge of the slag dump, so that the pots when filled may be hauled by a 7x12-inch locomotive and emptied. The shells from these pots are not saved. As soon as the locomotive has taken out a load, another set of trucks is let down into the pit by gravity and is being filled.

A locomotive, two of which are used alternately, consumes twenty-one tons of anthracite coal a month, and requires one driver, one switchman, one pot washer and one dumper per twelve-hour shift, whose wages amount to $8.75, or $17.50 in twenty-four hours.

The dumping pit gives considerable trouble in the rainy season, when it is frequently submerged.

The slag samples are taken twice a day from each furnace and granulated. The slag of each furnace is assayed separately, but an analysis is made only once a day of a mixture of the granulations of all the furnaces running on the same charge, except in special cases.

The shells from the slag pots are dumped into a buggy standing in a pit and hoisted by an electric elevator to the top of the slag hill, whence they are taken over a bridge to the charge floor. The settlers are also hoisted by another elevator to the top of the same slag hill, and emptied when cold. The matte cones of each furnace and each shift are kept together in one place and marked with the number of the furnace, so as to have a check on the work of the men. When cold, the slag is separated from matte and speiss, broken up and wheeled across a bridge to the furnaces. The matte is broken up and speiss is picked off, as much as possible, weighed, and put on the heap of the respective month. This is done to get an idea of the daily production of matte and speiss. The matte is wetted every day by turning on a stream of water from a hose. By this arrangement the matte weathers, crumbles up and can then be easily separated from the speiss. At convenient intervals, it is trammed over a bridge connecting the slag hill with the charge floor to another bridge connecting the charge floor with the sample mill, and run through a ball pulverizer. The ground material is weighed and sampled before it goes to the calciners.

---

*Describing the Guggenheim Smelter at Monterey.

The speiss is either returned to the furnaces, or, if not convenient, held in reserve. An analysis of 1482 tons of speiss showed as follows: Fe 71.6, As 15.6, S 5.5, Cu 1.2, Pb 3.5, not determined 2.6; total, 100. Silver contents, 14.3 ounces per 2000-pound ton; gold contents, 0.08 ounces per 2000-pound ton.

This speiss shows excessive reduction of iron; it should not have contained more than 60% of iron. It is apt to cause incrustations in the hearth, and, while liquid, it is intensely hot, imparting its heat to the settler, which appears white-hot at the bottom. It always carries lead-bullion along mechanically, and adheres tenaciously to the cast iron pot, so that frequently it had to be chiseled out, an operation which is attended by great breakage of pots and loss of time. The metallic lead also contributes to the "sticking of the pots" when solidified. If lead should go into the settler in quantity, as is the case when a furnace is not working well, it becomes necessary to pour it off into smaller pots as soon as matte and speiss have hardened sufficiently to permit this procedure. At smelter No. 2 they use a tap-hole near the bottom of the settler, at its back, with a spout attached to it, to tap off matte, speiss and lead into a flat, troughlike vessel on wheels standing in a pit. This arrangement has not given satisfaction at smelter No. 3, on account of the rapid widening out of the tap-hole by corrosion, and the frequent breaking off of the spout during the removal of the settler to the top of the slag hill. In the measure in which the matte approaches the stage of copper matte, it acts like the above speiss; the settler pots become "sticky," and require much hammering to get the matte cones detached. They also require cooling with water. The settlers were changed ordinarily every 1½ hours; but when the matte fall increased beyond the 5% mark (5% of the weight of the ore), they had to be changed oftener, and then the settler men used to desert their work. In smelting much Angangueo coarse ore, which was imperfectly roasted, the flow of slag was so rapid that the separation of matte was incomplete, and a good deal would run over into the slag pot. In order to save this matte, it then became necessary to save all the slag and break it off when cold, thus entailing a lot of work, which required extra men.

The application of a firebrick-lined settler of rectangular form, like the one in use at copper furnaces, known under the name of Orford forehearth, would recommend itself for such emergencies. But local conditions forbid it. The hearths of the furnaces were not high enough to get such a settler under the spout, without resorting to subterranean work; besides, the working of the furnaces was not rapid enough to keep the matte from chilling in the forehearth. So the manipulation of the slag had to be managed according to the circumstances.

The amount of slag resulting from 1000 pounds of charge is about 60%, to which have been added 400 pounds of slag from the preceding smelting. Of the 750 tons of slag produced, 300 are smelted over again when ten furnaces are running.

The method of separating matte and slag in vogue at the Omaha & Grant Works, Denver, Colo., who were in the same position as Smelter No. 3, might have been adopted at the latter place; but, the works being old and subject to continual repair, the firm decided to rebuild them entirely.

The lead bullion from the ore furnaces is allowed to run over continuously from the lead well into a small cast iron pot—the cooler—which holds eight 96-pound bars. This pot rests in a cast iron frame—the stove—over a fireplace, so that it may be heated when the bullion gets too cold to ladle it into molds. As the bullion is impure, it chills very quickly; but, owing to the want of draught, the ladlers do not use the stove. They prefer to pour hot slag on the bullion, to thaw it out, and afterwards to skim off the slag. The proper way would be to tap the bullion at stated intervals, as is done at some smelters in Colorado, into the cooler, skim off the dross and mold the bullion in one continuous series of operations. But it is next to impossible to break the natives from a routine once acquired.

The lead well is built up two thicknesses of brick above the curb plates, to keep the lead as high as possible in the crucible; but if the furnace is run on a reduced pressure of blast the height of the lead well must be reduced, too, or the bullion will run out of the slag tap.

At the matte furnace the bullion is tapped in the old fashion, direct from the crucible into a cast iron basin, at a point 8 inches from the top of the curb plates. If tapped from the lowest point of the crucible the tap frequently becomes so hot and soft that sudden outbreaks will occur. On this account it is advisable to tap the matte bullion through a tap jacket, like slag.

The furnace bullion is, as already stated, remelted in an annex of the furnace building. If the sole object of this operation were to obtain a dip sample of the bullion instead of a punch sample, no exception could be taken to it; but, as the main object is the recovery of the copper from the bullion, the sweating process in a liquation furnace as it is carried out at smelter No. 2, and at many refineries, is much more preferable. Copper will separate from lead bullion at a low temperature. If the copper dross is then skimmed off, a great deal of lead will go mechanically with the dross. If the temperature is raised to lessen the adhesion of lead to the dross, copper is bound to remain in the bullion. In the following is given an analysis of the dross skimmed at smelter No. 3: Pb 91.9181, Ag 0.8122, Au 0.0038, Cu 2.8500, S 0.7598, As 2.2340, Sb 1.3400, Fe 0.0521, Ni trace, Co trace, Bi not determined. This dross was returned to the ore furnaces, instead of being worked with other undesirable material in a separate furnace.

The remelting of the furnace bullion and loading of the cars is done by contract at $4 a carload of 400 bars. This work includes the following manipulations: Tramming the bullion from the furnaces to the remelting pots, remelting, skimming, syphoning, cooling and numbering the bars, running them over two weighing machines, loading them on the cars, taking chip samples for the government assayer and stamping the Mexican eagle on each bar, and dumping the dross outside of the building. The samples for the works are taken by an American foreman out of the swivel pot while the bullion is running out of the kettle. This man receives $3.25 per shift. If a night foreman is required, he is paid $3. The weigher, a Mexican, is paid $2 a day. The cars are sealed with lead seals by a railway official with the exception of one door, which is sealed by a representative of the government assayer. No bullion car must be removed from the smelter yard without permission from the government assayer. These rules are very strict.

The flue dust saved amounts to 1.2% of the dry weight of the ore. Most of it is deposited, of course, under the down-comers, and it had to be drawn out of the dust flue, every day, into water troughs running parallel to the flue. After thorough incorporation with water, the flue dust is trammed to a wooden platform, where it is mixed with loam from the smelter yard and moulded into bricks by hand. When these bricks are sufficiently air-dried they are burned in a kiln to harden them. In this operation a partial roasting takes places, whereby heavy clouds of steam, sulphur dioxide and arsenious anhydrate are emitted. The flue dust bricks are 8½ inches long by 4¼ inches wide by 2½ inches thick, and weigh, after burning, 3¾ pounds apiece. The drawing, mixing and bricking of the flue dust costs $1.25 per thousand, and the setting of the kiln and burning $1.25 more. Hence a 2000-pound ton of burned flue dust bricks costs $1.33 to make.

The handling of the flue dust, especially that from the calciners, is very injurious to the limbs of the workmen. By using a good bricking machine this could be overcome, and at the same time the burning would become unnecessary.

The average composition of the burned flue dust brick is as follows: SiO_2 19.0, Fe 22.0, CaO 6.0, Zn 2.0, S 2.4, Pb 16.2, Ag 28.6 ounces, Au 0.105 ounces.

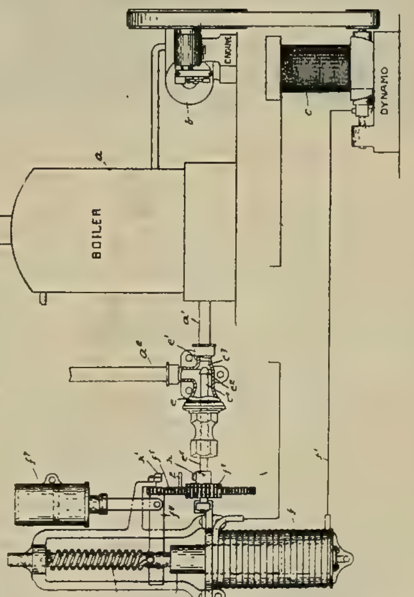
(TO BE CONTINUED.)

Mining and Metallurgical Patents.

Patents Issued August 21, 1900.

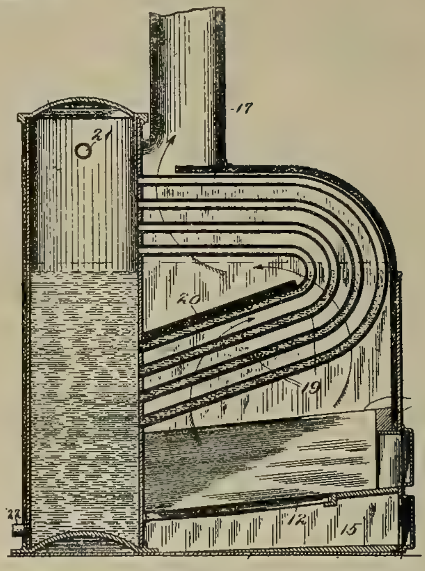
Spec'ally Reported for the MINING AND SCIENTIFIC PRESS.

ELECTRIC GENERATING APPARATUS.—No. 656,165; J. H. Bickford, Salem, Mass.



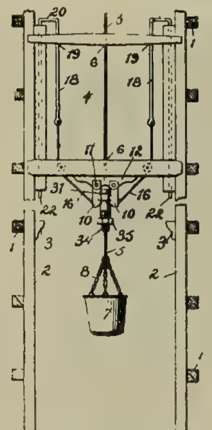
An electric generating apparatus comprising steam generator, engine and dynamo, burner for steam generator, valve controlling supply of fuel to burner, automatic means for operating valve operated by circuit of dynamo and means for opening valve independently of automatic means which serves as means for throwing automatic means into action and which is in turn operated by automatic means to close valve.

WATER TUBE BOILER.—No. 656,193; W. L. Jancey, Chicago, Ill.



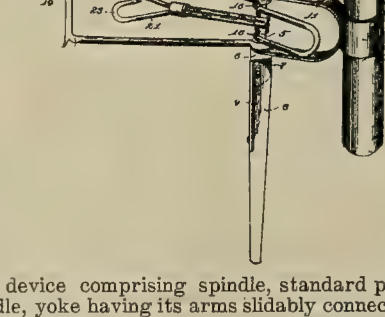
In a water tube boiler and furnace therefor, in combination, furnace having combustion chamber; vertical drum, plurality of bowed circulating tubes projecting into combustion chamber, both ends of each tube entering drum above fire grate and at different elevations, lower arm of each tube being inclined upwardly from its end, upper arm thereof being substantially horizontal; deflecting plate extending from drum between arms of several tubes, whereby line of draft is caused to substantially follow line of tubes.

SAFETY DEVICE FOR MINES.—No. 656,204; D. McCowan, Neihart, Mont.



Combination with guides, crosshead moving thereon, bucket rope passing loosely through crosshead, and supports on guides; clutch having spring actuated members pivoted to lower crossbar on crosshead, rope clamp which members are adapted to engage, chains or cords leading from members outward and over pulleys in crossbar, and rods extending from chains or cords upward through top crossbar, thence outward, thence downward through holes in side bars of crosshead, and projecting below latter so as to rest upon supports.

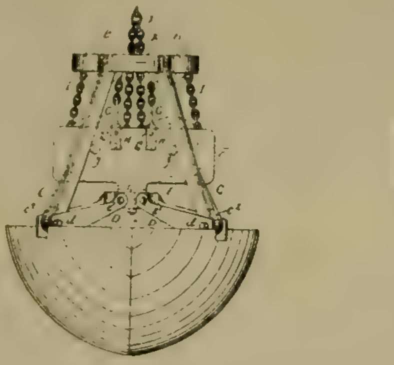
MINER'S CANDLESTICK.—No. 656,209; C. Peacock, Altman, Colo.



A device comprising spindle, standard pivoted to spindle, yoke having its arms slidably connected with spindle, candle holding clip pivoted to bight of yoke, attaching device consisting of a U-shaped, spring wire having its end adjacent bight wrapped around spindle between ends of yoke, and having its opposite end portions bent toward each other to form shoulders and then outwardly to form attaching fingers, and having oppositely disposed spikes at the shoulders, and second attaching device comprising wires wrapped around spindle between sides of first wire and having hooks, spindle having clamping nut engaged therewith to clamp attaching devices and yoke against pivotal movement on spindle.

◆

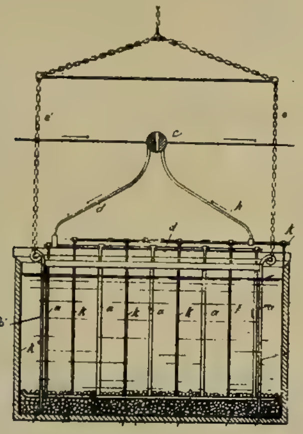
DREDGING BUCKET.—No. 656,224; C. H. Smith, Jersey City. N. J.



In a bucket head block with bifurcated lugs and housing; two pulleys journaled in head block; cross-shaped bottom block, ends of cross constituting journal boxes, and block vertically drilled through its center for bolt; housing consisting of two vertical sides and horizontal bottom drilled for bolt to secure it to bottom block; two sheaves turning on parallel and horizontal axles secured in housing; links consisting of two parallel portions open at lower ends; filler between open ends of links; approximately right angular braces pinned to bottom block riveted to sections of bucket; spherical shaped bucket sections, disposed so that adjacent edges meet at obtuse angles; U-shaped straps secured to sheave housing; chain linked to straps running over pulleys and under sheaves; eyebolts with chain secured to head block.

◆

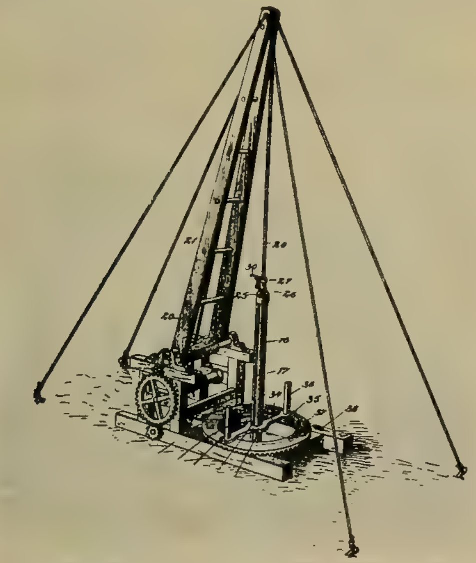
PROCESS OF ELECTROLYTICALLY EXTRACTING ZINC FROM ORES.—No. 656,305; W. Strzoda, Falenze, Germany.



The process of electrolytically extracting zinc from its ores, placing disintegrated or pulverized ore in its natural state in an electrolytic vat containing an aqueous alkali metal solution capable of dissolving ore with production of a zincate and in direct contact with cathode, closing circuit through vat, thereby precipitating zinc and alkali metal at cathode, alkali metal reacting with water to regenerate solvent solution.

◆

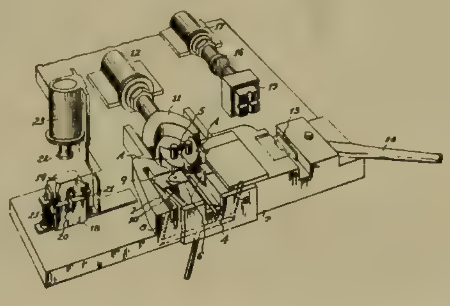
TELESCOPIC DRILL SHAFT.—No. 656,515; I. N. and W. J. Cassity, Holton, Kans.



Boring shaft comprising hollow telescopic sections, means for attachment of bit to lowermost section, means for attachment of rope to lowermost section, single rope passed through sections connected with lowermost section through medium of attaching means, means for holding sections against rotation with respect to each other through their telescopic movements, rope clamp carried by uppermost section for engaging rope to permit adjustment of sections, to permit bodily movement of shaft upwardly and downwardly and to support shaft, and means slidably connected with uppermost section for rotating shaft.

◆

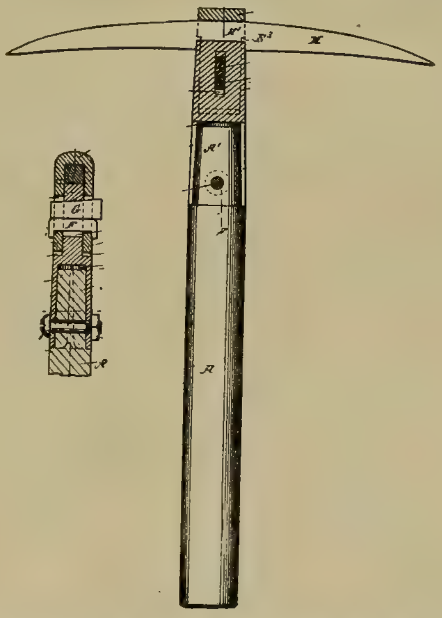
MACHINE FOR SPREADING, TRUING AND GAGING DRILLS.—No. 656,415; D. G. Morgan, Quartz Mountain, Cal.



In a machine of character described, hinged adjustable clamps and mechanism by which they are closed to grip drill shank between them, spring pressed lever arms having grooves in ends within which grooves horizontal bits of drill are fitted, hammer having converging channel adapted to engage and close outer ends of levers and to correspondingly spread grooved ends and extend bits.

◆

PICK.—No. 656,498; W. P. Bevington, Escondido, Cal.



Combination of handle, head having at end split socket for reception of handle, and upper end soild portion I-shaped in horizontal cross-section, forming longitudinal channels in opposite sides of head, channels being connected by an aperture extending through central member of I-shaped section, bolt passing through handle and through split socket, U-shaped clamp, side members of which slide in channels and have cross apertures registering with that head, shoulders projecting over parallel end members of I-shaped section, pick held between upper end of head and central member of clamp, key extending through apertures of clamp and head and having bent ends engaging clamp members exteriorly, and wedge extending through same apertures, engaging key and head.

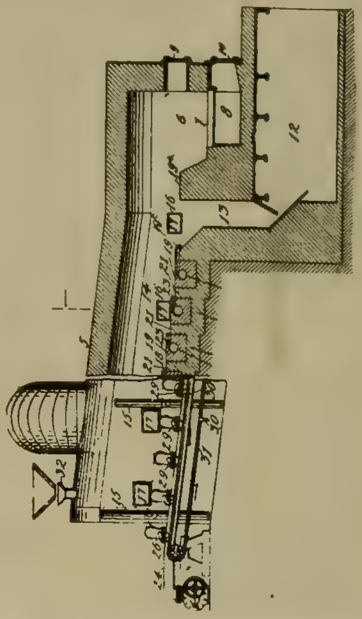
◆

PROCESS OF TREATING ZINC BEARING COMPLEX ORES FOR RECOVERY OF ZINC OR OTHER METALS THEREFROM.—No. 656,497; G. De Bechi, Paris, France.

A method of treating complex zinc ores for recovery therefrom of copper, zinc and lead, consisting in separately roasting ore and an alkali chloride in presence of air and steam, conveying sulphurous and sulphuric vapors thus derived from ore over and in contact with chloride during roasting to obtain hydrochloric acid fumes, condensing acid fumes in water, eliminating any sulphuric acid from acid water and eliminating any soluble sulphate from roasted ore as insoluble calcium sulphate by addition thereto of solution of calcium chloride, lixiviating ore with acid liquor to obtain solution of metallic chlorides, and successively precipitating metals of metallic chlorides as hydrates by successive additions of lime, heating zinc hydrate thus obtained in presence of air to drive off any combined chlorine, condensing any zinc that may be driven off with chlorine, mixing residue of calcined zinc oxide with carbon, compressing mixture to increase its density, and then retorting compressed mixture.

◆

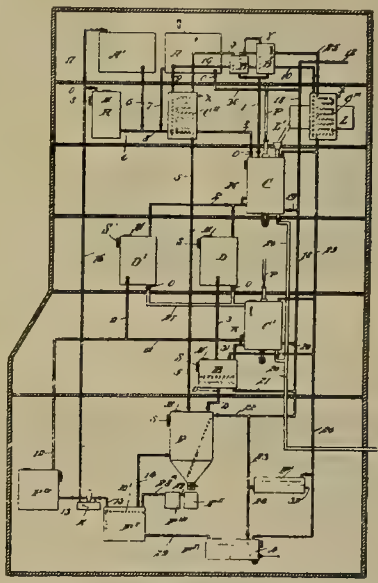
CALCINING OR ROASTING FURNACE.—No. 656,580; A. E. Johnson, Victor, Colo.



Calcining or roasting furnace, combination of stepped hearth, air conduit located outside furnace, pressure source with which conduit is connected, branch pipes connected with conduit, wall and hearth provided with openings leading to various steps and with which branch pipes are connected, valves located in branch pipes, valve spindles, cranks mounted on spindles and normally holding valves closed, exterior means arranged to engage cranks and open valves at suitable intervals.

◆

PROCESS OF TREATING GOLD AND SILVER ORES.—No. 656,544; H. Hirsching, Salt Lake City, Utah, assignor to the Mineral Union, Limited, Phœnix, Ariz.



Process for treating copper ores, which consists in adding comminuted ore gradually under agitation to an ammoniated solution, diluting solution, separating it from slimes, washing or leaching slimes separately, and subjecting residue of slimes to action of steam to extract ammonia therefrom.

◆

PROCESS OF LEACHING ORES OR TAILINGS.—No. 656,395; E. H. Dickie, Bodie, Cal.

Leaching ores or tailings with solution which dissolves precious metals, which consists in adding to solution an agent composed of an acetate of an alkali metal or of alkali earth metal capable of readily uniting with and forming acetates of base metals, and which has little or no affinity for precious metals, thereby enabling solvent to act directly upon latter, and then leaching the ores; the improvement in leaching with cyanide solutions, consisting in adding to such solutions calcium acetate in proportions of approximately five parts of potassium cyanide to one part of acetate.

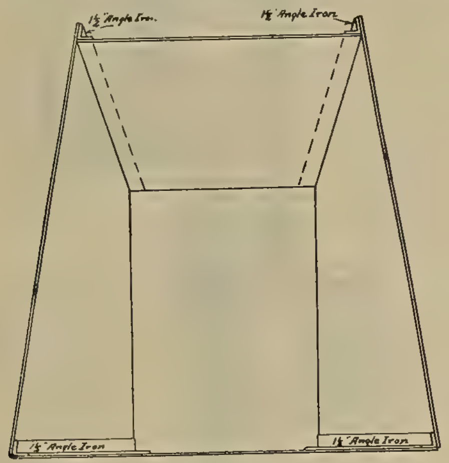
◆

A PRACTICAL expression of admiration of General Baden-Powell has been made by a group of miners in Queensland, who have presented him with a cake of pure gold on which is inscribed: "This is 24-carat, what the Croydon miners take you to be."

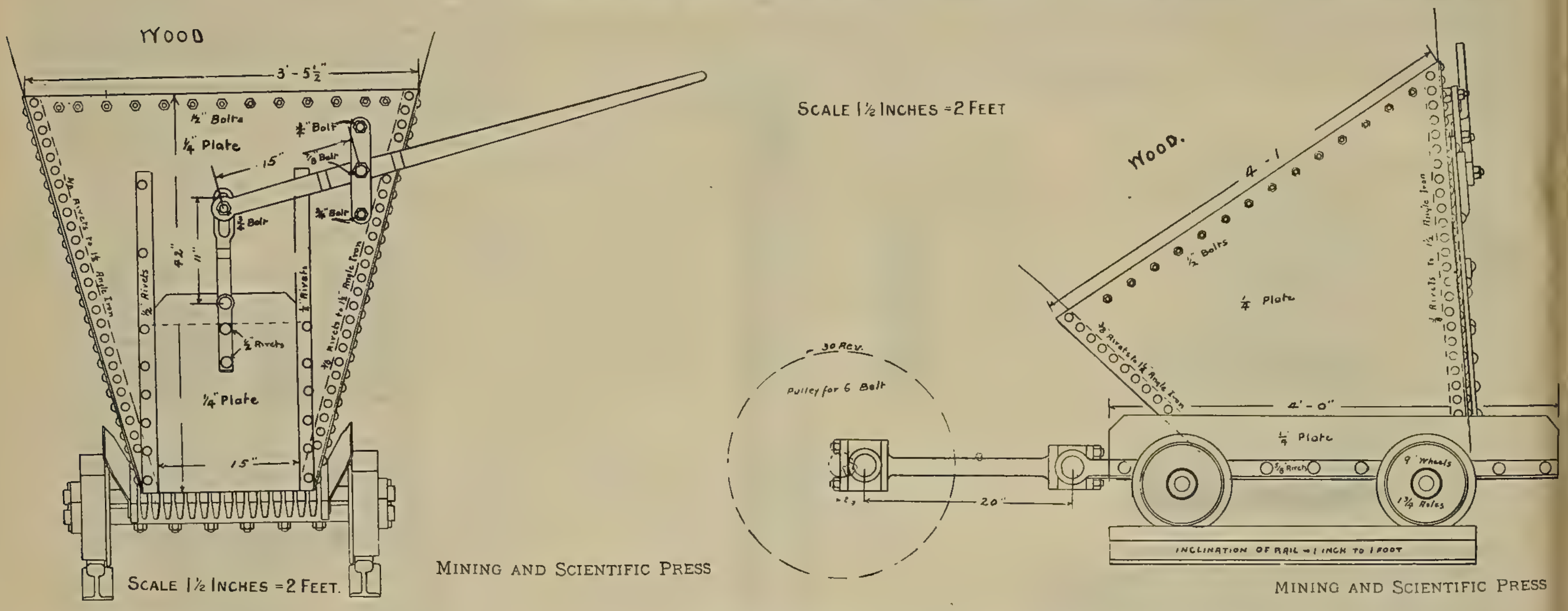
A Crude Ore Feeder.

Written for the MINING AND SCIENTIFIC PRESS by S. I. HALLETT, Aspen, Colo.

One of the hardest things to handle through a feeder is the crude ore as it comes from the mine—large lumps, fine ore and medium-size rocks altogether in one bunch. It is well known that it requires as much power in a crusher to handle damp sand when it packs as it does to crush the hardest rock; and if ore as it comes from the mine is fed directly to the crusher, both coarse and fine, the fine will fill the interstices between the larger boulders and a great waste of power is the result. This power required (that is entirely unnecessary) is very much larger than is generally supposed. Theoretically, all of this fine should be separated from the coarse before the coarse ore is fed to a crusher. It has been hard to find, as I said, a feeder that will remedy this difficulty, the ore varying from the size of a foot square or larger down to the finest sand.



SCALE 1½ INCHES = 2 FEET.
MINING AND SCIENTIFIC PRESS.


WOOD
3'-5½"
½" Bolts
¼" Plate
15"
½" Bolt
⅞" Bolt
¾" Bolt
¾" Bolt
42"
11"
½" Rivets
½" Rivets
½" Rivets
½" Rivets to 1½" Angle Iron
½" Rivets to 1½" Angle Iron
¼" Plate
15"
SCALE 1½ INCHES = 2 FEET.
MINING AND SCIENTIFIC PRESS
SCALE 1½ INCHES = 2 FEET
WOOD.
4'-1
½" Bolts
¼" Plate
⅜" Rivets to 1½" Angle Iron
⅜" Rivets to 1½" Angle Iron
30 Rev.
Pulley for 6 Belt
2"
20"
4'-0"
¼" Plate
⅝" Rivets
9" Wheels
1¾" Axles
INCLINATION OF RAIL = 1 INCH TO 1 FOOT
MINING AND SCIENTIFIC PRESS

Feeder for Crude Ore.

The kind of feeder, of which the accompanying is a drawing, has been in use by me for a long time and answers the purpose perfectly, so that every bit of power applied to the crusher is expended in breaking rock and not in compressing fine material. The feeder is fixed directly to the bin from which the crusher is fed. The bottom of the feeder is in the shape of a grizzly and is movable, being turned by an eccentric which alternately moves forward and backward. This allows the fine ore to pass through the grizzly; and, as the coarser ore is moved forward, the ore in the bin falls behind it and on the return movement of the feeder it slips from in underneath these coarser lumps and of course they fall off, the amount fed at each discharge being regulated by the gate. In practice, from the feeder to the crusher the ore is fed over a stationary grizzly that is placed at such an angle that all rock will run down, the finer (if any has been left) falling through the spaces in the grizzly. The continual forward and backward movement of the bottom of the feeder furnishes agitation enough to the ore to liberate the fine.

The pulley for the eccentric that moves this table or grizzly is shown in the drawing.

I think the object desired and the method of doing it is sufficiently shown in the drawings to need no extensive discussion of the pieces required.

Rand Mines During the War.

J. Klimke, ex-State Mining Engineer of the Transvaal, is in London from South Africa, and to the African Review makes interesting statement with reference to mining operations carried on by the Transvaal Government during the war. The Transvaal Government, disapproving of his direction of mining affairs on the Rand, offered him leave of absence for an indefinite period. He thereupon resigned.

The first mines to be taken over by the Transvaal Government were the Robinson, Bonanza, Ferreira Deep and Rose Deep. Government mining inspectors were put in as managers, and reported that they had great difficulties in starting the mines. They found that a great many repairs were necessary, and, as nearly all the mining men had left the country, it was not easy to carry out these repairs. As soon as they were done, however, the managers revised and brought up to date the plans of each mine. In one or two cases work had been done in the mines which was not shown in the plans, and in these cases the drawings were amended. Regular surveys of the mines were carried out and the results recorded on the plans, which constitute an accurate record of the work done in the mines by the Boers from October 10 to the end of May, the period of their operation. These four Government mines were worked entirely in the interests of the Government, and in order to profit to the fullest extent it worked the richest stopes, did no development work whatever, and reduced the Kaffir wages to an average of £1 per month, for the Government did not want more natives on the Rand than were absolutely necessary. In order to make the Kaffir rate of pay uniform a notice was inserted in the Staats Courant enacting that every manager who paid more than £1 per month would be fined £10 for each offense, and it also forbade a manager to receive into his compound natives from another mine under pain of a similar penalty. Thus the Government was able to work the mines at much lower working costs than had hitherto been possible. In course of time six other mines—the Ferreira, the Village Main Reef, the Wemmer, the Worcester, the Geldenhuis Estate and the Langlaate Deep—were started working, under the control of the companies' own managers. If these mines were not worked in the interests of the shareholders it was the managers' own fault. The Government did not interfere in any way with their working of the mines. It only stipulated that all the gold produced should be handed over to the State Treasury, and in return it promised to pay all the costs of working. It did not keep this promise, however, and has left the ten mines worked in its enterests with liabilities amounting in the aggregate to over a quarter of a million sterling. However, the damage to the mines has been confined to the ore actually extracted—apart from the consideration that no development work was done—and the Government mines, as they are called, are in this position to-day, that they can resume work at any time. As regards the mines not worked in the interests of the Government, no damage has been done to them as far as one could see. There will certainly be some repairs necessary—this is always unavoidable when a mine has been closed down for any length of time—but no damage has been done other than is natural.

With regard to the gold production, Mr. Klimke furnished the following figures, which are claimed to comprise the only complete and authentic return of the results of the Transvaal Government's mining operations yet published. The appended table covers the period from the beginning of the war (October 10) to April 30 last:

MINES.	Ozs. (fine) according to mine assays.	Value according to statements of managers. £	s.	d.	Approx. amounts of unpaid working costs. £
Robinson	102,926	428,069	0	0	47,073
Bonanza	52,929.33	213,329	0	0	14,271
Rose Deep	44,310.06	155,350	12	3	60,322
Ferreira Deep	54,213.10	227,695	0	0	30,019
Ferreira	58,511.75	211,690	3	11	43,488
Village Main Reef	48,120.50	203,992	13	5	25,286
Wemmer	37,274.87	157,965	6	0	11,767
Worcester	10,096	38,635	0	0	17,518
Geldenhuis Estate	9,960.30	34,898	10	5	8,125
Langlaagte Deep	10,919	38,924	0	0	10,927
Totals	428,270.89	1,710,549	6	0	265,761

To these totals the figures for May, the concluding month of Boer operations, must be added. Mr. Klimke estimates the May output of the ten mines worked at about 60,000 ounces, of the value of £240,000. There is also to be added the output of the Crown Reef, which was crushing the ore from the dumps until the end of March, and the gold obtained from the plates, mortars, etc., of the non-working mines which were cleaned by the Government. "The exact amount of the gold thus obtained," says Mr. Klimke, "will probably never be ascertained. Making only a moderate allowance for these items, it will be seen that gold to the value of £2,000,000 has been extracted by the Transvaal Government from the mines of the Witwatersrand. It has paid in working costs, Mr. Klimke estimates, about £500,000, and thus has made a profit on its mining operations of about £1,500,000.

"Will the Transvaal Government repay the debt, do you think?" was asked.

"Mr. Klimke smiled. "I would prefer not to express any opinion," he answered.

"Do you think it will be long before the mines are fully at work again?"

"In my opinion it will take at least one year after the conclusion of the war to bring the mines into full swing again—that is to say, to return to the average production of the working nine months of last year."

Exhibits of the Ericsson Telephone Company.

An exhibition which will interest many was made by the Ericsson Telephone Co. of 296 Broadway, New York City, at the meeting at Cleveland, Ohio, last month of the Independence Telephone Association of

the United States of America, and on June 20th, 21st and 22nd, at Detroit, Mich., at the meeting of the Railway Telegraph Superintendents' Association, as is shown in the accompanying cut.

The telephones exhibited made a fine display and were of those patterns sold for exchange and railway use, as follows: No. 250, with adjustable arm transmitter; No. 200, with transmitter fitted to the lid of the generator, or magnet box, and both finished in walnut and oak; No. 390, designed for use at terminal or extensions of lines, and also as a testing instrument, if desired; No. 375, an imported Swedish desk set, a complete telephone in itself, with generator bells and combination transmitter and receiver; No. 213, all-nickel desk set of American pattern; No. 311, imported Swedish wall set, in both oak and walnut; No. 175, wall or desk set, equally well adapted for both uses, and easily changed from one position to the other. There were also repeating coils, transmitters, receivers, batteries, etc. The instruments were connected up with the metallic circuit switchboard, and the operation of the board showed the ease with which it can be operated and how readily and quickly the wanted connection is made. The board is a model of beauty, and is finished perfectly in every detail, made with metal parts in bright brass or nickel finish, woodwork of mahogany, and all showing the fine workmanship and handsome appearance for which these well known goods are becoming noted. While the manner in which these instruments are finished proves very attractive to the eye, the positive way in which they do their work, compactness, and, above all, the sensitive and yet durable transmitters and receivers retain the favorable impression and confirm the many good words so frequently heard with reference to the high quality of these goods.

The company was represented by Messrs. J. F. Hemenway and J. A. Montague at both of the meetings.

The Tropenas Steel Process.

Last November the Union Iron Works of San Francisco, Cal., made its first steel casting by the Tropenas process at their 10-ton converter at the Potrero. This whole subject was gone into in an illustrated article in the issue of Dec. 31, 1898. Further technical reference is in order.

The Tropenas process consists in the use of a special converter, into which the pig iron, melted beforehand, is treated and converted into steel. This vessel, like all other converters, is a sheet steel shell, lined inside with refractory bricks or ganister. The shell is fitted with two hollow trunnions carried on two pedestals, so that the apparatus may be tilted according to the requirements of the operation—i. e., charging the melted pig iron, pouring the steel, etc. The inside of the converter is so arranged that the metallic bath has a much greater depth or thickness than in all the other pneumatic processes. It is conical for small charges and cylindrical for large ones. Upon one of the faces of the converter, and in a plane parallel to the axis of the trunnions, are fixed two wind boxes, connected by a conduit to the hollow trunnion communicating with the blowing apparatus. These two wind boxes are entirely independent of each other. Inside of the lower wind box a row of horizontal tuyeres terminate. These tuyeres are large in diameter, varying from 1¼ inches to 2 inches, according to the size of the converter. They open into the converter high enough to be always above the surface of the metallic bath. In the upper wind box a second row of tuyeres is placed. They are flattened and their free section is equal to about three-quarters of that of the lower tuyeres. This row of tuyeres is placed above the lower row, the distance varying from 4 inches to 7 inches, according to the capacity of the converter. The upper wind box is connected to the air main by an independent pipe, fitted with a valve, allowing to regulate, at will, the flow of air discharged by the top tuyeres or to suppress it entirely. Lastly, in the horizontal plane all the tuyeres are so placed that they can not communicate any gyratory motion to the metallic bath.

When the melted pig iron has been run into the converter, the latter is turned up in such a manner as to bring the lower tuyeres near the metallic bath, but always above it. The top tuyeres air valve is now closed. Then blowing is commenced in this position until the carbon flame appears. When the operation is well under way, the top tuyeres valve is opened so as to admit through these tuyeres a supplementary quantity of air, which penetrates into the converter at a certain height above the metallic bath. This air meets the gases escaping from the metallic bath and burns them, thus producing a zone of high temperature, which, by radiation, considerably increases the heat of the charge. The operation is stopped when the flame disappears. This corresponds to extra soft steel. Recarbonization is then made in the converter by means of a final addition, accurately weighed, thus allowing to produce exactly the hardness and quality of steel required.

The blast pressure required for good working varies between three and four pounds per square inch, according to the kind of pig iron treated. The blast can be produced by means of a blowing engine or by a rotary positive pressure blower.

By what has been said above it is apparent that the characteristic features of the Tropenas process are the following:

1. Low pressure blast, always above the surface of the metal and through the lower or fining tuyeres.
2. Disposition of the tuyeres in the horizontal plane, so that the jets of air, arriving above the bath, can not impart to the latter any gyratory motion whatever.
3. Great depth of the metallic bath, so as to avoid the churning and stirring of the latter during the operation.
4. Arrangements above the fining tuyeres, independent of the latter, of a supplementary row of combustion tuyeres, so as to burn the combustible gases escaping from the metallic bath and thus increasing the final heat of the steel.

Objection has been made to surface blowing on the ground that a greater quantity of iron is burnt than with bottom blowing, as in the Bessemer vessel. This is true to a degree. During a certain period of the operation there is a little more red-brown smoke than in the Bessemer operation, but the loss of iron resulting does not exceed from 1% to 1½%. The low pressure of the blast greatly attenuates this loss, which evidently would be much greater if the high pressure necessary with the Bessemer process was made use of. However, acknowledging this loss, it is easy to account for when making out the cost price.

On the other hand, blowing above the surface gives a better quality of steel than some of the other pneumatic processes, which blow from the bottom or more or less below the surface of the metallic bath. During the whole time of the Tropenas operation the bath remains perfectly quiet, and this is entirely different from all the other processes, in which a continuous mixture of metal scoria and air takes place. The steel produced by this process is purer and contains hardly any gas in dissolution. The operation being particularly quiet, there is no projection of steel, or very little, through the neck of the converter, contrarily to what occurs in the Bessemer; hence the saving of metal on this score compensates for the loss of from 1% to 1½% due to the greater oxidation resulting from blowing upon the surface.

By the use of the top tuyeres the carbonic oxide gas arising from the metallic bath is transformed into carbonic acid gas, thus greatly increasing the temperature of the final steel without increasing the cost price. This is accomplished by merely burning, in a practical manner, the gases, which all the other processes discharge, without utilizing, into the atmosphere.

The steel obtained being hotter, and consequently more fluid, allows the gases to escape more easily, and when the metal is poured into the moulds it is perfectly quiet. Owing to its high temperature and consequent great fluidity the pouring is much easier and the steel produced is better utilized, as no skull remains at the bottom of the ladles.

At the end of the Tropenas operation, before any final addition is made, the product obtained is practically pure iron. This enables the production, currently, of a very large number of steel castings for dynamos and other similar uses, possessing a very great magnetic permeability, and which, when analyzed, show from 99.75% to 99.80% of pure iron. These pieces are particularly sound, and when machined show no blowholes or similar defects. With the Tropenas metal, produced in such a state of purity and at such a high temperature, it is possible to make varied final additions with the view of producing different qualities of steel, from the softest to the hardest, and all the intermediate grades, by modifying the final addition according to the product required.

The waste of metal during the operation has been the object of special researches. The average, taken from a great number of operations, shows that the loss at the cupola varies between 5% and 6½%. The waste at the converter during the blow varies between 10% and 12½%. The average total loss in the cupola and converter is therefore about 17%. This loss is not excessive when it is considered that it applies to small converters and that the pig iron generally used for manufacturing steel castings contains from 2½% to 3½% of silicon.

The pig iron usually employed in the process for manufacturing steel castings has the following analysis:

	Per cent.
Silicon	2.50 to 3.50
Manganese	0.50 to 1.25
Carbon	3.00 to 4.50
Sulphur	0.03 to 0.06
Phosphorus	0.04 to 0.06

The freer the pig iron is from sulphur and phosphorus the better the results. However, when the results required are merely those needed for navy and railroad use, ordinary Bessemer pig iron containing not over sulphur 0.06 and phosphorus 0.05 can be used. When the steel produced is to be submitted to particularly severe tests, it is better to use a pig iron as devoid as possible from sulphur and phosphorus.

The sands necessary for making moulds are siliceous sands containing a sufficient proportion of alumina to give the moulds the required hardness.

All machinery castings having to be machined upon several faces must be cast in dried moulds, also large castings with great thicknesses. Less important castings, which slight defects (such as pin holes, slight scale, etc.) do not render useless, are cast in green sand moulds not dried. In the majority of foundries using this process, a great proportion of the castings are cast in green sand moulds not dried or merely skin-dried. The greater part of the small castings are cast in the same manner.

When the castings are taken out of the moulds, it is not indispensable to reheat them. The steel as it comes from the converter is soft and malleable. The great majority of castings are neither reheated nor annealed. When pieces, however, have great or uneven thicknesses, or when they are of a great bulk, it is preferable to reheat them for a few hours at a cherry-red heat in an ordinary furnace, without the use of any iron ore or other recarbonizing elements. The object of such a reheating is to transform the crystalline structure of pieces having great thicknesses into a finer grain, or to relieve the molecular tensions due to the considerable shrinkage of steel when the castings have a great bulk. Reheating is also necessary when high mechanical results are to be obtained, and principally when a great elongation is required.

The installation of the steel process proper requires, first, one or several converters, according to the quantity of steel to be produced. Each converter works in connection with a cupola; the latter is generally placed upon a metallic platform high enough to allow the melted pig iron to run direct to the cupola into the converter. The cupola is operated in the usual manner by means of a fan or a positive pressure blower. The air blast for the converter can be produced by means of a rotary positive pressure blower, the air pressure being only from three to four pounds per square inch. The quantity of compressed air required is from 22 to 25 c. m. per minute (776 to 883 cubic feet) per ton of pig iron to be treated. The expenditure necessary for a plant consisting of two one-ton converters, two cupolas and their platforms, fans and rotary positive pressure blower, is about $6500, erection included. The cost of two two-ton converters, two cupolas, platforms, fans and blower is about $8500, erection included. To this must be added the cost of a crucible furnace for final additions, which are generally made in a melted state. The expenditure for such a furnace is a small one and does not exceed from $150 to $200. Besides the steel-producing plant proper, the usual foundry apparatus are necessary, such as flasks, ladles, tumblers, reheating furnace, ovens for drying cores, moulds and hand ladles, sand crushers and mixers, forges for smithy, tools for cutting headers, cranes, etc.

Each operation in the converter lasts from fifteen to twenty minutes. Some time is required for pouring the steel into the moulds and for repairing the converter for another blow. When small pieces are manufactured and the whole charge has to be poured by means of hand ladles forty minutes are necessary for a complete operation. When the pouring is made with large ladles it requires only thirty minutes. In the first case three operations can be made every two hours, and four operations in the second case. With such data it is easy to calculate what quantity of steel can be produced when working eight hours per day.

The converter lining lasts from 125 to 150 operations, and the tuyeres from thirty to forty operations, after which the latter must be replaced. While this is being done the necessary patching up of the lining is made according to requirements. If some holes have been formed they can be plugged by means of a mixture of cement and brick. The linings are made with silica bricks, the cement being composed of quartz, sand and clay.

The cost of producing the steel varies from $5 to $6 per ton of 2200 pounds over and above the cost of pig iron. This includes all expenses incurred at the blowing apparatus, cupolas, labor, lining, tuyeres, and all general expenses for the manufacture of steel in the ladle ready to pour. These prices are the result of the accounts of works in normal operation for several years and in which the yearly output is about 2500 tons.

Henry C. Wulf, the chemist and metallurgist of the Union Iron Works, whose services in the above are cordially recognized, says that for U. S. Government requirements the phosphorus in steel is limited to .06%. Should it contain .001% above that it is rejected, and in blowing it has to be constantly borne in mind that the metal must be of a certain composition to meet the rigid physical requirements of the Government in tensile strength, elongation, elastic limit, reduction of area, quenching test and bending.

At Cape Nome, Alaska.

Our Nome, Alaska, special correspondent sends us some photographs from which was engraved the plate on the front page of this issue, which gives a good idea of the present appearance of things in that most northern American gold mining camp. Advices from there received this week confirm the former statements published herein, viz., that while the place was originally wonderfully rich in gold, it was worked out and overrun by experienced Klondikers before the first shipload arrived; that everything is overdone and those who can are leaving.

Siberian Gold Fields.

A recently published work by M. de Batz gives information about the gold-bearing strata, climate, etc., of Siberia.

In the mining districts of Tomsk, Tobolsk, Akmolinsk, Semipalatinsk and Semirechensk gold is found in the tributaries of the Ob. New considerable up-to-date diggings are confined to the affluents of Lake Zaissan and the Narim and Black Irkutsk rivers.

In the Maritime province there is one group of concessions in the basin of the Amur and another on the island of Askold, where the sea bed, which consists of auriferous sand, is worked in a perfunctory way.

The gold workings of the Amur constitute four groups, distributed over the left tributaries of the Amur river. In West Transbaikalia diggings are confined to the affluents of the Chikoi, a tributary of the Selenga, which empties into the Baikal, a tributary of the Yenisei.

The Lena mining district comprises the region traversed by the lesser hills of the Yabloni mountains.

The virgin forest zone in Siberia abounds in bogs and swamps, the ground being frozen, and has a series of river and torrent systems, which may for the purpose of general classification be called (a) the Podkammennaya Toungounska system, (b) the Great Pit system and (c) the system of the Yenisei and its tributaries. The Great Pit forms the boundary between the north and south districts.

In the Lena district the gravel is very poor and difficult to work. The district of Biruginsk is the poorest locality within this jurisdiction, although at one time it occupied the foremost place in Siberia as a gold-producing district.

In the district of the Altais gold is worked on the tributaries of the Ob. The placers on the left bank of the Tom are worked by the companies of St. Petersburg with special permission of the Czar. The right bank is free, and diggings are to be found on the river Tom, Alkan Choulichman, Upper Katoun Benshtarma, etc.

The auriferous area extends over the slope of the mountain ridge, which, rising from the steppes of Turkestan and dying away as it skirts the sea of Okhotsk, traverses obliquely the Asiatic continent from southwest to northeast. From the meridian of Tobolsk to the Pacific the range is about 4300 miles long, with an average breadth of nearly 400 miles and an area of over 1,600,000 square miles. This country has only been superficially prospected, because roads are lacking and it is impossible to penetrate those primeval Siberian forests in summer and to prospect in winter, when every outcrop and surface indication is buried beneath the snow, not an inviting nor profitable undertaking.

The work of government exploration in the eastern portion has not proceeded beyond 62° latitude, although the existence of a rich auriferous vein is known in the mountains, between the Lena and the Ayan.

The Siberian placers are situated on the north and northeast of the great mountainous plateau described.

This vast plain, intersected by important rivers—the Wenga, Angara, Yenisei (nearly 3000 miles long), Ob (over 2600 miles), Lena (more than 2000 miles) and the Amur (2600 miles)—still shows traces of great glacial activity. The origin of the Siberian placers, judging from researches made in other parts of the world—the United States, Australia and Europe—may be accounted for as follows:

The Silurian or Devonian mud, on account of the auriferous pyrites it contains, M. de Batz regards as the almost universal source of gold. This was upturned at the period of the formation of the Asiatic ridge, and at the same time was fissured or broken. The fissures, filled with quartz and pyrites torn from the schist by the action of the waters, became the veins already found. Subsequently, the powerful action of the glacial period gave rise to the placers which are now being worked.

If this theory of the formation of auriferous alluvia, which has been verified in other great gold-producing countries, proves true of Siberia, then it is to the south of the localities at present worked that a systematic search for the primitive strata ought to be carried out.

The Altais contains veins of lead, silver and copper; numerous specimens of all kinds of minerals have been brought from that region by hunters and foresters. It is in these hills, with their westerly continuations, and in the mountainous mass which strikes out from Manchuria in a northeasterly direction that the wealth of Siberia must be sought.

The chain of the Khingan, "Mountain of Gold," is said to be rich in minerals, and it is doubtless from these hills and their spurs that the gold in placers of the Ussuri and the Amur lower portion was brought. The same reasoning holds good for the hills bordering on the sea of Okhotsk.

The great extent of the regions covered with auriferous sands in Siberia is the cause of the difficulty experienced in examining them systematically. The impenetrable virgin forests at the north, with their luxurious vegetation, fallen trees and marshy soil prove an obstacle to geological research. It is impossible, in the majority of cases, to follow the different strata, recognize outcrops or ascertain the nature of the subsoil.

It was not until 1886 that the want of a school of geology at Irkutsk made itself felt, although as far back as the year 1843 the Department of Mines had sent Col. Hofman to Siberia to study the gold deposits. The information obtainable on the subject of Siberian placers is scattered through a great number of monographs; and until the geological committee of the Great Siberian railroad publishes the result of their labors, it will be difficult to treat the subject comprehensively. In contrast with the great strata of the Sierra Nevada mountains in California and in British Columbia, which belong to the pre-Tertiary period, as attested by the volcanic matter with which they are covered, the alluvia of Siberia belong to the Quaternary epoch and are of recent formation.

Siberian placers are situated in valleys having usually a gentle fall and often marshy. Their distinctive feature is that the pay gravel above the bedrock is covered, in the immense majority of cases, with an unproductive layer of soil.

Auriferous localities are also generally characterized by the presence of low, rounded hills, testifying to the intensely destructive action of the atmospheric agents upon the rocky conformation of the country. The placers are found at a moderate altitude above sea level. In the Urals they are met with at a height varying from 500 to 1000 feet; in the Alatau mountains at 2000 feet; in the valley of the Olekma from 2000 to 2500 feet; and in the Yenisei from 2500 to 3000 feet.

In addition to native gold, frequently found in nuggets, iron pyrites, often in the form of mispickel, and all the products of its decomposition, such as magnetic oxide, limonite, hematite, etc., are met with in Siberian gravels. Copper is found, sometimes native, sometimes in the form of copper pyrites; lead has been discovered as sulphate, carbonate, phosphate or sulphuret. Native bismuth has been found in the valley of the North Yenisei and in certain valleys of the Altai. Among the hard stones, garnets, rutile, tourmaline, zircon, peroxide of tin, etc., are found.

The organic remains are most generally those of the mammoth. In 1840, it was calculated that more than 2000 of these animals were found: some, with portions of their bodies still soft, were discovered in the frozen clays of the extreme north. The woolly rhinoceros (rhinoceros tichorinus) is also frequently met with. The state of preservation of these mammoths- animals which required abundant vegetation—indicates, in a striking fashion, the rapidity with which the glacial period must have enveloped the vast plains of Siberia.

Human remains have also been found—a skull at a depth of 10 feet in the Chtogolev mine in 1860, ancient hearths, also a stone slab, with inscriptions, in a mine in the basin of the Kigas.

A feature altogether peculiar to the Siberian placers, especially those in the district of the Lena, Zeya, etc., is that the soil remains perpetually frost-bound or thaws only slightly in the summer time. Near the sources of the rivers, places are found not frozen: these are said to be caused by warm or tepid springs beneath the surface of the earth.

The working of Siberia gold mines dates back only to the middle of the eighteenth century, at which period the first auriferous veins were discovered in the Urals and in the government of Archangel. Gold was discovered in the Ural mountains in 1744. Several veins situated on the banks of the river Beregofka were worked with varying success from 1800. In 1895 the output was 19.46 poods (703 pounds). In the southern Urals the first gold reef was discovered in 1799. The Kothkar reef yielded in 1894 about 85 poods (3069 pounds).

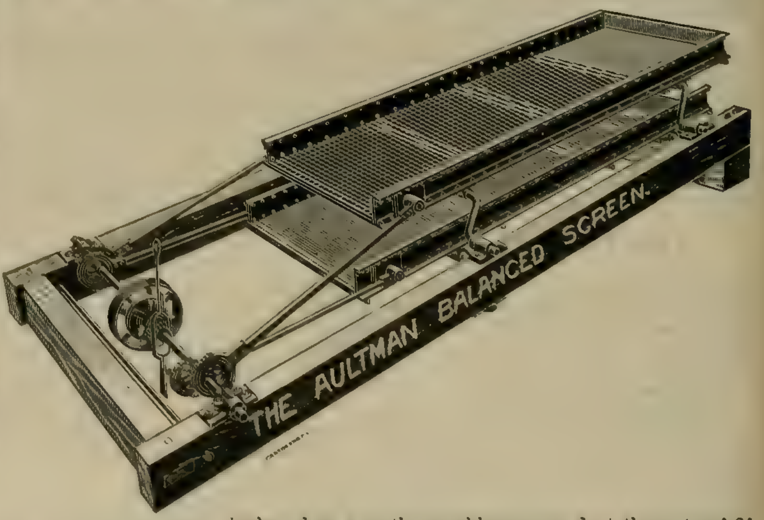
Toward the close of the period 1870 1879, reefs were discovered in the government of Yenisei and the province of Transbaikalia. In 1894 95 gold-bearing strata were found in the district of Marunsk, in the government of Tomsk.

In 1866 the Amur province was opened to private trade: two years later, mining was begun on the concessions belonging to the Upper Amur M. Co., in the basin of the Djalinda. At the same period, explorations were set on foot in the Maritime province, and in 1871 the first gold was taken from the mines belonging to a Mr. Yetukof, in the province of Amgoun. During the season of 1897 the Amgoun M. Co. treated 10,834 cubic sagens of gravel, from which about 55 poods of gold were extracted, giving an average of 7.825 grams to a cubic meter. On the other hand, the Amur M. Co. took out of their placers 20¼ poods (734 pounds), showing an average of more than 17.06 grams to a cubic meter:

Mr. Greener adds: "In 1896 the Government dispatched to the shores of the sea of Okhotsk an expedition which, according to the latest news, has found rich alluvial drifts. There have recently arrived at this port direct from the United States six practical American miners under the auspices of the Russo-Chinese bank. They are supplied with modern machinery, are men of experience and go to the Yumen, where rich discoveries are reported. These are the 'original forty-niners of the New California,' and it is hoped they will give new impetus to mining in the Maritime province. In conversation with one of them, who last winter prospected in the Yukon, Alaska, the idea was emphasized that the whole region about Anadirski and the extreme eastern range of the Stanovoi mountains, near Bering straits, would prove as rich as the Cape Nome region, since it was of analogous formation."

A Balanced Shaking Screen.

In the shaking screen herewith illustrated the forward and backward movement of the upper screen is counterbalanced by the reverse movement of the lower screen, the thrust of the moving parts being absorbed in the heavy countershaft. The screen frames are so placed on rocker arms that the screening surface always moves through the true arc. At each end of the stroke the material naturally raises slightly and is again forcibly caught by another portion of the screening surface. Favorable materials, sand, shale, fire clay, phosphate, cement and coal, when dry, are thoroughly screened at the rate of fifteen to twenty tons per hour, and when damp at the rate of ten to fifteen tons per hour. Dimensions: length of upper and lower screens, 14 feet; width, 3 feet; height over all, 26 inches; size of friction pulley, 24x6 inches; speed of countershaft, 250 R. P. M. Space required for screen complete on skids, 18x4½ feet. The frame carrying the wire cloth or perforated metal is in removable panels for convenience in renewing the wire cloth and to provide for changes in the fineness of separation. The Aultman Co., Canton, Ohio, are the manufacturers and solicit inquiries from interested parties.



Regarding Final Proofs.

In applications for patent the General Land Office requires that affidavits for publication, etc., shall be filed within a reasonable time, under penalty of forfeiture. It having been reported that Register Hobbs of the Salt Lake land office had declared thirty days the limit when such proofs will be received, Mr. Hobbs desires it understood that he has no right, and that he would not presume, to definitely interpret so vague a term as "a reasonable time." He stated, however, that, owing to lack of promptness on the part of applicants for patents, complications have arisen which have indefinitely deferred the issuing of patents in a large number of cases in his office, and advises applicants to avoid unnecessary delay in presenting proofs. Every quibble raised subsequent to advertising, if proof is not immediately presented, undergoes the delay of investigation.—Bingham, Utah, Bulletin.

Liable to Lead Poisoning.

TO THE EDITOR:—In the dry lead mines of this county, where much of the ore is shipped to San Francisco for reduction, lead poisoning is very common, and is well understood as one of the risks the miner takes in working in such mines. In some mines water is introduced to lay the dust and lessen the risk. I have seen many cases pronounced by physicians to be lead poisoning, and some have resulted in insanity so serious as to necessitate committing the patient to the asylum, where the subject had not been in any way connected with a smelter of any kind. W. G. T.

Independence, Inyo Co., Cal., Aug. 25.

◆

FLASHLIGHT pictures are now taken by an invention which has the gas stored in a jar, with a flame in position to ignite it when the jar is opened by pressure on a pneumatic bulb, the latter also operating the shutter of the camera.

MINING SUMMARY.

ARIZONA.

The Surveyor-General reports 105 surveys for patents during the year ending July 1, 1900, [illegible] for the corresponding twelve months preceding, [illegible].

GILA COUNTY.

A. Lockwood has bonded his interest in the Cracker Jack mine, [illegible], to Moses & Campbell. The Cracker Jack, comprising [illegible] claims, is [illegible] miles from Payson.

Silver King: At the United Globe mines and the Old Dominion Copper Co. after Sept. 1st all underground men will be paid $3.50 per day.—The shaft on the Black Warrior Co.'s Gold Gulch mine is down 125 feet.

GRAHAM COUNTY.

M. E. Terry, of the Gold Coin M. & D. Co. and associates are traveling over the country in search of good mines. They are camped at Thompson's station, 20 miles north of Lordsburg, prospecting.

MARICOPA COUNTY.

H. Dennison reports returns from a carload shipment of ore from his Pima mine, near Tempe, of 23% copper.

The Par Value G. M. Co. has incorporated at Phoenix; capital stock, $100,000.

The Sierra Vista Co. has fourteen claims, 30 miles north of Phoenix. Assays show copper and gold. Sixteen men are employed.

MOJAVE COUNTY.

Near Chloride the concentrating plant at the Tennessee mine, belonging to the Willapa M. Co., was recently burned. It had a daily capacity of 200 tons. All work is suspended at present, as the steam hoist at shaft No. 1 was undergoing repairs and the power was being taken from the engines in the burnt building. H. N. Botsford is Supt.

The mill at the Tennessee mine, Chloride, recently destroyed by fire, will be rebuilt. The loss was about $30,000; insurance $15,000.

PINAL COUNTY.

The County Supervisors have raised the assessment on the Mammoth mine, patented, from $2000 to $50,000, and on the Ray mines, patented, from $1000 to $25,000.

W. Lawrence has seventy-six ounces gold, representing a month's clean-up from the mine, 2 miles south of Dripping springs. The ledge is 2 feet wide and carries a rich streak 2 inches wide. The gold is in decomposed iron.

YAVAPAI COUNTY.

J. Shirley, Cherry creek, 15 miles from Jerome, contemplates an electric plant at the Etta.

The Eclipse, adjoining the Etta, will have a new 200-foot shaft.

G. W. Hull, Jerome, has a mine in the center of the town, said to contain copper ore. He is seeking to drive a tunnel from Bitter creek under the town of Jerome, connecting with the shaft he has down.

The Dewey group of twenty-five mining claims is sold to J. W. Dean of Denver and his associates for $100,000. It is in the Yeager canyon country, 8 miles from Jerome. The company will run a tunnel 500 feet.

YUMA COUNTY.

The Boston company which has for eighteen months been developing a copper property at Empire Flats, or Copper Basin, 15 miles below Needles, on the Arizona side, 3 miles from the river, reports satisfactory progress.

Manager T. M. Drennan of the Parker M. Co. is developing a gold property 30 miles down the Colorado from Needles, on the Arizona side, 9 miles above Copper basin, where the new smelter is going in. The ore is honeycombed quartz, carrying oxidized iron and gold.

CALIFORNIA.

AMADOR COUNTY.

At Sutter Creek the miners at the Wildman mine have been paid two months' back pay—$15,000. It is locally figured that the Wildman will change hands, and, with ample capital, will sink the shaft over 2000 feet.

At Jackson the new 60-stamp mill at the Oneida is completed and only awaits the installation of the transformers and other electrical appliances to be started. The mill building is 136x40 feet; the power room adjoins the mill on the north and is 40x80 feet; the clean-up, retort and furnace rooms, 12x32 feet, adjoin the mill on the south. There are twelve separate shafts, with five stamps to a shaft, each set of five stamps constituting a battery. Each stamp weighs 1200 pounds. An improved iron guide box is in use, enabling those in charge to take out each stamp at any time independent of the others comprising the battery; thirty concentrators are in place. A double-track tramway extends from the hoist to the ore bins; [illegible] of the mill is the [illegible]. The Standard Electric Co. will furnish power [illegible] of running [illegible] stamps. The [illegible] shaft has been [illegible], and [illegible] connection made between the [illegible] new shafts. The [illegible] is [illegible] feet deep, the new shaft over 2000 feet. [illegible] of 300 feet has been made in the [illegible] shaft.

At the [illegible] mine, near Pioneer, the crosscut tunnel has tapped the ledge. The mine is under the management of T. Schenck.

At the [illegible] mine, between Pine Grove and Volcano, ten stamps will be running this month.

At the [illegible] mine near Clinton, [illegible] & [illegible] [illegible] are [illegible] ore [illegible].

At the [illegible] mining will be resumed when the mill is ready to run.

BUTTE COUNTY.

Wm. Stephens will have charge of the 10-stamp mill to be erected at Bloomer Hill.

Twenty men are employed by the Cherokee Co. putting the mine in shape for work when the dam is completed. It is expected that by the 20th inst. the tunnel now being run by the Banner Co. will be finished and water sent from Cherokee to the Banner mine.

The owners of the Fall River mine, near [illegible] Valley, project putting in ten new stamps.

Oroville hears that the Magnolia mine is to be reopened. F. B. [illegible] of Colorado is reported looking for an opportunity to purchase the mining property for Eastern men.

CALAVERAS COUNTY.

C. W. Howard, Supt. of the P. & C. Co., has a new air compressor at the mine in [illegible].

A chlorination plant is to be built for the Lightner M. Co., near Angels.

In the Jenny Lind district the State creek mill is running a few hours a day, owing to shortage of water.

The Golden Eagle mine, Dolan & Epperson, Milton, is down 50 feet on pay quartz.

The Lost Dog is to be shut down to take out the old machinery, to be replaced by that of larger capacity. The shaft will be sunk 200 feet deeper.

The Bonnie Blue Bell M. & M. Co. has been incorporated at Stockton, 200,000 shares, $1 each; $120,000 subscribed. G. W. Patterson, M. S. Thresher, G. A. Baird, I. W. Howard, J. P. Mosher.

W. T. Hayes is trying to incorporate at Mokelumne Hill, on a co-operative plan, to develop the Sparrow Hawk mine, on Esperanza creek. He thinks that with a 20-stamp mill the cost of mining and milling the ore would not exceed $1.25 per ton.

In the Ritter mine, near El Dorado, a tunnel being run on the vein is about 400 feet in, 192 feet below the croppings. It is to be extended to cut the old shaft.

EL DORADO COUNTY.

The Lone Jack mine, near Garden Valley, has been sold by the Sheriff to T. A. Geogh of San Francisco, to satisfy a judgment for the sum of $1254.38.

At the Larkin mine, Diamond district, the shaft is 700 feet deep. Sinking will be continued to 800 feet.

At the Mount Hope mine, near Grizzly Flat, the lower or main tunnel has been driven 800 feet.

The tunnel at the Electric mine, near Georgetown, is in 700 feet.

Fifty men are employed at the Mammoth Bar river claim, on the middle fork of the American river below Pilot Hill.

A new incline shaft is being put down at the Minnehaha mine, near El Dorado.

FRESNO COUNTY.

At Fresno it is reported that the Haskell group of copper mines, owned by H. B. Vercoe & Son, has been sold to an English organization.

INYO COUNTY.

The manager of the Tuba mines, near Ballarat, tells the Register that work on them is down 200 feet, with 12,000 tons ore blocked out.

KERN COUNTY.

The Blue Chief M. Co. has incorporated at Bakersfield: W. James, T. C. Minzer, H. I. Tupman, F. A. Brown, R. A. Edmons; capital stock, $100,000; subscribed, $50.

MADERA COUNTY.

J. A. Greenwood of the Questo C. M. Co. says a big flow of water necessitated the installation of a steam pump. Sinking has been resumed.

MARIPOSA COUNTY.

Mariposan: At the Mariposa mine the shaft is down 650 feet; sinking has been stopped and the east and west drifts started.

MONO COUNTY.

A. C. Pratt, at Par Value mine, 18 miles west of Bridgeport, has a twenty-ton stamp mill, with water power, rock breaker, concentrator, etc.

NAPA COUNTY.

The Napa [illegible] Co. has incorporated at St. Helena: [illegible], A. K. [illegible], J. W. [illegible], R. A. [illegible]; capital stock, $1,000,000; subscribed, $[illegible].

NEVADA COUNTY.

The [illegible] M. Co. has levied an assessment of 25 cents per share, delinquent Sept. 22.

At a meeting of the [illegible] M. Co. C. [illegible] was reappointed Supt. During the past year two tunnels have been driven—the upper one 200 feet from the surface, [illegible] feet. There there is a ledge 24 feet thick. The lower tunnel [illegible] 22 feet [illegible] 200 feet from the [illegible].

Herald: W. A. Fagerburg, resident engineer South Yuba Water Co., [illegible] work at [illegible]. In the [illegible] a large section of [illegible] flume was swept away. [illegible] the damage was repaired, Mr. Fagerburg with forty men building 600 feet of flume 6 feet wide and 3 feet high.

PLACER COUNTY.

D. T. Callahan of San Francisco has bought the [illegible] gravel mine, comprising about 400 acres [illegible], on the Forest Hill divide, 3 miles northwest of Forest Hill, for $35,000. It is a channel mine with 1000 feet of tunnel through gravel, with [illegible] breast at the face in good ore. The new owner is building a 10-stamp mill and expects to crush gravel by Sept. 1. R. E. Stephens will superintend the work.

J. A. Johnston and associates are locally reported to have sold the [illegible] claim, near Forest Hill, for $35,000. It is a gravel mine and is supposed to be on the same channel as the Mayflower.

F. Nicholls is superintending a project to work tailings in the North Fork of American river by the use of [illegible]. A dam will be built three-fourths of a mile below [illegible] bridge.

Colfax Sentinel: The California quartz mine, at Ophir, is being developed by Messrs. Bree, Lozano, [illegible] and Smith. The main tunnel is in 300 feet.—Development work is progressing at the Southern Cross quartz mine, on the North Fork of the American river near Towle. The main tunnel is 40 feet below the river and is now in 700 feet. Supt. S. J. [illegible] has twenty-two men employed.—Diego McGarey & [illegible] of San Francisco have a year's bond on quartz mines on the American river southeast of Cisco, Fairview, Daisy and Everett. A tunnel is begun in the mountain side that will give 1500 feet of backs.—Paying gravel has been struck in the Gleeson placer mine, near Iowa Hill. Recently one pan yielded $107.30. The tunnel is in 600 feet, about half of it being through bedrock.

PLUMAS COUNTY.

Near Greenville, at the New York, owned by the [illegible] estate, the 5-stamp mill, operated by steam power, is crushing ore said to run $15 per ton.

The McIntyre mill, ten stamps, has been moved from McClellan ravine to the [illegible] property.

Plumas National Bulletin: Wallace McGregor, mining engineer and metallurgist, is working the sulphurets which accumulated at the Plumas Eureka mine during several years, employing a modified cyanide process and meeting with success.—Near Johnsville at the [illegible] mine twenty stamps are running steadily. The mine is worked through a three-compartment shaft, two for hoisting and the third for pumping. The shaft is down 230 feet; 130 feet from the surface a drain tunnel connects with the shaft. The tunnel is nearly half a mile long. The water is pumped up from the bottom of the shaft 50 feet and discharged into the tunnel. The pump throws a continuous stream of water 10 inches in diameter, capacity 1300 gallons per minute. Of the twenty stamps the ten stamps in the upper part of the mill each weigh 850 pounds. The second ten, added last year, weigh 1000 pounds each. All of them drop ninety-eight times per minute. The mill crushes about sixty tons per day. By crushing the ore fine better results are obtained. Outside amalgamation is used. About 1000 pounds of sulphurets are saved daily and shipped to the Selby Reduction Works. From each carload of ore from the different working faces in the mine a sample is taken. These are assayed and the value of the ore from each face thus determined. As each carload of ore reaches the top of the shaft another sample is taken and all combined. This combined sample is assayed, giving the average value of the ore taken from the entire mine, also affording a check on the mill battery samples. Samples are taken from the battery every hour. The tailings are sampled at the same time as they leave the plates, also after having passed over the concentrators. By assaying these samples it is learned just what percentage of the gold the mill is saving. [illegible]. The storage capacity of the [illegible] is [illegible] acre-feet, covering about 400 acres.

RIVERSIDE COUNTY.

The [illegible] mine and mill are running [illegible]. The last clean-up was $2080, netting $1630.

At the [illegible] Queen [illegible] the [illegible] mine [illegible].

The Good Hope mill is temporarily shut down.

The Santa Rosa mine and mill, under bond to an English syndicate, has changed hands.

SACRAMENTO COUNTY.

At the Blue Ravine mine the new [illegible] compartment shaft will be commenced [illegible].

[illegible] when the water is lowered sufficiently [illegible] will be put in.

SAN BERNARDINO COUNTY.

The State Supreme Court has rendered a decision of importance to miners and prospectors. J. Kahn brought suit against [illegible] & [illegible], [illegible] his assessment right to the [illegible] quartz mine. [illegible] alleged a failure on the part of Kahn to perform the necessary amount of work required by law [illegible]. The lower court held that the work performed [illegible]. The Supreme Court reverses the decision. It says that the court should not substitute its own judgment and wisdom as to the best methods of developing the mine in place of that of the owner. The Supreme Court holds that the tunneling [illegible] to develop both mines, and the cost of the work being far in excess of what is required by law and the work being in progress at the time of the [illegible], it can not be said that the original location had been abandoned.

SAN DIEGO COUNTY.

W. S. [illegible] and [illegible], interested in the [illegible] iron mines, Lower California, tell San Diegans that a furnace is to be built in San Diego to smelt 300 tons of ore by the [illegible] process.

The Golden Cross, at Hedges, is one of several mines in a belt, [illegible], composed of [illegible], which shows itself on the surface in [illegible]. The gold is found in the [illegible]. Six miles north of the Golden Cross is the [illegible] mine, now [illegible], owned by ex-Governor [illegible], who has [illegible].

The [illegible] of the [illegible] Co., [illegible], general manager, is down 420 feet. [illegible] has been reached.

SAN FRANCISCO COUNTY.

The [illegible] Co. has incorporated: [illegible]; capital stock, $100,000; subscribed, $500.

The [illegible] Co. has incorporated: [illegible]; capital stock, $500,000; subscribed, $50.

SHASTA COUNTY.

W. S. [illegible] is sending miners and mill men from [illegible] to the [illegible] mine, of which [illegible] is Supt.

[illegible] is running a new tunnel on the [illegible]; [illegible] tunnel work is being pushed.—One of the most important mining deals in this county [illegible] the group of claims on the divide between [illegible] creek and South Fork, which has been bonded by S. W. [illegible], representing

ing a company at Lawrence, Mass.——A tunnel will be started on the Lewis claim Oct. 10th and extended into the mountain 3000 feet, cutting the old Chicago mine at a depth of 700 feet.

SIERRA COUNTY.

The Thistle Shaft Co. has, for two years, been boring holes on their property, near Gibsonville, to determine the depth of the gravel channel to tap it by a tunnel.

Packer & Son are engaged operating their mine on Slate creek, near La. Porte. They have twenty-six men in their employ.

The Ne Plus Ultra, owned by Gibsonville men, is bonded to Mr. Bullock, who is driving a tunnel in the dividing ridge between Slate creek and the south fork of Feather river, near Newark. The tunnel is in 3000 feet. The pay channel is expected to be reached in 1000 feet more.

SISKIYOU COUNTY.

In the French Gulch mining district is reported the prospective sale of the New Brunswick mine by F. Rossi to Colorado men for $30,000.

Roberts & Jillson have ten men at work on the Gladstone.

The Searchlight says the American mine, owned by Baker & Hamilton, will resume work with the 10-stamp mill.

At the Brown Bear Supt. Dobler is proceeding with the construction of the new mill.

STANISLAUS COUNTY.

The Stanislaus M. & P. Co. has the machinery for its plant at Knights Ferry.

TRINITY COUNTY.

C. D. Galvin of the Shasta King mine is successfully operating a Keystone driller on Weaver creek. It is thought a dredger will be put in.

G. E. Bailey, Supt. Adele Co., Lewiston, has a new mill breaking up cemented gravel and saving free gold and handling the black sand. The material is fed from an ore bin into a revolving hexagon of steel bars, broken up and the boulders washed clean, the latter falling into a car that carries them to the dump. The cement, gold and black sands pass through the grate bars onto a table of riffles, with a rapid side shake bringing the gold into contact with the mercury in the riffles. After leaving the table the pulp passes through a revolving screen that separates the coarser from the black sands. The black sands pass on to a moving carpet table, which cleanses them so that they can be shipped to the smelter. The plant has a capacity of ten tons of gravel per hour.

TUOLUMNE COUNTY.

The Magnet hears that the Utica M. Co.'s electric line is to be extended from Murphys to Carters. The owners of the Utica also own the Eureka Con. (Deadhorse) mine near Carters.

The railway track has been completed from Jamestown to Tuttletown. Work has begun on the cable tramway that will connect Tuttletown with Carson Hill.

The Boston & Tuolumne M. Co. at Big Oak Flat has resumed operations. P. Loeffler is Supt.

There has been placed on record a transfer from the Santa Ysabel G. M. Co. of Wyoming to the Santa Ysabel G. M. Co. of Colorado the following mining properties: Miller & Holmes, Knox & Boyle mill and mill site, Grey Eagle quartz mine and mill site, Wyman consolidated quartz mine, and eighty acres of adjoining land. Consideration $70,000. The properties lie between Stent and Quartz.

Soulsbyville reports the discovery of a parallel vein in the Black Oak mine. The shaft recently reached a depth of 1000 feet. At 60 feet in a drift north of the shaft to reach the ore shoot that had been uncovered in the drifts above a 6-foot drill was started in the foot wall, and before it had reached its length was found to be in high-grade quartz. A crosscut opened a ledge 10 feet wide. Assays show lowest value ore $40, highest $70.

Independent: At the Crystalline opertions will commence at once with steam power.——Advantage will be taken at the Republican mine of the "no water" season in extensive and needed improvements on the property.——The mill at the Rawhide mine is closed owing to lack of water, the working force reduced from eighty to twenty. The latter will be retained to retimber and sink the main shaft from the 1900 to the 2300-foot level.——Supt. F. F. Restano at the Golden West has new ore discovery in a ledge 4 feet wide. The tunnel is being retimbered, new cars, airs and water pipes, 2000 feet steel rail are being put in.

Jamestown Magnet: The power house at Phœnix lake is shut down for the season, the water supply in the Tuolumne Water Co.'s reservoirs being exhausted. This necessitates the closing down of many mines altogether and the reduction of the working force in others. Including the employes let out during the past month by mines employing small crews, 600 men who work in either mine or mill find themselves out of employment temporarily by the giving out of the water supply.——At the Jumper Syndicate's mines about thirty-five men have been drafted, principally at the Golden Rule mine. They have hung up twenty stamps in the Jumper mill. It is the intention of the superintendent to keep forty stamps in operation as long as they have battery water, using their own electric power and steam to operate by.——At the App Con. Co.'s properties about forty men are retained, some sixty being let out. This company had everything in readiness for the shut-down. At the Rawhide they have commenced retimbering the shaft. When this is finished, sinking below the 1700 level will be resumed.——At the Harvard the force has been reduced from sixty-five to sixteen men, who are doing development work at 5 and 7 levels.——The Black Oak people will continue to operate their 30-stamp mill right along, using steam power.——On the cessation of the water supply, the Dutch mine closed down entirely, in the absence of Supt. Trittenbach. On his return, he stated that ten stamps will be kept in operation as long as the battery water lasts. About fifteen men will be employed about the mine.——About forty men were laid off at the Golden Gate mine, only sixteen being retained. The chlorination works at this property are still in operation.——Seventy men were laid off at the Eagle–Shawmut mine as a result of the giving out of the water supply and closing down of the mill. About forty men are kept on. During the shut-down the mill will be overhauled and some changes made.

COLORADO.

BOULDER COUNTY.

At the Lucky Star R. A. Duncan reports that in sinking 100 feet enough ore was taken out to pay $2500 over the expenses of the work.

CLEAR CREEK COUNTY.

Georgetown reports that the Doric gold mine has started up again and will be worked under the management of an English expert, who has been sent over here to take charge of the development work by the London shareholders.

An extensive power plant is being introduced at the Griffith mine by the Annetta Co.

The Sedgwick mine, on Covode mountain, is reported to yield values of $35 per ton in gold, silver and copper. A. Harley, one of the principal owners, is in charge of operations.

The Silver Glance mine, Democrat mountain, is under bond and lease to G. Berg & Co., with whom is associated J. H. Robeson, manager Pelican Dives and Seven-Thirty mines at Silver Plume.

B. F. Kelly, at Georgetown, has a tunnel scheme. The idea is to run straight into Democrat mountain 6000 feet, cutting in its course many lodes. The first vein will be cut within 300 feet of the mouth of the tunnel, and it is locally calculated that from that point on there is scarcely 100 feet on the line that is not cut by a vein. The ore first encountered is gold, silver and lead, running about $8 in gold, fifteen ounces in silver and a percentage of lead. Near the proposed terminus of the tunnel the ore is high grade silver, many of the mines having ore which runs 400 ounces a ton. The advantage to these silver mines is that, owing to the decayed condition of their workings, new shafts are inoperative if worked from the surface, and the tunnel can be run the entire 6000 feet about as cheaply as a single shaft can be sunk to the depth of the tunnel. A feature of the contract with the property owners is that, if for any reason they do not see fit to work veins on their property that may be cut by the tunnel, Mr. Kelly has the right to work these veins on a five-year lease. In connection with the tunnel scheme it is the intention of Mr. Kelly to construct a mill at the mouth of the tunnel for the treatment of the low grade ores that may be encountered. This enterprise will not be started until the tunnel has cut a sufficient number of ore bodies to guarantee a sufficient supply of ore for a large plant.

The Wilcox tunnel, owned by the Miami M. & M. Co., has been sold to the Big Five M. Co.; W. D. Daniels, Denver, president. The tunnel is now in 2200 feet, and will cut Quartz hill at 2000 feet depth, perpendicular measurement. The Big Five Co. has also bought the Turner water right on Clear creek.

The Monarch M. M. T. T. & P. Co. have bought the Freeland mine and about sixty other claims, and a tunnel site from Clear creek through Trail and Banner mining districts to the Freeland.

The Newhouse tunnel is progressing at the rate of 200 feet per month, and is now in to Old Seaton, over 10,000 feet, with about the same distance to go. The tunnel is 12x12; its destination is the 1900-foot level of the California mine at Nevadaville. The company has acquired the available land opposite the tunnel, lately owned by Hall & Co.

GILPIN COUNTY.

At the new mill at Blackhawk of the Boston & Denver M. & M. Co., the eighty stamps are crushing ore from the Cook, Ridgewood and Gregory properties. An electric motor hauls the ores from the Cook mine to the mill, which is handling 300 tons every twenty-four hours.

An option on the East Notaway mine has been given by Sheriff Mitchell to the proposed purchasers for six months, at the end of which time they are to pay $25,000 and assume the payment of the bond, which calls for $25,000 more in two years.

At the Saratoga mine forty men are employed.

The Kokomo is shipping ore to the Rocky Mountain mill at Black Hawk.

The 76 G. M. & M. Co., through L. E. Curtis, has sold the First Centennial mining property, in Chase gulch, to the Imperial G. M. Co. for $50,000.

GRAND COUNTY.

The Gilsonite Co. are opening deposits at the head of Willow creek. They find a ready market at a good price.

GUNNISON COUNTY.

Spencer reports that the owners of the Gunnison and Standard mines will soon resume.

At Midway the Dale Co. is at work.

At the Elko mill J. P. Smith is in charge, putting in tables of his own invention for concentration.

There is prospect of a smelter at Gunnison City. Citizens have raised $10,000 bonus and donated fifty acres of land, on which are the remains of the old smelter. The Colorado & Southern Railway offer to haul ore for $1 per ton anywhere on their line from the line of the range to the smelter.

LAKE COUNTY.

The Yak tunnel is to be driven to the Forest Queen property, on the summit of Breece hill.

Leadville is to have a mining stock association.

The Penn mines are reported shipping 300 tons a day of siliceous ore carrying bimetallic values.

The Miner says the bad air is being drawn out of the Hummer shaft. In the upper level are streaks of lead ore and large bodies of siliceous ore. It is impossible to carry a candle away from the shaft in the bottom level; but the air pipes have been extended 100 feet into this level, and it will soon be cleared to this point.

PARK COUNTY.

(Special Correspondence).—The Boston G. M. & M. Co., at Black mountain, are pushing work on their Boston tunnel, designed to cross all formations at a depth of 700 feet, and will be driven 1500 feet into Hammond's Peak, with intent to tap a body of low-grade sulphides in No. 5 shaft. An air compressor and machine drills will be installed next month. The property is managed by D. G. Jewett. The tunnel is now in 120 feet. Seven men are at present employed.

Guffey, Aug. 20.

PITKIN COUNTY.

During the year ending July 1 the Argentum–Juniata, at Aspen, produced 48.287 tons, net weight, of regular (shipping) ores, netting $1580.73; 6990.093 tons, net weight, of lease ores, netting $63,384.67; 38,259 tons, gross weight, milling ores, which produced concentrates netting $151,672.56; aggregate net smelter returns for the year, $216,637.96. The average gross value of the ore milled during the year was $7.36 per ton gross, in the mine. For the timbering of stoped ground, development workings, and in timbering repairs, about 500,000 feet B. M. of timber was used during the year, largely in the form of framed sets. The company received $14,344.59 in royalties and charges on lease ores, 22.63% of the net cash returns for lease shipments. The company paid out on these ores, as royalties to lessees, $2287.41, leaving $12,057.81 net income for the year from leased ground.

PUEBLO COUNTY.

J. R. Gorden, register of the Pueblo land office, says that for the first half of 1900 the number of mineral applications show an increase of 33⅓% over the corresponding period of 1899. During July there were forty-four applications for patents.

SAN MIGUEL COUNTY.

(Special Correspondence).—The Butterfly mine and mill and the Terrible mine are now operated by the Butterfly-Terrible M. Co., of which C. Bullock is president, K. Benson vice-president, F. J. Hobbs secretary and D. J. Sayer manager. The upper workings of the mine are at an elevation 1000 feet higher than the mill, a wire rope tramway, 1300 feet in length, connecting the lower Butterfly tunnel with the mill. An upper, intermediate and lower tunnel, crosscutting the formation a distance of 2100, 1010 and 1010 feet, respectively, open three veins—the Butterfly, Ida and Terrible. On the last named vein a vertical shaft sinks 643 feet from the surface, from the base of which a 145-foot crosscut connects with the upper tunnel. The workings on the group aggregate nearly 9000 feet. The ores from the Terrible vein consist of a sulphide, carrying good values in silver and lead. The Butterfly and Ida veins carry a gold bearing ore, which is quite free milling. The mill of thirty stamps and nine Frue vanners is operated by a 6-foot Pelton water wheel; to run the latter two flumes converge at the mill—one conveying water from Lake fork and the other from Wilson creek. Only twenty stamps are now dropping and one vanner is idle. The ore being milled, which in the main comes from the Butterfly and Ida veins, runs from $9 to $10 per ton. Of the values saved about 80% are obtained on the amalgam plates.

Ames, Aug. 24.

(Special Correspondence). — The San Juan G. M. Co. of Milwaukee, Wis., operates the Bessie mine and mill in Alta basin at between 11,000 and 12,000 feet altitude, situated between Telluride and Ophir. The mine is opened through a main tunnel, running northward 1600 feet, which affords access to two north and south veins and two veins trending east and west. The Bessie and Sioux veins, running north and south, are opened by about 1700 feet of drifting, with some stoping. The Montezuma and Baldy veins, trending east and west, are developed by nearly 2000 feet of drifting, with several upraises for stoping. These veins vary in width—perhaps 2 feet would be an average. The ore is siliceous, with very little sulphides, and carries gold and silver. It is conveyed to the mill over a 4200-foot Finlayson tramway line, having twenty-two buckets of 410 pounds capacity each. An electric motor at the mill terminal attaches to the tramway machinery to steady its motion and to stop and start it promptly.

The mill machinery is operated by an electric motor. The ore passes through crushers to two sets 1½-mesh rolls, thence is elevated to automatic sampler, dropping then into ore bins. From the bins the material is fed to an Argall cylindrical drier, thence elevated to three sets of rolls, which grind to 2-mesh, 6-mesh and 10-mesh, respectively. From the rolls it passes through a series of seven revolving screens, graduated to different sizes, the very fine being screened off and carried to the pulp bins by a suction fan, the coarse being returned to the rolls for regrinding. Lime is mixed with the material before grinding to counteract the effect of acid in the ore. The ore, in this finely pulverized condition, is dropped from the pulp bins into cars, by which it is carried to leaching tanks where cyanide solution is applied. There are six leaching tanks, each of 150 tons capacity. A weak solution is forced into the tanks from below by pressure from the storage tanks. After twenty-four hours a strong solution is applied on top of the material in tank, allowing it to percolate through. The solution is then drawn off to the zinc boxes by a vacuum pump.

The zinc slimes, carrying the values, are subjected to the sulphuric acid bath, by which the zinc is dissolved, leaving the gold and silver in precipitate form, the latter being dried, put into crucibles and smelted. Some loss is said to be entailed in the form of coarse gold, which fails to dissolve in the cyanide. To recover it riffles are being put in the sluiceway, through which the refuse is washed down. The mill capacity is about 200 tons per day, though only about 75 tons are being run at present.

The Alta mine is producing about thirty-five tons of ore per day, about thirty tons of this being concentrated at the Gold King mill, the balance being shipped to the smelter. An account of the development of this property appeared in the MINING AND SCIENTIFIC PRESS of the issue of Aug. 11, 1900.

The Gold King mill has forty stamps. Ten of them, with concentrators, operate on Alta ore; the other thirty operate on Gold King ore, which is strictly free-milling, a very close saving being made on the plates. About fifty tons of Gold King ore per day are milled, which averages close to $20 per ton. The latter mine is worked by lessees, to whom the ground is blocked out by the company's manager.

Alta Basin, Aug. 24. WASCOTT.

(Special Correspondence).—The Crown Point lode, on the north side of Ophir canyon, is being worked under lease to Geo. Rohmer, who is shipping about thirty tons of ore per month to the Durango smelter. The main values in the ore are gold and silver, carried in an iron and manganese base, the smelters allowing about $2 per ton for the manganese, bringing up the entire value to an average of $20 per ton. Packing the ore to the railroad and freight to Durango costs him $4.25 per ton.

The Suffolk mine and mill are being operated this year by the Suffolk Co., under the management of W. J. Scoutt. The mill is not running full capacity, putting through only about 100 tons of ore per month, which, however, is high grade, the saving being on the plates and in concentrates.

The Statsbury, located in Statsbury basin, belongs to New York parties, who are developing the property. Recently a test run of their ore was made at Suffolk mill.

The Deadwood and Nevada group of seven claims, located on the northern slope of Yellow mountain, is in control of the Milwaukee-Ophir M. Co., of which Geo. R. Dolf is manager. This company has a bond and lease on the old Nevada lode and have acquired the claims covering the Deadwood and Mt. Vernon veins and the Deadwood tunnel site. The Nevada lode was extensively worked in earlier days. It trends northeast and southwest and was opened through three crosscut levels, 60 to 100 feet apart, drifts on the vein at each level having been run several hundred feet and the ore stoped out between levels and to the surface. In these old workings the vein is said to have been from 4 to 5 feet wide. The ore on this lode is a lead and copper sulphide, carrying gold, silver and lead values. Present efforts of the company are exerted in driving the Deadwood tunnel to cut the Nevada lode at a point nearly 1000 feet below the old workings and at a horizontal depth of 1950 feet from the entrance. The work has progressed 950 feet, the tunnel being 4½x7 feet, with a drainage flume below the trackage. This tunnel cuts through the Mt. Vernon vein at 175 feet and the Deadwood vein at 400 feet from the entrance. This company is a close corporation, made up largely of Milwaukee people.

The Suffolk cyanide plant, under the management of W. E. Bennett, has just started operating on a dump of 20,000 tons of tailings impounded from the Suffolk mill, which, Mr. Bennett thinks, runs from $3 to $30 per ton. The present plant has a capacity of twenty tons per day. If the first run of thirty days prove as successful as anticipated the plant is to be enlarged to fifty tons capacity. The cyanide solution is first forced upward through the tank of tailings by pressure, and afterwards poured in at the top. The zinc precipitating boxes are so constructed as to draw off the gold slimes at the bottom.

The Carribeau concentrating mill runs steadily with ten stamps and four tables, there being no amalgamating plates. About twenty-five tons of ore per day are reduced to five and six tons of concentrate. The values are gold, silver and lead, carried in a copper, iron and lead sulphide. The tailings from this mill are being impounded. WASCOTT.

Ophir, Aug. 25.

(Special Correspondence).—The Telluride Power Co. has commenced the construction of an electric power plant near this place, which will be practically a duplicate of their plant at Ames. The generators at the new plant will be run by water power, to supply which about 6 miles of pipe line will be laid.

Vance Junction, Aug. 25.

The Butterfly-Terrible mine, at Ophir, for the three months ending Aug. 1 produced $15,946.43, the ore running $18 per ton in gold and silver. The vein is vertical. The average output is about forty tons per day. The company is also engaged in development work.

SUMMIT COUNTY.

At Kokomo Mr. Robertson has a lease and bond on the Robert Emmett in Mayflower gulch.

The El Dorado mine, Robinson, is shipping ore.

The Rattler is taking out ore which runs 600 ounces silver per ton.

TELLER COUNTY.

At the Independence mine Supt. Stark has resigned. Two foremen have been discharged and replaced with men from Silver Plume. The duties of Supt. will for a time be discharged by H. A. Shipman, resident manager. Mr. Stark will take the general superintendency of the John A. Logan and American Eagles; W. S. Stratton owner, Mr. Emerson manager.

The Union G. M. Co. has sold its Bull hill properties for $350,000.

The Six Points G. M. Co. has sold the Six Points claim to F. Rawley for $120,000. A meeting of the stockholders has been called for ratification September 4th.

The Moon-Anchor Con. G. M., Ltd., of London will meet on the 22nd inst. to increase the capitalization from $600,000 to $1,250,000, divided into 1,250,000 shares, par value of $1 each. The new company expects to start with about 250,000 shares and $100,000 cash. The reorganized Moon-Anchor Co. will own the present holdings on Gold hill, the Zeolite and Bloomington lodes on the east side of Battle mountain and the Surplus fraction. The officers believe that they will find their ore bodies richer and permanent when granite is reached, which is supposed to be between 100 and 200 feet deeper.

IDAHO.

The values of mines and mining improvements, as given by the County Assessors, are as follows.

County.	Value.
Bingham	$4,000
Blaine	88,250
Boise	115,119
Cassia	1,625
Elmore	85,000
Idaho	61,720
Kootenai	12,000
Lincoln	4,950
Owyhee	234,200
Shoshone	592,350
Washington	14,997
Total	$1,214,211

The number of quartz mills is 79, of which Boise has 19, Elmore 17, Idaho 11, Kootenai 1, Owyhee 14 and Shoshone 17; of concentrators Idaho has 6, Kootenai 1 and Shoshone 16. Shoshone reports 1 sampler and Washington 2 smelters.

BLAINE COUNTY.

Near Hailey, C. W. Courtney, Supt. Liberal and Maggie May group of twelve claims, Little Smoky district, has a vein 18 feet wide, ore assaying $8.

The Hailey Times says the Jumbo group of mines has passed into the hands of men who are able and willing to develop it. It has been purchased by D. Mackenzie of Burlington, Vt., and H. L. Hollister of Boston, who have associated themselves with men of Scranton, Pa., and organized a close corporation; capital stock, $250,000; merely for convenience, as there are no shares for sale.

BOISE COUNTY.

The Statesman says that the Elkhorn mine is practically sold to S. Gundaker and associates for $17,000, although the deal has not been definitely closed, as Mr. Gundaker's bond still has about six months to run.

H. Edlin, who has been Supt. Iowa mine for the War Eagle Con. Co. at Quartzburg, has turned over the works to his successor, Mr. Du Forrest of Denver. He says there is plenty of ore in sight; it is of good paying quality.

OWYHEE COUNTY.

Mining is to be resumed at the Cumberland. The new machinery is all in.

SHOSHONE COUNTY.

At Burke the Hecla M. Co. has declared a dividend of $20,000. Two years ago this property was but a prospect; shares went begging, 5000 being at one time transferred to satisfy a bar bill.

The new tunnel at the Custer is to be 3000 feet; it was started 800 feet above the level of the creek, is now in 2000 feet and 700 feet more will carry the work to a point below the old workings with an increased depth of fully 1000 feet. Some rock from the face of the tunnel shows sulphurets and concentrating galena.

Osborn reports Blake Bros. shipping ore from the Yankee group on Big creek, rich galena yielding average amount of lead and 150 ounces silver to the ton.

MICHIGAN.

HOUGHTON COUNTY.

No. 7 shaft at the Quincy mine is timbered to the bottom, a depth of 4300 feet. No. 8 shaft is down 500 feet. The Quincy's compressors can furnish power to 225 drills. Next month the new stamp mill will be ready to crush 3000 tons of rock daily. A pipe line a mile long is being laid to furnish power from No. 6 shaft compressor plant to No. 8 shaft. The new engine at No. 7 shaft of the Quincy is capable of working to a depth of 8000 feet.

MONTANA.

CASCADE COUNTY.

Near Neihart the Hegener mine has sunk a two-compartment shaft, vertical the first 30 feet, inclining below 157 feet. The ledge contains galena, copper pyrites and brittle silver.

GRANITE COUNTY.

The new electric power plant of the Granite Bimetallic Con. M. Co., at Flint Creek Falls, constructed at a cost of $100,000, is in successful operation, thereby largely reducing expenses, heretofore a retarding influence in the financial operation of that corporation. P. A. Fusz, president and present manager, and Mr. Porter of the Hope M. Co. are at Philipsburg.

JEFFERSON COUNTY.

The Belle mine at Wickes has been leased and bonded to Church, Sutton & Hermann.

LEWIS AND CLARKE COUNTY.

A Helena special says: "Thieves stole $5000 worth of gold from the assay office of the Jay Gould cyanide plant. The gold was in a retort and represented a two weeks' clean-up of R. A. Harsh's cyanide mill. The amalgam was red hot when taken from the office, having just come from the furnace."

F. A. Heinze has taken a lease and bond on the Barden copper property, near Helena, for $25,000. A shaft is to be sunk 500 feet.

MADISON COUNTY.

The Pony Sentinel says A. W. Tanner of Red Bluff has commenced work again on his Pole creek placers. He did not commence work where the expert placer miner of Toronto left off, but intends to leave the latter's work as a monument to the stupidity of a company in sending a tenderfoot to take charge of a mammoth enterprise. W. Tarleton is now foreman for Mr. Tanner.

At the Red Bluff mine is a new gallows-frame that cost about $4000. A 60-ton concentrator will be erected.

At the Red Chief excavating for a 30-ton concentrator is pushed. The crusher will be a Griffin three-roller centrifugal mill, with plates; the concentrators used will be Wilfley tables.

E. W. Riggs is operating the South Fork mine, on Mill creek, near Sheridan. Development consists of a shaft 320 feet in depth and a 225-foot tunnel. The ore averages $25 a ton.

NEVADA.

DOUGLAS COUNTY.

The Little Bonanza mine, at Delphia, is now running with an output of twelve tons of rock per day from a 5-stamp quadruple discharge mill.

ELKO COUNTY.

All the stock of J. S. Lakin in the properties of the Dexter & Tuscarora G. M. Co. at Tuscarora is sold to Col. S. B. Milner for $120,000.

LINCOLN COUNTY.

A Boston company, F. W. Dunn local manager, is completing its 20-stamp mill at Searchlight. El Dorado canyon is to have a 50-stamp mill.

STOREY COUNTY.

A consolidation of Comstock mining interests under one management is projected.

NEW MEXICO.

GRANT COUNTY.

The Hanover Co. has bought the Emma property at Fierro. A steam hoist has been erected, a pump put in operation and timbers are being framed for the shaft, which will be sunk considerably deeper.

W. H. Seamon has visited the Dundee mine, Lordsburg district, owned by the Orion M. Co., headquarters El Paso; report indicates minimum width of vein 10 inches, maximum 30 inches; ore averages $3.50 silver, $3.20 gold and $7.20 copper.

The Mineral Mountain M. Co., Chicago, S. S. Winn manager, is reopening five claims 3 miles from Stein's Pass.

OREGON.

CURRY COUNTY.

J. B. Burns, operating a quartz mine on Mule mountain, wants a 5-stamp mill, as he thinks he is throwing away $40 a ton.

GRANT COUNTY.

At Granite the Magnolia and Little Giant mills, idle since January, are to be started up. Manager Bley of London, who represents the English owners, is at Granite. The claims against the Little Giant Co., exclusive of the unpaid portion of the purchase price on the Magnolia, aggregate $11,000. There is still due $25,000 on the Magnolia.

JOSEPHINE COUNTY.

W. E. McMartin, vice-president Big Yank M. & M. Co., is in San Francisco regarding the bonding of the property in Galice mining district. The ledge has been cut at a depth of 100 feet by a crosscut tunnel, which exposes a streak carrying copper and gold.

The strike in copper made by H. C. Booth is on Little Pickett creek, near Merlin. There are two parallel veins. The assays give a return of $12 per ton in gold and 19% copper.

The 12-mile wagon road recently constructed at a cost of $19,000 by the Goldbug M. Co., from Glendale to the Goldbug mines, Mt. Reuben, has been made a toll road.

The ore shoot in the Ashland at the 425-foot level is 170 feet long. The shaft is down 575 feet. Twenty-five men are at work. B. Carlisle is Supt., with General Manager Ingersoll.

UNION COUNTY.

Manager N. J. Jenkins at the Gem mine, near Sparta, says a depth of 460 feet has been attained and levels run 450, 350 and 300 feet in depth. An upraise from the 450 to the 350 foot level is being driven for air. A contract has been let to sink a prospect shaft 300 feet south of all previous workings. Ore bodies are being exposed.

TEXAS.

BURNET COUNTY.

The White Eagle M. Co. at Burnet will send three cars of their ore to Denver to test the different processes of treatment of their ores. They claim to have a vein from 20 feet to 60 feet, which shows values all the way from 8% to 30% copper, and from $3 to $10 gold. It is expected that a plant will be erected by the company to treat its own ores.

UTAH.

JUAB COUNTY.

At Eureka twenty-five men at the Bullion-Beck mine have been drafted.

The Alaska mine shaft at Silver City will be sunk much deeper, and a pumping plant will be put in.

SALT LAKE COUNTY.

It is now inferred in Salt Lake City that the A. S. & R. Co. has modified its plans, and instead of putting up a new million dollar smelter it proposes to put up a $300,000 addition to the Germania smelter.

SEVIER COUNTY.

Near Richfield C. E. Watkins, general manager Boston Placer M. Co., is working gold-bearing bars on the Colorado river. He thinks he has discovered "the long-lost Spanish mine," 25 miles northwest of Richfield. When found the mouth of the shaft was almost covered over with masonry. The shaft is perpendicular 30 feet, then inclines for 25 feet, perpendicular again for some distance, inclines again, and so on. There are ten men at work. They have followed the opening 135 feet. The remains of drill holes indicate that the excavation was made by man. Thousands of stalactites that hang from the walls show that ages have passed since the work was done.

TOOELE COUNTY.

The output of the Con. Mercur gold mines has reached a daily average of nearly 1200 tons of ore on a net valuation of $4 per ton. Its present earnings are in the neighborhood of $140,000 per month. The capacity of the crushers is 2100 tons daily; the output will be increased.

WASHINGTON.

SPOKANE COUNTY.

At Spokane the mining department of the Exposition opens Oct. 2nd.

SNOHOMISH COUNTY.

The Bluebird mine, on Gold mountain, near Darrington, reports that the miners have a vein of chalcopyrite in the lower tunnel.

The Calumet, at Index, is again being operated; C. Osner is manager. The Calumet is a copper proposition principally, although there are some gold and silver values in the ores. The ore is a chalcopyrite, average 15%. The Calumet is 4 miles northeast of Index. The Calumet aerial tram, capable of transporting twenty tons per day, was completed last January, and cost $5000.

At Silverton the 45-tram will be cut in two at the summit, with a reloading station at that place.

At the Imperial Supt. Swinnerton is sacking ore.

WYOMING.

CARBON COUNTY.

The men buying the Ferris-Haggerty copper mine at Battle Lake for $2,000,000 telegraphed to learn if the death of President Ferris would delay negotiations. To obviate unnecessary delay the will of Mr. Ferris was filed Aug. 22d and the deal for the mine will be closed Sept. 15.

BRITISH COLUMBIA.

Grand Forks reports that the B. C. Co., Summit Camp, have bought the water power at Cascade. Power is being developed by the Cascade W. & L. Co. The falls are capable of developing 10,000 H. P.

J. P. Graves has a four-fifths interest in the R. Bell mine, Summit Camp; purchase price, $50,000.

In the portion of the Porcupine district, which the provisional boundary arrangement transfers from Alaska to Canada, are about half the placer mines of the district, which are in all yielding some $250,000 of gold per annum at the present. Henry Bratnober says there are gold quartz indications and valuable deposits of copper-gold. If the provisional boundary arrangement should be confirmed, British Columbia will receive an addition of new mining country, small in area, but apparently rich in gold and copper.

The fire loss at the Dundee concentrator at Ymir is set at $11,000.

A. Laidlaw of the Standard Copper Co. has bought a smelter site on Boundary creek, 3 miles below Greenwood. A plant for a 200-ton hot and cold blast standard pyritic smelter is under construction by the Denver Engineering Works Co. of Denver, Colo.

At Grand Forks the Granby smelter

was blown in on Aug. 21st. It has a daily capacity of 500 tons; water power will be used. The smelter will use 15,000 miners' inches under a head of 45 feet. The dam is 175 feet across the top, 75 feet from heel to toe on the bottom, built of 12x12-inch sawn timbers, filled in with rock. The flume is 12x6 feet—a mile long. Power was offered the Granby Co. from Bonnington falls, on the Kootenai river, for $75 per horse power per year, but the company will generate its own power.

A spur track 2½ miles long runs from the main line to the north end of the smelter works. The power house is 1000 feet from the smelter buildings and 100 feet below them. The main power with which the blowers, sampling works, etc., will be driven is to be created by a duplicate set of 16-inch turbine wheels operating under an effective head of 45 feet. These wheels are connected with the flume by a steel intake pipe 4 feet 7 inches in diameter. Both are directly connected with one Westinghouse rotating arm, alternating current generator. Another wheel is belted to a pump with a daily capacity of 750,000 gallons. The pump will furnish water and pressure to granulate the slag as it runs continuously from the furnaces.

The smelter consists of two double-decked, steel-jacketed furnaces, 160x44 inches. The gases pass off from the top in a 4-inch diameter down-take pipe, which is connected with the big flue dust chamber leading to the stack. The down-take of the furnaces is connected with the big flue chamber, 10x10 feet on the inside and 300 feet in length. The stack is 11x11 feet inside measurement and 150 feet high.

The blower room is 50x58 feet, and is 12 feet from the furnace building. It will contain three blowers—one for each furnace and one in reserve. These are connected with the furnace by a 54-inch diameter blast pipe, all blowers being connected with the one main pipe. Each of these blowers is driven by an 88 H. P. variable speed Westinghouse induction motor, belted directly to the blower.

The main sampler building is 64x70 feet, and is surrounded on three sides by ore bins. The ore train, as it comes into the smelter, will be carried by an incline to a series of receiving bins parallel to the front of the sampling works, 23 feet above the floor and 33 feet distant. These receiving bins will have a total capacity of 1000 tons. The bins are filled directly from the cars, which have a bottom dump.

It is intended that the matte shall be shipped after being brought up to 45% or 50% copper. For the present it will go to an Eastern refinery. This shipping matte, after having been cooled, will be crushed in one corner of the furnace building on the furnace floor. This crushed matte will be raised by an ordinary sub-elevator to a special matte sampler. This matte can be sampled automatically or by hand. The lower part contains four bins, holding about one car of matte, and it will contain the matte after it shall have been sampled.

When the works are enlarged it is proposed to put in a matte-converting plant complete and to ship converted copper. A roasting plant will also be installed. For the present, 50% of the ore will be roasted in piles. The treatment rate for custom work will not exceed $5.50 per ton.

GERMANY.

Consul-General Guenther of Frankfort writes: A statement compiled by the imperial statistical office of the mining and metallurgical production of Germany and Luxemburg in 1899 shows the production of some of the more important minerals and metals to have been as follows:

MINING PRODUCTION.

Articles.	Metric tons.*
Coal	101,621,866
Lignite	34,202,561
Iron ore	17,989,665
Zinc ore	664,536
Lead ore	144,370
Copper ore	733,619
METALLURGICAL PRODUCTION, ETC.	
Raw iron	8,117,594
Zinc, in block, etc	153,155
Lead, in block, etc	129,225
Copper, in block, etc	34,626
FURTHER MANUFACTURE OF RAW IRON.	
Cast iron of second fusion	1,720,443
WELDED IRON AND WELDED STEEL (SCHWEISSEISEN).	
Blooms and rails	78,904
Finished manufactures	1,103,740
CAST IRON AND CAST STEEL (FLUSSEISEN).	
Ingots	456,815
Blooms, billets, sheets, etc.	1,042,597
Finished manufactures	4,791,022

* 1 metric ton = 2204.6 pounds.

MEXICO.

Oasis: In the San Miguel country, 35 miles northwest of Pesqueira station, on the Sonora Railroad, is a scene of great activity. The Melzcer M. Co. is pushing development work upon the Copete mine; J. L. Giroux of the United Verde is working upon his Sultana property; Mills & Strom are developing their Colorado mine.

Personal.

W. B. DEVEREUX has returned from Salt Lake City to Boston.

W. P. HAMMON has returned from Plumas Co. to Oroville, Cal.

JOS. R. LUXON has been appointed Supt. Stratton's Independence, Colorado.

W. S. KEYES of San Francisco is in Rossland, B. C., as expert in a mining case.

ALGERNON DEL MAR is in southern California examining mines for Eastern parties.

G. S. RITCHIE of San Francisco is examining mining property in northern Idaho.

W. A. CLARK is at Jerome, Arizona, and plans a large cyanide plant for the United Verde.

ARTHUR WINSLOW, general manager and Supt. U. S. & B. C. M. Co., is visiting Telluride, Colo.

BENEDICT CROWELL of Cleveland, Ohio, is visiting his mining property at Grant's Pass, Or.

E. H. BENJAMIN, secretary California Miners' Association, has returned from Calaveras Co., Cal.

I. C. MILLER of Rawlins has been elected president Ferris-Haggerty Copper M. Co. of Wyoming.

WILLIAM MCMILLEN of Nevada has been appointed inspector of surveyors general and local land offices.

L. F. J. WRINKLE has been appointed Professor of Mines and Mining Engineering at the Nevada State University.

B. C. PEYTON, late Supt. California Powder Works, has returned to San Francisco from Carlsbad, Germany.

F. PARRISH is now manager B. C. M. Co., Greenwood, B. C., and is raising an average of 100 tons of copper ore daily.

J. R. RYAN, Supt. Comstock Pumping Association and of the Con. Cal. & Va. mine, has returned to Virginia City, Nevada.

THE Mineral Mountain M. Co. has appointed C. W. Maxson its New Mexico agent, with headquarters at Lordsburg, N. M.

JOHN W. FLEMING of Silver City, New Mexico, six years U. S. coal mine inspector for New Mexico, has sent his resignation to Washington, D. C.

T. TRAFFORD WYNNE, representing the Touzdou & Janson Mining Engineering Co. of London, is investigating the mineral resources of Mexico.

MRS. E. C. ATWOOD, treasurer International Mining Congress, Empire, Colo., says the June, 1901, meeting at Boise, Idaho, will be more of a success than the last one.

LIEUTENANT HERBERT DEAKYNE of the U. S. Debris Commission, and Hubert Vischer, deputy commissioner and engineer, are at Marysville, Cal., looking over the projected barrier work.

SUPT. MCWILLIAMS will discharge the duties formerly devolving upon David Keith, whose other engagements have compelled him to relieve himself of the management of the Anchor mine, Park City, Utah.

W. ROBERTSON, British Columbia provincial mineralogist, is at Atlin holding an examination of intending assayers to admit those qualifying to practice their profession in British Columbia, Atlin applicants for assayers' certificates being thus saved the cost and trouble of a voyage to Victoria.

COLORADO'S LABOR COMMISSIONER, J. T. SMITH, has returned to Denver from an extensive trip over the mining sections and says that he found that there are about 31,000 men employed in the gold and silver mines of the State. Their wages run from $2.50 to $3.50, and the proportion of men employed at the various wages makes an average wage of $2.90.

Catalogues Received.

THE most striking and unique trade catalogue received this year comes from Arthur Koppel, 68 Broad St., New York City. It is 10x14 inches and has a front-page illustration that is striking in every sense of the word. The contents are cosmopolitan in their character, being a description in all the principal European languages of the mining appliances, more especially the Koppel transportation devices, made and supplied by Arthur Koppel of Berlin. Finely engraved views of nearly every part of the world are presented, portraying the operation in Europe, Asia, Africa and America of the Koppel tramway system. The all-embracing idea of such a trade album has been well carried out in the execution.

CATALOGUE NO. 4, third edition, and Catalogue No. 10, third edition, published by the Risdon Iron Works, San Francisco, are received. No. 4 treats of the Risdon patent tangential wheel, which is elaborately illustrated and specifically described; there are ten solid pages of figures, giving horse power, miners' inches, cubic feet water per minute and revolutions per minute of the Risdon water motor and water wheel, based upon a power efficiency of 85%. There is besides considerable practical information of value to users of water everywhere. No. 10 is entirely devoted to detailed illustrated description of the pumping machinery made by this firm, including some newly patented valve mechanism, which, like other devices, is illustrated in sectional detail. The usual general tables and additional technical formulæ are appended. The outside back cover gives a good view of the new Risdon Iron Works ship building plant. The Risdon now copyrights its catalogues. The entire series comprise seventeen handsome technical treatises on subjects connected with all forms of mine work.

Books Received.

"The Metallurgy of Lead," H. F. Collins: octavo, pp. 368, with numerous illustrations. This is a companion volume to "The Metallurgy of Silver," by the same author, received and reviewed some months ago, and is of equal value. Being of later date than Hoffman's—the latest edition of that work to hand being dated 1894—it contains considerable up-to-date information. It is edited by W. C. Roberts-Austen, and goes at considerable length and with great detail into Australasian practice in smelting and desilverization. The book is a decided addition to metallurgical literature, and, judged by the criterion of fitness, should have considerable sale. It is published by Chas. Griffin & Co., Ltd., Exeter St., Strand, London, England.

List of U. S. Patents for Pacific Coast Inventors.

REPORTED BY DEWEY, STRONG & CO., PIONEER PATENT SOLICITORS FOR PACIFIC COAST.

FOR WEEK ENDING AUGUST 21, 1900.

656,383.—BOX PRINTING MACHINE—J. F. Ames, Portland, Or.
656,498.—PICK—W. P. Bevington, Escondido, Cal.
656,596.—ARTIFICIAL TOOTH—R. E. Campbell, S. F.
656,395.—LEACHING ORES—E. H. Dickie, Bodie, Cal.
656,245.—PADLOCK—J. T. Dufau, S. F.
656,249.—MANHOLE OPENING—R. Herman, S. F.
656,405.—HARNESS SUPPORT—W. R. Hewitt, S. F.
656,581.—WATER GATE—W. H. Kiler, Pomona, Cal.
656,415.—SPREADING AND TRUING DRILLS—D. G. Morgan, Quartz, Cal.
656,418.—DRAWING STEAM BEER—J. O'Connor, S. F.
656,374.—ROTARY BRUSH—W. H. Robinson, Alameda, Cal.
656,484.—CARBURETOR—J. E. Shearer, Chico, Cal.
656,331.—WATER PURIFIER—H. Stillman, Sacramento, Cal.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

LOCK.—No. 655,921. Aug. 14, 1900. P. V. Cornils, San Francisco, Cal. This invention relates to improvements in locks for doors, and its object is to provide for a compact lock mechanism which is containable within doors having but little thickness. It comprises mechanism by which the bolt may be prevented from moving except by the use of a key; means by which the outside and inside knobs may be connected or disconnected at will, and the bolt prevented from moving over from its locked or unlocked position. The knob shanks are independent and act upon the spring-pressed slidable locking bolt which they meet transversely to its line of travel. One of the knob shanks has a hollow sleeve with a lug to engage the lock bolt, and the other has a head fitting and turnable in the sleeve with a transversely slidable spring pressed block adapted to engage the sleeve when projected. Spring-pressed tumblers are slidable longitudinally in the shank and through an opening in the slidable block, said tumblers being normally held in position to retain the block within the head. Slots are formed transversely in the tumblers and the key has bits so formed as to move said tumblers through the sliding block until the transverse slots are in line therewith. A spring then projects the block to engage the surrounding sleeve and a slot or channel is formed in the key shank, and a pin in which the key fits, over which the slot is slidable when the key is properly introduced.

CLUTCH.—No. 655,906. Aug. 14, 1900. Joseph A. Moore, Paauhau, Hawaii. This invention relates to a device for driving and interrupting the movements of apparatus requiring such intermittent movements. It is especially designed for the transportation of sugar cane and the like from points where it is collected to the crushing rolls, but is also useful in any connection where similar conditions occur, and in which it is at times desirable to temporarily interrupt the travel of the apparatus. It consists of a drum fixed upon the shaft to be driven, a driving wheel, a friction wheel loosely turnable upon the shaft contiguous to the ends of the drum, a rope having its ends connected respectively with the driving wheel while the intermediate portion is loosely coiled about the drum. A frictional band is employed and means by which it is tightened about the wheel so that the rope is tightened upon the drum, and motion transmitted to it and the shaft. Guides extend from the driving wheel paralled to and in proximity with the surface of the drum whereby the rope is retained in position.

DEVICE FOR DRAWING STEAM BEER.—No. 656,418. Aug. 21, 1900. James O'Connor, San Francisco, Cal. This invention relates to an apparatus which is designed for drawing liquids under pressure, such as steam beer, etc. It consists of connections between one or more casks and a distributing chamber and connections between said chamber and a cylinder containing a piston which is reciprocable within the cylinder, so that when beer is admitted into the cylinder, the piston will be moved toward the opposite end until the desired amount of beer has been admitted, which is shown by a suitable recording device. The beer is drawn from the cylinder through a discharge cock, and the gas in the beer is so diffused and caused to escape so that little or no foam results when it is drawn from the cylinder. The second cylinder in line with the first contains a piston, a common rod connecting the two pistons so that they move in unison. A four way cock is interposed between the cylinders and the water under pressure is brought through this cock and allowed to enter the second cylinder while the beer is entering the first and the cock is then turned to allow the water to escape from the second cylinder, and to enter the first cylinder so as to return the piston to its normal position after the beer has been drawn.

Commercial Paragraphs.

THE Vulcan Iron Works of San Francisco has about completed the iron work at the Nevada county, Cal., courthouse.

THE contract for the erection of the Grand Encampment, Wyo., smelter is let to the Allis Machinery Co. of Milwaukee, Wis.

THE Weber Gas & Gasoline Engine Co. have sold a 10 H. P. motor to the Oro Verde M. & M. Co. at Yankee, Colo., to drive the air compressor and for lighting purposes.

ON September 1, 1900, the Edw. P. Allis Co., Milwaukee, Wis., discontinued their office at Butte, Mont., and established a branch office at Spokane, Wash., 110 Mill street, in charge of H. V. Croll.

THE Risdon Iron Works of San Francisco have been granted by the harbor commissioners space on the water front adjacent to the property of the works for a large floating dry dock. With the recent acquisition of the former Pacific Rolling Mills, the Risdon Co. is coming into position to enter the shipbuilding field on a large scale.

Recently Declared Mining Dividends.

Hecla M. Co., Idaho, $20,000	Sept. 5
Union G. M. Co., Colorado, 25 cents per share	Sept. 1
Gemini M. Co., Utah, $10 per share, $50,000	Sept. 1
Yreka M. & M. Co., California, $5 per share	Sept. 1
Acacia M. Co., Colorado, 1 cent per share, $15,000	Sept. 15

Latest Market Reports.

SAN FRANCISCO, Aug. 30, 1900.

SILVER—Per oz., Troy: London, 28⅜d (standard ounce, 925 fine); New York, bar silver, 61⅜c (1000 fine); San Francisco, 61⅝c; Mexican dollars, 49⅝c.

Shipments of silver to Europe during the past two or three months have been exceptionally heavy. The demand has been credited to the trouble in China. A large quantity of the metal will be required for the payment of foreign troops stationed in the Far East.

The London Financial Times, in commenting on the British Board of Trade returns, says: "The bullion movements are worth a passing reference. For the month of July the imports of gold and silver declined from £5,159,000 to £2,446,000, while the exports increased from £1,621,000 to £2,134,000. For the seven months there was a decrease, in round figures, of £7,000,000 in imports, and of nearly £5,000,000 in exports. The principal shrinkage is, of course, in the imports from South Africa, which have dwindled from £11,224,000 to £210,000, while the bulk of the exports went to France, Germany, Mexico, South America and British India, a large increase in the shipments to the last-named country being particularly noticeable. On the other hand, hardly any bullion was dispatched to the United States, notwithstanding the heavy exports of merchandise from that quarter, a fact which tends to show that we are paying for our American purchases by other methods than by cash, and we imported from that country £8,720,000 worth of bullion, as against £7,201,000 in 1899 and £4,891,000 in the previous year."

COPPER.—New York: Lake, 1 to 3 casks, 16.87½ cash; carload lots, 16.62½; Electrolytic, 1 to 3 casks, 16.75; carload lots, 16.50; Casting, 1 to 3 casks, 16.62½; carload lots, 16.37½. San Francisco: 17. Mill copper plates, 20c; bars, 22@23c.

LEAD.—New York, $4.35; Salt Lake City, $4.15; St. Louis, $4.20; San Francisco $5.00, carload lots; 5½c 1000 to 4000 lbs.; pipe 6¾, sheet 7½, bar 6c. London, £17 10s.

One year ago zinc ore's top price was $45 a ton and lead ore was $27 per 1000 pounds. Last week's prices were $29 and $23.50. The high prices paid for zinc ore a year ago served as a stimulus to mining in the Missouri–Kansas district and many mines were opened up and worked profitably then that have been since abandoned.

SPELTER. — New York, $4.10; St. Louis, $4.05; San Francisco, ton lots, 5½c; 100-lb lots, 5¾c.

ANTIMONY.—New York, Cookson's, 10½c; Hallett's, 9½c; San Francisco, 1000-lb lots, 12c; 300 to 500 lbs., 13@14c; 100-lb lots, 15@18c.

IRON.—Pittsburg, Bessemer pig, $16; gray forge, $14.50; San Francisco, bar, per lb., 2¾c. in small quantities.

The total exportation of pig iron from the United States during the first seven months of this year amounted to 89,810 tons, against a total of 162,936 tons for the same period a year ago.

STEEL.—Bessemer billets, Pittsburg, $18.50; sheet bars, $23.50; San Francisco, bar, 7c to 12c per lb.

QUICKSILVER. — New York, $50.00; large lots: London, £9 5s; San Francisco, local, $48.50 ℔ flask of 76½ ℔s.; Export, $45.50.

A Nome, Alaska, correspondent says: "I saw quicksilver, that sold at $1 per pound at Seattle just before we left, sell here for 45 cents," another case of oversupply.

MAGNESIUM.—New York, $3.00 ℔ ℔.; San Francisco, $4.00.

ZINC.—San Francisco, 5½c; slab, 6c; bar, 7¾c.

SOLDER. — Half-and-half, 100-℔. lots, 21c; San Francisco, Plumbers', 100-℔. lots, 17¾c.

BABBITT METAL.— San Francisco, No. 1, 10c.

TIN.—New York, pig, $31.75; San Francisco, ton lots, 33c; 1000 ℔s., 33½c; 500 ℔s., 34c; less, 35c; bar tin, ℔ ℔, 40c.

ASSAY LITHARGE.—San Francisco, 10c ℔ ℔, small lots.

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 30c to 35c.

PLATINUM.— San Francisco, crude, $17 ℔ oz.; New York, $18.25; manufactured, $19.50@22.00.

BISMUTH.—New York, ℔ ℔., $1.60 50-℔ lots; San Francisco, $2.50 to $2.75 ℔ lots.

NICKEL.—New York, 50@60c ℔ ℔.

TUNGSTEN.—New York, ℔ ℔., 95c; San Francisco, $1.15.

FERRO-TUNGSTEN. — New York, 37%, 35c; San Francisco, 65c (60%).

FERRO-MANGANESE. — Pittsburg, 80%, domestic, $85, large lots.

POWDER.—F. o. b. San Francisco: No. 1. 70% nitro-glycerine, per ℔., in carload lots, 15¼c; less than one ton, 17¼c. No. 1*, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1** 50%, carload lots, 11¾c; less than one ton, 13¾c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9½c; less than one ton, 11½c. No. 2** 30% carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9, in lots not less than 1000.

FUSE.—Triple tape, $3.60 per 1000 feet; double tape, $3.00; single tape, $2.65; Hemp, $2.10; Cement No. 2, $3.00; Cement No. 1, $2.65, in lots of 3000 feet and up.

CANDLES.—Granite 6s, 16 oz., 40s., 12¼c ℔ set; 14 oz., 40s., 11¼c.

CHEMICALS.—Cyanide of potassium, 98%–99%, jobbing, 32½@34½c ℔ ℔.; carloads, 31@32c; in 10-℔. tins, 40c; sulphuric acid, 66% B, 2c ℔ ℔.; soda ash, $1.60 ℔ 100 ℔s. 58%; hyposulphite of soda, 2¾@3c ℔ ℔.; blue vitriol, 5½@6c ℔ ℔.; borax, concentrated, 7@8c ℔ ℔.; chlorate of potash, 12@13c; roll sulphur, 6c; alum, $1.90@2.00; flour sulphur, French, 2¼@2½c; California refined, 1¾@2c; nitric acid, in carboys, 8c ℔ ℔.; caustic soda, in drums, 3@4c ℔ ℔.; Cal. s. soda, bbls., $1.00; sks, 95c ℔ 100 ℔s.; chloride of lime, spot, $2.50@2.60; nitrate of potash, in kegs, 8c; caustic potash, 10c in 40-℔. tins.

San Francisco Stock Board Sales.

SAN FRANCISCO, Aug. 30, 1900.

9:30 A. M. SESSION.

150 B. & B......17c	200 Mexican 25c
300 Caledonia....40c	400 Sierra Nev..34c
650 Chollar 14c	100 ....35c
800..............13c	100 Silver Hill...36c
400 G. & C.......18c	300 Union Con...17c
150 H. & N......17c	

2:30 P. M. SESSION.

50 Ophir. 49c	100 H. & N.....18c
200 G. & C.....21c	200 Confidence...67c
100 .... 20c	200 Overman....08c
100 B. & B......16c	200 Caledonia....40c
100 C. C. & V.$1 25	

SITUATIONS WANTED.

Position as chief engineer at mines. Go anywhere. Have family. Long experience with mining machinery. R. J. Blackwell, Temescal, Riverside Co., Cal.

WANTED.—SITUATION BY A MAN OF EXperience who is competent to take charge of a gold mine. Understands assaying, surveying, and has business qualifications. Best of references as to character and ability. Address K. C., this office.

WANTED.—SITUATION BY A COMPETENT and experienced millman on concentrators or battery frame. Highest references. Address L. W , 509 Kearny street, room 2, first floor, San Francisco, Cal.

WANTED.—SITUATION AS MANAGER OF producing or developing property. Twelve years' experience in gold mining and milling, copper mining and smelting. Address C. H., care of Mining and Scientific Press.

WANTED.

A Rich Placer proposition, adapted to working by Railroad Steam Shovel, or Dry Land Excavator. Description, with price and terms, to receive attention must be accompanied by reliable reports and references.

Address: EDWARD N. BREITUNG,
MARQUETTE, MICH.

Quicksilver
—FOR SALE BY—
The Eureka Company,
OF SAN FRANCISCO.
ROOM 1, - - 320 SANSOME STREET,
SAN FRANCISCO.

Quicksilver
For Sale in Lots to Suit.
REDINGTON & COMPANY, Wholesale Druggists, 23-25-27 Second Street, San Francisco.

BENJAMIN T. LLOYD,
STOCKS, BONDS AND MINES.
Have immediate customers for well-developed Gold and Copper Properties.
P. O. Box 608, SALT LAKE CITY, UTAH.

WE BUY very rich Ores, Dental Scraps, Tellurium Ores, Mill Wastes, Jewelers' Sweeps, Gold Retorts, Old Iron Retorts, Base Amalgam, Quicksilver, Amalgamated Plates, Gold and Silver, Old Slags.
A. M. DONALDSON & CO.,
ASSAYERS AND WASTE PRODUCT SMELTERS,
1661 Larimer St., Denver, Colo.
Donaldson's Assayers' Slag Hammer { 1 lb......$1.10 / 1 lb. 3 oz. $1.25

THE ERICSSON SWEDISH
TELEPHONES
HAVE BEEN IN USE OVER 20 YEARS.
THEY ALWAYS TALK. GIVE THEM A CHANCE TO TALK TO YOU.
CATALOGUES FREE.
ERICSSON TELEPHONE CO
20 WARREN ST. NEW YORK. N.Y.

WANTED.

WANTED. A COMPETENT AND RELIABLE man to take charge of a gold quartz mine and stamp mill in Sinaloa, Mexico. Must understand assaying and have business qualifications. References as to ability and honesty required. Address C. L. Merry, Pres. H. G. M. Co., Kansas City, Mo.

TO MINING EXPERTS.
WANTED.—A proposition containing magnetic pyrites ($Fe_7\ S_8$ to Fe_{11} to S_{12}).
Address THOS. L. NEAL, Attorney, Lankershim Block, Los Angeles, Cal.

Experienced Coal Miners
can secure **steady employment** either on **contract** or by **day's work** at the **TESLA COAL MINES, Tesla, Alameda County, California.** Good wages guaranteed, also good board. Good climate, and also good accommodations and houses for families.
For further particulars, please apply to the Superintendent at the Mines, or to the Company at 328 Montgomery St., San Francisco, Cal.

WANTED.
An Ore Tramway—Bucket or Jig Back—Cable and Terminals.
Must be in perfect order for use in central Arizona. Length 1700 feet. Grade 24%. Daily capacity 80 to 100 tons. Address "TRAMWAY," 406 Rookery Building, Chicago.

REFRACTORY ORES
WANTED.
1000 TONS or more which will assay $75.00 Gold per ton and over, delivered free of charge at San Francisco, Cal. Correspondence solicited.
C. J. TALLON,
308 MARKET STREET, SAN FRANCISCO, CAL.

SPIRAL SAND PUMPS.
For Pumping Sand, Slimes, Tailings and Crushed Ores.
The Cheapest and Most Durable Pump on the Market. Manufactured by J. H. Frenier & Son.
Represented by M. S. HAUSER,
12 Front Street,.............San Francisco, Cal.

MILL PLANS.
Cyanide, Concentration, Smelting, Sampling.
F. D. BAKER, Mech. Eng., DENVER.

FRED C. MILES,
CISCO, PLACER CO., CAL.
COPPER AND GOLD PROSPECTS.
A GOING GOLD PROPERTY.

FOR SALE.

FOR SALE.--Ten mines, forming a group (gold and silver), with mill site and water power. Acuitapilco Mining District. Ore assaying from 30 ozs. to 100 ozs. to the ton; gold, ½ oz. Address to LIC. ELIAS GALINDO, P. O. Box 26, Tepic, Mexico.

FOR SALE --- Developed Zinc-Lead-Silver Property. Texas.
Two trunk lines. 700 acres. 8100 feet on vein. Splendid concentrating proposition. 1500 feet development. Mine average: Zinc, 17.66%; lead, 9.57%; silver, 7.35 ozs.; gold, .04 ozs. Price, $30,000. Principals only. H. B. RUNKLE, El Paso, Texas.

FOR SALE.
FILTER PRESS.
Johnson, 24-chamber, acid proof, washing Filter Press, 24-in. square plates. Nearly new.
THE S. H. SUPPLY CO.
WRITE FOR CATALOGUE OF MINING MACHINERY AND SUPPLIES.
22nd and Larimer Sts., DENVER, COLO.

WANTED.
Experienced Promoter and Stock Operators
to handle the sale of stock for an oil company. State previous experience.
For particulars, address
C. J. TALLON,
308 Market Street,........San Francisco, Cal.

ASSAY OFFICE
FOR SALE.
An old established and completely equipped Assay Office and Chemical Laboratory, doing a good business in Denver, Colo.; power plant with crushing and grinding apparatus in connection. Good business reasons for selling. Bargain if sold at once. Address Q 641, Mining and Scientific Press.

Notice the Shape of
GLOBE BOX---THE BEST BABBITT.

J. M. HAYDEN & CO.
GLOBE
GRAND RAPIDS MICH.
THE BEST BABBITT.

Send for trial order, Ladle free.
The Globe wire lace makes the smoothest joint, runs the stillest and lasts the longest of any lacing. Sent on approval. Write us for booklet with instructions, etc. J. M. HAYDEN & Co., 58 Pearl St., Grand Rapids, Mich.

WHITEWASHING
—AND—
TREE SPRAYING
PUMPS.
Prices from $4 to $60. Nozzles from 75 cts. to $1.00. Catalogues. WM. WAINWRIGHT, 1411 Jackson St., San Francisco. Telephone Hyde 2986.

WEST COAST OF MEXICO.
WÖHLER, BARTNING Suc's, Mazatlan (Sinaloa), Mex.
Bankers, Importers, Exporters and Commission Merchants.
Representatives and Agents of the principal Mining Companies in the State of Sinaloa and the dependencies of the Pacific coast in the States of Durango, Chihuahua, Sonora, Lower California and Jalisco.
ORE BUYERS AND EXPORTERS. - MINING SUPPLIES.

It's Hard to Tell
all the good points about the
U. S. INJECTOR
in a few words, but our little "ENGINEERS' RED BOOK" goes into details. It also solves 500 or more engineering problems that every engineer will be interested in. Write for one.
AMERICAN INJECTOR CO.,
Detroit, Mich., U. S. A.

P. T. TAYLOR & CO.,
525 MISSION ST., SAN FRANCISCO, CAL.
GEAR WHEELS, GEAR CUTTING,
ALL DESCRIPTIONS UP TO 50 INCHES.
GEARS FOR AUTOMOBILES A SPECIALTY.
FULL INFORMATION BY MAIL.

RISDON IRON WORKS,

SAN FRANCISCO, CALIFORNIA.

Cable: "Risdon's." Code: A. B. C. & Leiber's.

MANUFACTURERS OF

Gold Dredging Machinery

And COMPLETE EQUIPMENT for Placer Mines OUR SPECIALTY.

We build **GOLD DREDGES COMPLETE IN RUNNING ORDER** to handle 2500 cubic yards per day at a cost of 3 cents per cubic yard.

We excavate 50 feet below water, 20 feet above water and handle boulders up to one ton weight.

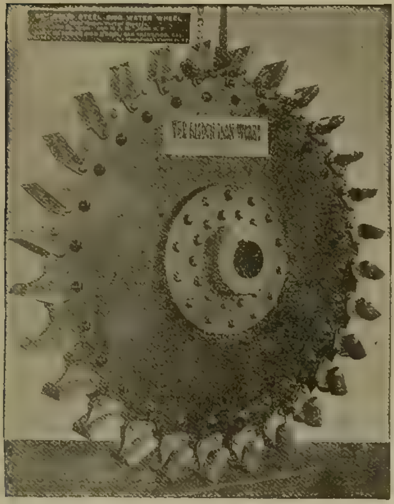
Send for Dredging Catalogue No. 17.

—WE ALSO BUILD—

All kinds of Mining, Milling, Concentrating, Pumping, Air Compressing, Hydraulic, Water Wheel and Hoisting Machinery.

EVANS HYDRAULIC GRAVEL ELEVATORS.

We publish sixteen catalogues. Write for one in the line you are interested in.



TANGENTIAL WATER WHEELS

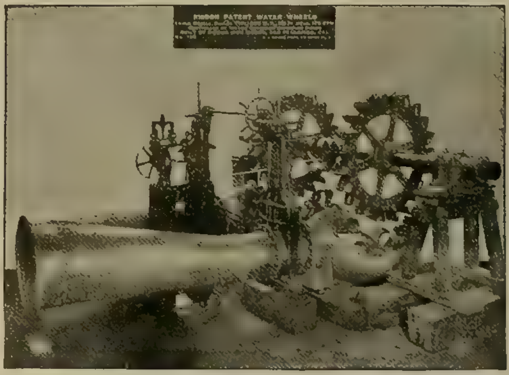
MANUFACTURED BY

RISDON IRON WORKS,

SAN FRANCISCO, CALIFORNIA.

We build Water Wheels for any head and for any power. Complete electrical power generator wheels a specialty. Large wheels up to 50 feet diameter for driving compressors.

SEND FOR CATALOGUE NO. 4.



JOSHUA HENDY MACHINE WORKS,

Principal Office: NO. 42 FREMONT STREET. - - - Works: Corners Bay, Kearny and Francisco Streets, SAN FRANCISCO, CAL.

SPECIAL DEPARTMENT OF

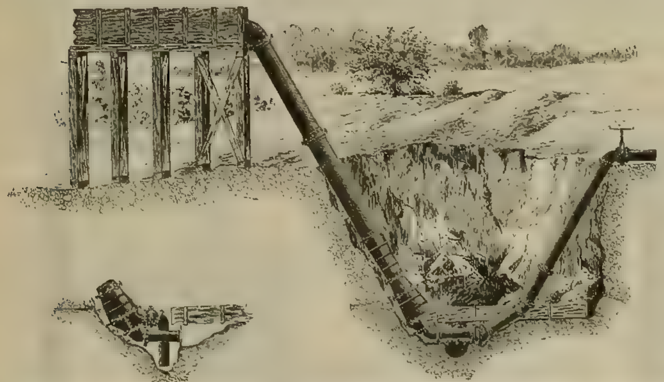
Hydraulic Mining Machinery,

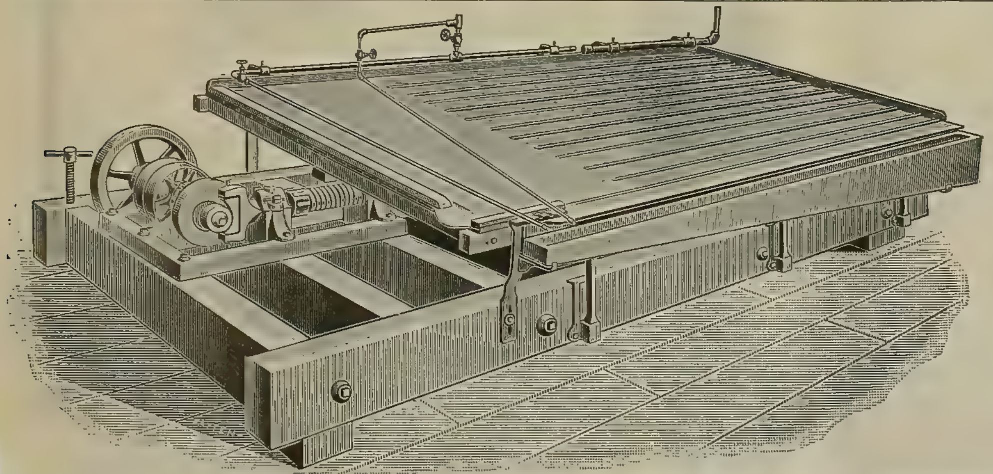
Comprising Hydraulic Gravel Elevators, Double-Jointed Ball-Bearing and Single-Jointed Giants, Sheet-Iron and Steel Water Pipe and Fittings, Water Gates, Etc.

NOTICE.—All other forms of Hydraulic Gravel Elevators are simply poor imitations in construction and infringements of the patents held by us.

The Double-Jointed Ball-Bearing Giants recently perfected and patented by our MR. JOHN H. HENDY are incontestibly superior to any other form of Giants yet introduced.

We are prepared to furnish plans and estimates of cost of any proposed Hydraulic Mining Plants upon any specifications submitted to us, and tender the services of our Hydraulic Mining Engineer to erect and place same in successful operation under guarantee.





WOODBURY'S IMPERIAL CONCENTRATING TABLE.

THE Imperial Concentrating and Amalgamating Table is the latest invention of Mr. Geo. E. Woodbury, whose fame as one of the pioneer concentrator builders is world wide, machines of his manufacture being in general use in every country on the globe where the milling of ores is carried on. This Table is, however, built on entirely new lines, differing materially from either the well-known belt or bumping table types of concentrators.

SIMPLE IN ITS CONSTRUCTION.

SAVES FINE SULPHURETS.

WITHOUT LOSS IN TAILINGS.

MAKES HIGH PRODUCT.

CAPACITY FROM 5 TO 10 STAMPS.

GEORGE E. WOODBURY,

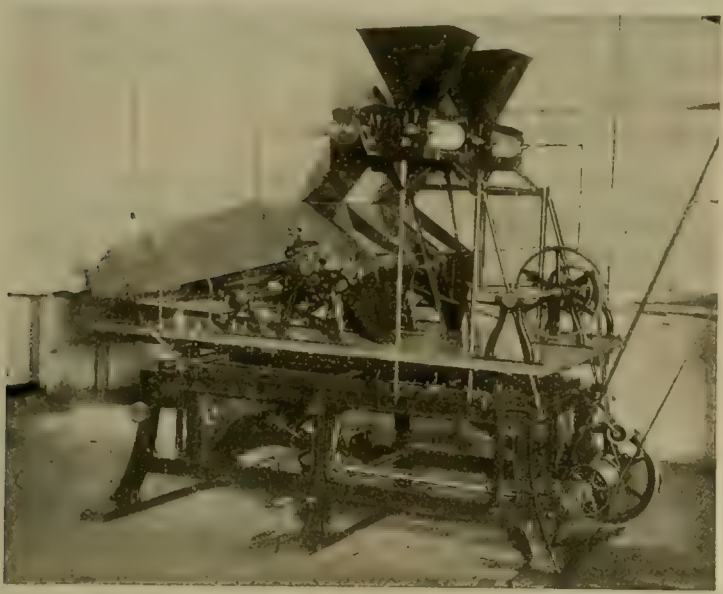
Send for Catalogue. *'Phone Main 1766.* 223 First St., San Francisco, Cal.

DEWEY, STRONG & CO., Patent Agents, 330 Market St., S. F., Cal.

CROWN GOLD MILLING CO.

Manufacturers of the "CROWN" CONCENTRATOR and CROWN ORE SIZER. A dry process of sizing and concentrating ore, sand or gravel. Designed to accord fully with the laws of specific gravity, and especially adapted to refractory ore or localities where there is no water.

The chief claims for the Crown Concentrator are that it occupies less floor space and has nearly four times the capacity of any wet concentrator; that it will concentrate ores containing base and refractory metals that ordinarily slime and carry off values; that it effects a saving of values far above the ordinary methods of concentration.



We have, now in operation, a complete plant for crushing, sizing and concentrating ores by the

Crown Dry Milling Process.

Mine owners desiring tests made can forward us, freight prepaid, not less than 1000 lbs. nor more than 4000 lbs. of sample, for which a charge of $20 will be made. (This amount includes assaying, etc.)

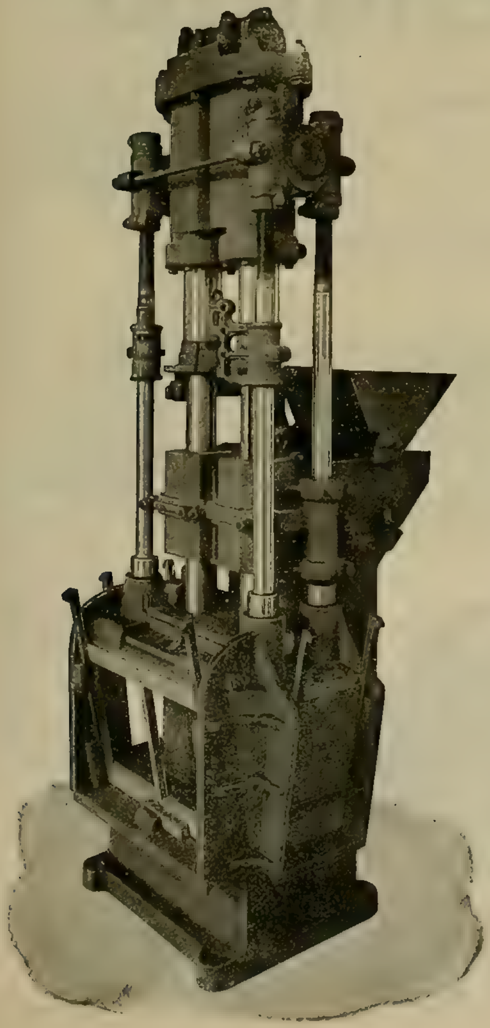
Ores for which this process is adapted and of which consignments are solicited are any concentratable ores, pulps, tailings, or sands, carrying sufficient values, whether they have heretofore been profitably concentrated or not.

⁂

Office,............................230 Post St.
Works,...............23 Stevenson St.
SAN FRANCISCO, CAL.

CATES IRON WORKS.

THE TREMAIN STEAM STAMP MILL



has made many fortunes for its owners. It costs but little money. Can be transported anywhere.

A Money Maker in Nicaragua.

MURRA GOLD MINING COMPANY, NICARAGUA, C. A.
NICARAGUA, June 20, 1899.

GATES IRON WORKS, CHICAGO.—GENTLEMEN:

After ane xperience covering a period of three years with both the first and improved "Tremain Steam Stamp Mill," in every particular I havet ound it perfection—a money maker, and just the thing for a small capital, while companies organized on a large scale would do well to look into its merits.

I find no difficulty in crushing eight tons of ore per day and running on hard ore. This mill should be a winner.

Very truly yours,
[SIGNED] L. W. ADAMS,
General Manager Murra Gold Mining Co.

Eight Years in Operation Without a Cent for Repairs.

GOLDEN P. O., JOSEPHINE CO., COLO., December 23, 1899.

GATES IRON WORKS, CHICAGO.—GENTLEMEN:

Our Tremain Mill is giving us good results, and although being in operation since 1892 has not cost us $1 for repairs, and to-day is making 80 drops per minute with 95 lbs. steam pressure.

The ore we are working at present is soft and we mill in 24 hours, using No. 10 slot screen, 15 tons.

Yours truly,
M. C. DAVIS,
Superintendent Sarah Belle Mines.

Running Under Compressed Air in West Australia.

293 ST. GEORGE'S TERRACE, PERTH, W. A., February 6, 1900.

F. R. PERROT, ESQ., AGENT OF GATES IRON WORKS, PERTH, WEST AUSTRALIA.

DEAR SIR: In reply to your enquiry as to the working of the Tremain Mill on the Burbanks Grand Junction, I would state that at the start we worked this from the boiler supplied by the Gates Iron Works Company, but owing to certain irregularities of the running, which were in a measure due to the intermittent supply of ore and the short time that we were able to run it per day, I finally laid on air piping from my air compressor, a quarter of a mile distant, and used the boiler as an air receiver, with the result that I got an absolutely constant run, which, I believe, averaged about 105 drops per minute, and this was kept up with great regularity and showed a much better return in the treatment of the ore. The usual air pressure in this case was 80 lbs., whereas under steam we were not so satisfied with the result as worked at 100 lbs. By this we were also saved in cost the charges of stoker, fuel and water, and it was worked with much greater cleanliness, and during the whole time the mill was running—which was several months—it never froze up on us or showed any signs of trouble in that direction.

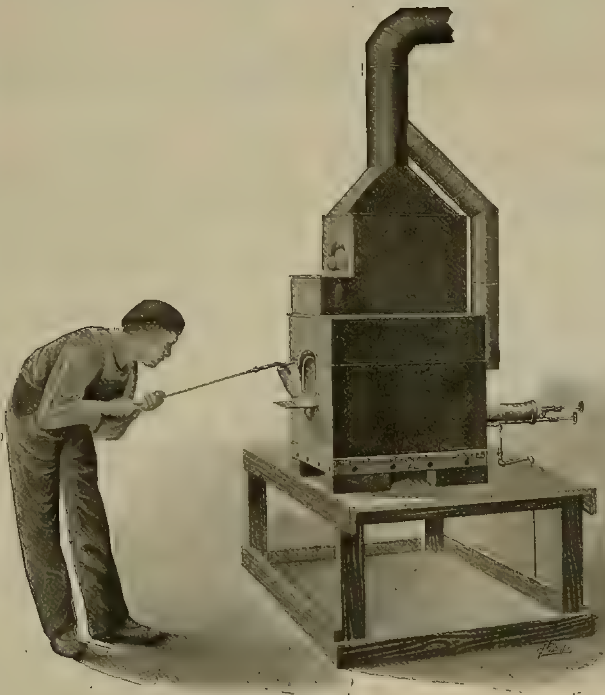
The mill is now temporarily stopped, but when it is again started I shall most decidedly continue the use of compressed air.

Yours faithfully,
[SIGNED] GEO. HEWER.

Send for Catalogue No. 8.

San Francisco Agents:
AMERICAN M'F'R'S ASSOCIATION,
20 & 22 Fremont St.

MAIN OFFICE AND WORKS:
650 ELSTON AVENUE,
CHICAGO.



NO TROUBLE TO OPERATE--A BOY COULD RUN IT.

TO ASSAYERS:

This is our DOUBLE MUFFLE FURNACE, No. 37. The lower muffle is 10x16x6 inches, and will hold eight 20-gramme crucibles. The upper muffle is 6x12x4 inches.

One Cary burner, size 2 1-4 inches, heats both muffles simultaneously.

Starting with a cold furnace and burner, the first batch of eight crucibles can be poured in less than one hour from time of lighting match, and same cupelled in one hour and a half.

When furnace has become thoroughly heated, melts may be made every twenty minutes and cupellations every twenty-five minutes.

Further particulars on request to

F. W. BRAUN & CO.,
Modern Appliances for Assayers,
LOS ANGELES, CAL.

The Copper King, Limited.

Pacific Coast Smelting and Refining Works.

Works:
Seal Bluff Landing,
Cal.

Mines:
Fresno County,
Cal.

Purchasers, Samplers and Smelters
of
Gold, Silver and Copper Ores, and Furnace Products.

Offices:

222 Sansome St.,
San Francisco, California.

32 Old Jewry,
London, E. C., England.

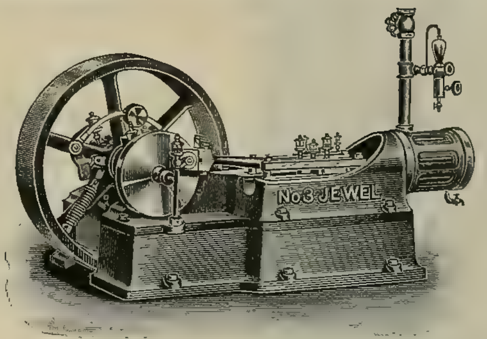
GENERAL ELECTRIC COMPANY'S

Electrical Mining Apparatus

Does away with long steam piping, and of leaking compressed air joints. It saves the miner from the high temperatures due to steam piping, it preserves the mine timbers through the absence of moisture, and costs far less for repairs and renewals than any other system of mine operation.

General Office: Schenectady, N. Y.

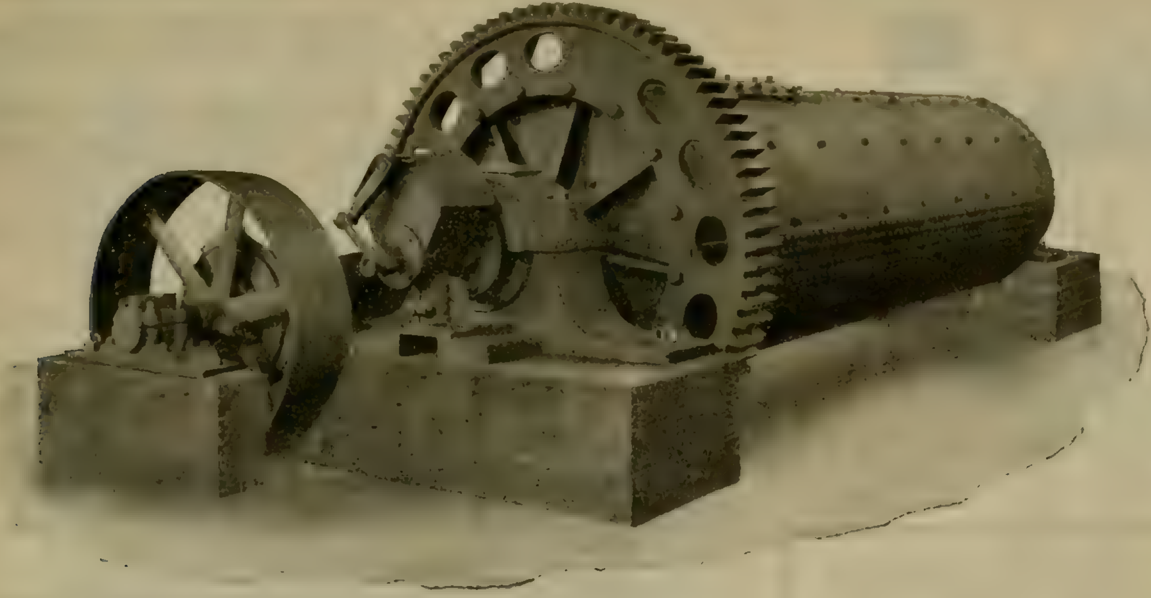
San Francisco Office: Claus Spreckels Bldg. Denver Office: Kittredge Building.



JEWEL ENGINES

A THOROUGHLY RELIABLE, SIMPLE, HIGH CLASS, PERFECTLY GOVERNED AUTOMATIC ENGINE AT A REASONABLE PRICE.

BAKER & HAMILTON,
SAN FRANCISCO, SACRAMENTO, LOS ANGELES.



GATES IRON WORKS.

Sole Manufacturers of the

Clark Patent Tube Mill.

The simplest and most durable machine for very fine grinding of ores either wet or dry.

Catalogue No. 15 describes it.

—Address—

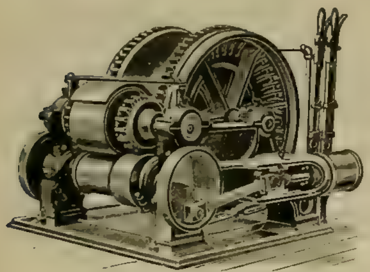
650 Elston Ave., Chicago.

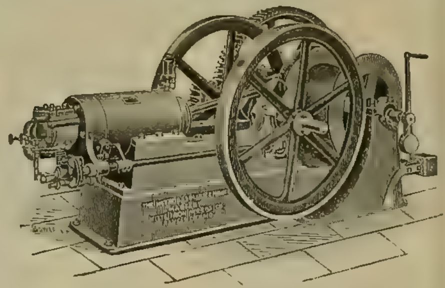
WE MAKE A SPECIALTY OF

HIGH GRADE HOISTING MACHINERY

DESIGNED FOR

STEAM, COMPRESSED AIR, ELECTRICITY AND GASOLINE.





ALL STYLES. ALL SIZES.

Our Line of Patterns Contains Something Exactly Suited to Your Requirements.

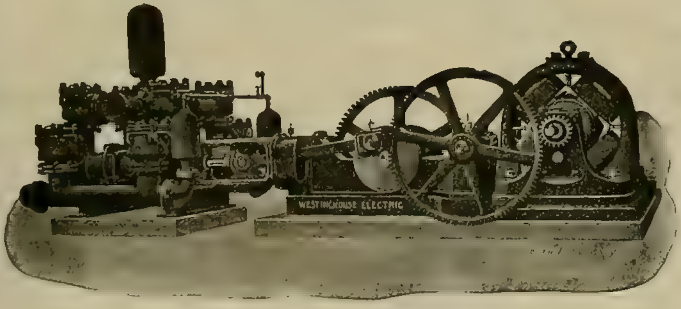
WE SOLICIT YOUR CORRESPONDENCE.

The Hendrie & Bolthoff M'f'g & Supply Co.

No. 38. DENVER, - - - - - - COLORADO.

Westinghouse

Electric Apparatus



Westinghouse D. C. Motor Operating Pump.

The standard of excellence. Operates machinery in the best equipped mines.

Westinghouse Electric
& Manufacturing Co.

Mills Building,
San Francisco.

Pittsburg, Pa.

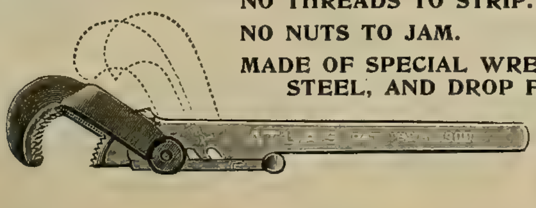
All Principal Cities
in U. S. and Canada.

66g

ATTENTION! USERS OF PIPE WRENCHES.

THE LATEST, BEST AND CHEAPEST PIPE WRENCH.

NO THREADS TO STRIP.
NO NUTS TO JAM.
MADE OF SPECIAL WRENCH STEEL, AND DROP FORGED.

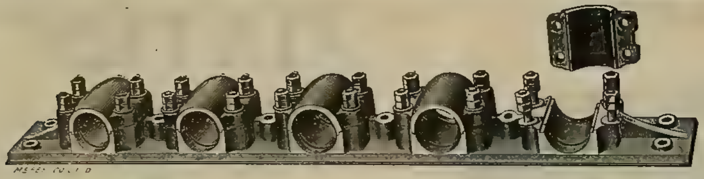


The good qualities of Chain Pipe Wrench and Screw Pipe Wrench combined, without the faults of either.

Quick, effective and positive in adjustment. Cannot slip, crush or lock on the pipe.

Made in four sizes: 10, 18, 24 and 36 inches. Handling from ⅛ of an inch wire to 4½-inch pipe. Price no higher than other pipe wrenches on the market.

ATLAS PIPE WRENCH CO.,
Flood Building, SAN FRANCISCO.
NEW YORK OFFICE, 121 LIBERTY ST. WORKS, NEW HAVEN, CONN.



Globe Battery Stem Guide.

PATENTED AUGUST 24, 1897.

RIGID. SIMPLE. DURABLE. EFFICIENT. ECONOMICAL.

Effect a Saving in Friction Losses. No Trouble to Install.
No Alterations of Mill Necessary. No Keys or Wedges to Adjust.

—MANUFACTURED ONLY BY—

GLOBE IRON WORKS, STOCKTON, CAL., U. S. A.

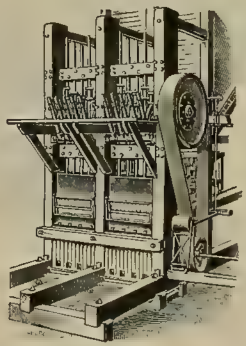
Manufacturers of All Classes of Mining Machinery. Estimates Furnished.

THE EDWARD P. ALLIS COMPANY,

MILWAUKEE, WIS.

—MANUFACTURERS OF—

MINING, SMELTING, MILLING PLANTS.



LEYNER DRILLS,
AIR COMPRESSORS,
CONCENTRATORS,
ORE FEEDERS,
REFINING FURNACES.

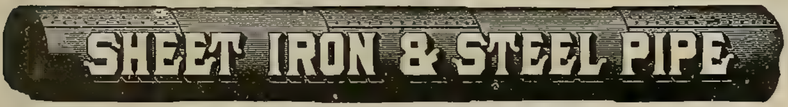
MINE PUMPS AND HOISTING ENGINES.

REYNOLDS CORLISS ENGINES.

WE SELL EVERYTHING USED IN CONNECTION WITH MINING AND MILLING.

FRANCIS SMITH & CO.,

—MANUFACTURERS OF—



FOR TOWN WATER WORKS.

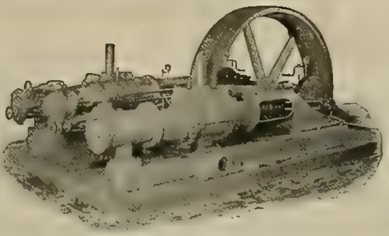
Hydraulic, Irrigation and Power Plants, Well Pipe, Etc., all sizes.

46 FREMONT STREET, - - - - SAN FRANCISCO, CAL.

Iron cut, punched and formed, for making pipe on ground where required. All kinds of Tools supplied for making Pipe. Estimates given when required. Are prepared for coating all sizes of Pipes with Asphaltum.

Figure 152 represents our
DUPLEX STEAM ACTUATED

AIR COMPRESSOR.



Steam Cylinder Outboard and Detachable.
Can be run as a Power Machine also.

We also build Steam and Power Pumps for Mines

If interested, address

THE STILWELL-BIERCE & SMITH-VAILE CO.,
276 Lehman St., DAYTON, OHIO, U. S. A.

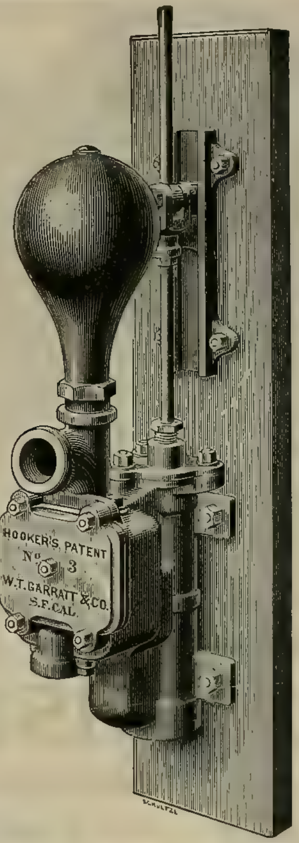
SMOOTH-ON CASTINGS.

TRADE MARK

An iron cement for repairing leaks or fractures in steam or hydraulic work. When hard it will withstand a red heat, steam, water or oil, and expands and contracts with heat and cold the same as iron, insuring a tight joint at all temperatures. Difficult flange connections can easily be made with Smooth-On, as it adapts itself to the flanged faces whether parallel or not. Connections are easily taken apart. Unequaled for boiler patching, and repairing blemishes in iron castings. Write for catalogue and prices. Sole proprietors and manufacturers: Smooth-On Mfg. Co., Jersey City, N. J., U. S. A.

MESSRS. MADISON, BRUCE & SELLERS,

34-36 STEUART ST., SAN FRANCISCO, CAL.......................AGENTS FOR PACIFIC COAST.

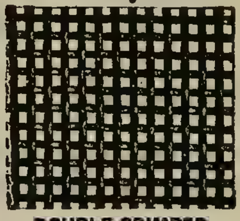

HOOKER'S PATENT
No. 3
W.T. GARRATT & CO.
S.F. CAL.

A GOOD MINING PUMP.

The Hooker Double Acting Pump.
Well Built, Simple, Durable, Efficient.
All Working Parts Easy of Access.
Duplicate Parts in Stock.
We furnish these pumps with suction pipes, hose and strainers complete. Estimates on application.
Can furnish up to number three with double brake for hand power.
Just the pump for a small mine. Larger sizes, larger capacities.
Send for our catalogue on pumps.

W. T. GARRATT & CO.,
Cor. Fremont and Natoma Sts.,
SAN FRANCISCO, CAL.

"The Perfect"



DOUBLE CRIMPED
STEEL MINING CLOTH

THE LUDLOW-SAYLOR WIRE CO.,

ST. LOUIS, MO.

USE "THE PERFECT"
Double Crimped Cloth.

MINERS' STEEL CANDLESTICKS.

STEEL RAILS, TRACK FIXTURES,

PRODUCT PENNSYLVANIA STEEL COMPANY.

BAR, SHEET AND BOILER STEEL,

STRUCTURAL MATERIAL,

Cold Rolled Shafting.

GEORGE W. GIBBS COMPANY,
33-39 Fremont Street, 38-40 Beale Street,
CORRESPONDENCE SOLICITED. SAN FRANCISCO, CAL.

MODERN MINING MACHINERY.

QUARTZ MILLS of any capacity,
IN UNITS OF TWO AND FIVE STAMPS.

Acme Amalgamators for CAPE NOME and other placer mining. Successfully applied to quartz mills in addition to or displacing plates.

Successful Gravel Mill Recently Improved.

Special Gold Dredging Pumps and Machinery. Concentrators, Feeders, Rock Breakers and Power Plants.

Largest manufacturers of Irrigation and Reclamation Pumps in the United States.

Catalogues: No. 20, Pumps; No. 22, Cape Nome; No. 25, Mining.

KROGH MANUFACTURING CO., 9-17 Stevenson St. and 134-136 Main St., San Francisco, Cal.

W. H. BIRCH & CO.

OFFICE AND WORKS:
127-129-131-133-135 First St., San Francisco, Cal.
WRITE FOR A CIRCULAR ON THE

"BIRCH" Improved Two-Stamp Mill.

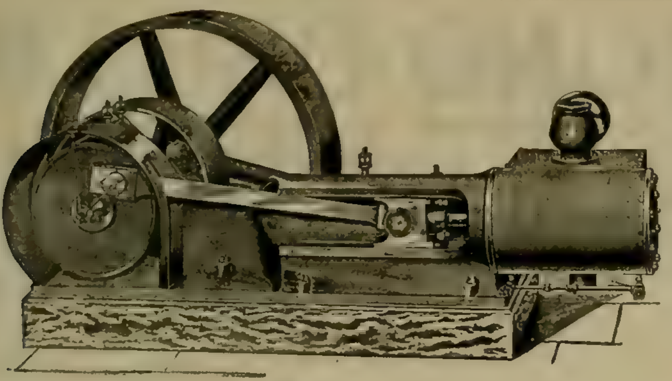
IRON FRAME. TRIPLE DISCHARGE. 850-LB. STAMPS. FORGED STEEL SHOES AND DIES.

Price, $450 f. o. b.

Manufacturers of the LIGHTNER QUARTZ MILL.

Dewey, Strong & Co., Patent Agents.

330 Market St., San Francisco, Cal.



ENGINES, BOILERS,
UP-TO-DATE MACHINERY.
WRITE US FOR PARTICULARS.
THE COMPRESSED AIR MACHINERY CO., 11-13 First St., San Francisco, Cal.

THE WM. HAMILTON MANUFACTURING CO.,
LIMITED,
MINING MACHINERY,
PETERBOROUGH, ONTARIO,
CANADA.

TRADE MARK.
(M'ARTHUR-FORREST PROCESS.)

CYANIDE PROCESS.
The MacArthur-Forrest Cyanide Process is the Best

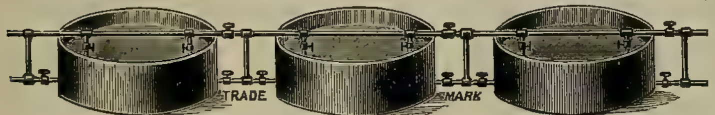
For the Treatment of Refractory and Low Grade Gold and Silver Ores and Tailings. We are the Originators of the Cyanide Treatment, and have kept up with the times in all Improvements in Cyanide Methods.

Successful Plants in Operation in all Western Mining States.

Samples Assayed and Fully Reported Upon. Properties Examined Designs Furnished. For Terms and Particulars, Address

The Gold and Silver Extraction Co. of America, Ltd.
GEO. A. ANDERSON, General Manager,
Testing Works: 1716 Blake Street, Denver, Colo. 208-210 McPhee Building, Denver, Colo.
ALMARIN B. PAUL, Agent, 27 Crocker Building, San Francisco, Cal.

"PNEUMATIC" CYANIDE PROCESS.
(Patented in U. S., So. African Republic, New Zealand, Victoria, New So. Wales, So. Australia.)



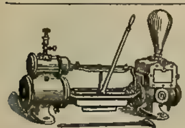
WILL DO IN 7 HOURS WHAT REQUIRES FROM 2 TO 6 DAYS BY OLDER METHODS.
SEND FOR PAMPHLET.
THE PNEUMATIC CYANIDE PROCESS CO., 306 Boston Bldg., Denver, Colo.

CARY SPRING WORKS,
240 & 242 WEST 29th STREET, NEW YORK, U. S. A.

Telephone, 3346—38th St.
WIRE SPRINGS
OF EVERY DESCRIPTION.

MANUFACTURERS OF
All kinds of ROUND AND FLAT WIRE, TEMPERED AND UNTEMPERED.
SPRINGS
For Machinery, Rolling Shutters, Motors, Etc.

MUSIC BOX AND FINE SPRINGS OUR SPECIALTY.



SOLE AGENCY
Worthington Steam Pumps and Water Meters.
Pumping Plants of any Capacity.
TATUM & BOWEN,
34-36 Fremont Street, San Francisco, Cal. 29-35 First Street, Portland, Or.
MACHINERY—ALL KINDS

TANKS!
AND COMPLETE
CYANIDE PLANTS.

ILLUSTRATED CATALOGUE

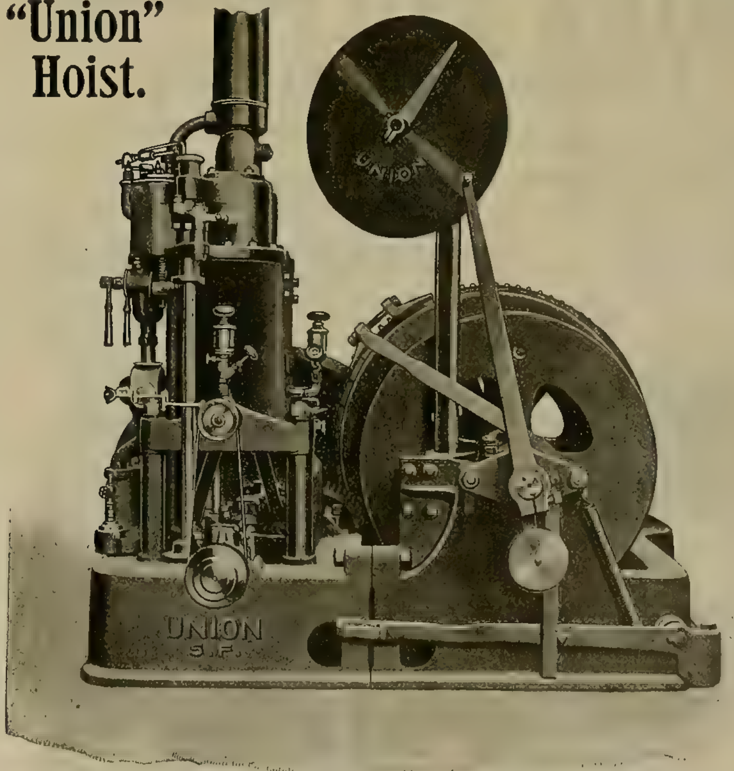
MAILED FREE.

Zinc Lathes with Automatic Feed
FOR CUTTING ZINC SHAVINGS.
Pacific Tank Co., Manufacturers.

348 East Second Street,
Los Angeles, Cal.

35 Beale Street,
San Francisco, Cal.

"Union" Hoist.



The above illustrates the 25 H. P. double cylinder, single drum "Union" hoist, with all the latest improvements.

THE UNION GAS ENGINE CO.
—BUILD THE—
"Union" Gas Engines,
Which use either MANUFACTURED or NATURAL GAS, ORDINARY STOVE GASOLINE (NAPHTHA or BENZINE), DISTILLATE or KEROSENE.

STATIONARY ENGINES for All Kinds of Work in Sizes from 3 to 300 h. p in actual use.
"UNION" COMBINED HOISTS in Sizes from 2 to 130 h. p. in actual use.
"UNION" COMBINED COMPRESSORS—20, 30, 40 h. p.
HOISTS and COMPRESSORS Can Be Built in Larger Sizes to Order.
"UNION" MARINE ENGINES, 4 to 200 h. p., of Single, Double and Four-Cylinder Types.
FIFTEEN YEARS' EXPERIENCE Building Gas and Oil Engines.
"UNION" ENGINES Are In Use All Over the United States.
"UNION" ENGINES Are Simple, Durable and Economical.

Office, 248 First Street. Works, Corner First and Clementina Streets, SAN FRANCISCO, CAL.

BULLOCK DIAMOND DRILLS

If you are interested in prospecting send for our new Diamond Drill Catalogue (No. 33).

BULLOCK MINING MACHINERY

PORTABLE HOISTS—Send for our new Catalogue (No. 40). CHAMPION MINE VENTILATORS—Send for our new Catalogue (No. 35).
HOISTING AND HAULAGE PLANTS, ORE CARS, SKIPS, CAGES, ETC., ETC.

PARKE & LACY CO., Agent,
21 & 23 Fremont St., San Francisco, Cal.

M. C. BULLOCK MFG. CO.,
1172 West Lake St., Chicago, Ill., U. S. A.

RAND ROCK DRILLS and Drill Mountings.

HIGHEST DEGREE OF PERFECTION ATTAINED. ∴ INDISPENSABLE IN MINING, TUNNELING & EXCAVATING.

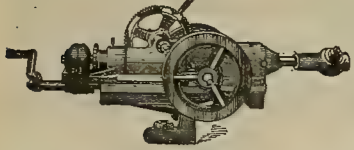
AIR —AND— Gas COMPRESSORS.

STANDARD TYPES! SPECIAL PATTERNS! ALL SIZES!

RAND DRILL CO., 100 BROADWAY, New York, U. S. A.

San Francisco Office: 223 First St.
1328 Monadnock Blk., CHICAGO, ILL.

THE JACKSON HAND POWER ROCK DRILL.



Works in Any Rock, in Any Position.

Write for Circulars and References.

THE JACKSON DRILL & M'F'G CO.,
1756 Larimer Street, DENVER, COLO.

Sole Licensees for all Foreign Countries and Eastern United States: THORNTON N. MOTLEY COMPANY (INC.), 43 John St., New York.

AGENTS: CHAS. B. BOOTHE & CO., 126 SO. LOS ANGELES ST , LOS ANGELES, CAL.

FIRTH'S DRILL STEEL.

USE THE BEST.

Has no equal in Hard Rock Drilling.

ABNER DOBLE COMPANY, GEN. AGTS.,
FREMONT AND HOWARD STS, SAN FRANCISCO.

Sold by Seattle Hardware Co., Seattle, Wash.

CANTON STEEL COMPANY,
—— Manufacturers of ——

CANTON DRILL STEEL.

UNEQUALED FOR TOUGHNESS AND ROCK-CUTTING QUALITIES. WRITE FOR 1900 STEEL LIST, CONTAINING ENDORSEMENTS AND USEFUL INFORMATION.

Works: CANTON, OHIO. Branch Warehouse: DENVER, COLO.

Established 1837.

I. C. Yawger,
Successor to VICTOR BISHOP & CO.

IMPORTER OF CARBONS FOR DIAMOND DRILLS.

21 Maiden Lane, - NEW YORK

DIAMOND DRILLS
FOR PROSPECTING.
AMERICAN DIAMOND ROCK DRILL CO.
120 LIBERTY ST N.Y.

THEODOR LEXOW, 14 JOHN STREET, N. Y.
......Importer of......

CARBONS
(BLACK DIAMONDS)

For DIAMOND DRILLS and all Mechanical Purposes.

HENRY DEMMERT.

SULLIVAN

Diamond Core Drills

FOR PROSPECTING. Catalogue 29.

The most extensive line of sizes and styles ever offered.

CONTRACTORS FOR PROSPECTING WITH DIAMOND DRILL.

ROCK DRILLS

FOR MINING. Catalogue 30.

Superior valve and ratchet motions. The highest possible grade.

Send for Our New Catalogues.

Sullivan Machinery Co.,
New York. Pittsburg. Claremont, N. H.
Main Office, CHICAGO......................54 to 60 N. CLINTON ST.
Western Office, DENVER....................332 SEVENTEENTH ST.
Pacific Agency, SAN FRANCISCO, HENSHAW, BULKLEY & CO.
Cable Address, Diamond, Chicago. Codes: A. B. C. 4th Edition, Postal Directory, Western Union, Liebers.

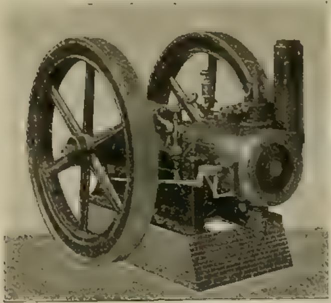
The only roofing without a fault

P & B Ready Roofing

Paraffine Paint Co
116 Battery Street—San Francisco

The best builders in America use P & B Ready Roofing Shingles may warp, slate may chip, tin may sweat, tar may run, or iron expand, but P & B will stand any climatic condition—the weather of the west requires it Demand it of your dealer

WE CAN SHOW YOU A



HERCULES Gasoline Engine

Running on less than ½-gallon of fuel per H. P. hour, with a speed regulation of 2½%.

JOHN WIGMORE & SONS CO.,
117-123 S. LOS ANGELES ST.,
LOS ANGELES, CAL.

McFARLANE & CO.,
1734 FIFTEENTH ST., DENVER, COLO.

Mining and Milling Machinery.

STAMP AND CONCENTRATING MILLS BUILT AND ERECTED.

STEAM AND ELECTRIC HOISTS, CRUSHERS, ROLLS, REVOLVING SCREENS, JIGS. ORE CARS, CYANIDE TANKS, CORNISH PUMPS, CORLISS ENGINES.

GENERAL PHOTO-ENGRAVING CO.
[SUCCESSORS TO DEWEY ENGRAVING CO.]

FINE ZINCOGRAPHS, HALF-TONES, AND DESIGNING.

ENGRAVINGS OF MACHINERY OUR SPECIALTY.

SEND FOR SAMPLES AND PRICES.
TELEPHONE BLACK 1466.

NO. 536 CLAY STREET,
SAN FRANCISCO, CAL

THE IDEAL CONVEYOR BELT

Is the one that will carry stone, ore, coal, wet or dry material, holding buckets firmly and securely; will stand all kinds of exposure, and resist the heaviest strains during a long period of service. This is what the **LEVIATHAN BELT** has done, and we quote the following from a letter from the New York Steam Co.:

"We have used Leviathan Belting for four years, up to 24-inch by 8-ply, elevating and conveying coal. Some of the Belting is outside, exposed to freezing weather; some in a steam bath. In both conditions the results have been very gratifying, over 500 tons having been handled in ten hours time."

MAIN BELTING COMPANY,

1225-41 Carpenter Street, Philadelphia.
55-57 Market St., Chicago. 120 Pearl St., Boston.
SEND FOR PRICE LISTS AND SAMPLE.

SHOES and DIES of **SUPERIOR** quality and at prices 20 to 30% lower than any other maker.
FURNISHED BY
ARTHUR KOPPEL, 66 Broad St., N. Y. City.
WRITE FOR PARTICULARS.

MINING CARS of every description.
PORTABLE RAILWAYS, Rolling Stock, Railway Outfits for Mines of every description. **Export Work** a specialty.
ARTHUR KOPPEL, 66 Broad St., N. Y. City.
SEND FOR CATALOGUE AND ESTIMATES.

Pacific Coast Agents, Baker & Hamilton, San Francisco and Sacramento.

OUR 24-INCH WRENCH IS ESPECIALLY ADAPTED FOR MINE WORK.

The Johnston Patented Pipe Wrench.

A Strictly High-Grade Tool---Drop-Forged---Warranted.

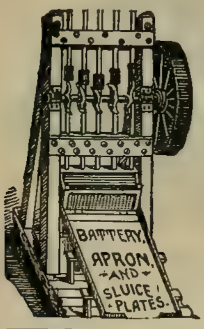
THE STRONGEST, SIMPLEST AND BEST.
Never Jams, Self-Adjusting, Self-Releasing.

WM. B. VOLGER,
SOLE MANUFACTURER,
88 Chambers St., NEW YORK.

MADE IN 3 SIZES:

	10 in.	16 in.	24 in.
Pipe	⅛ to 1 in.	¼ to 1½ in.	½ to 2½ in.
List	$2 25	$3.00	$6.00

Agencies: THE MINE & SMELTER SUPPLY CO., Denver and Salt Lake City.


BATTERY APRON AND SLUICE PLATES.

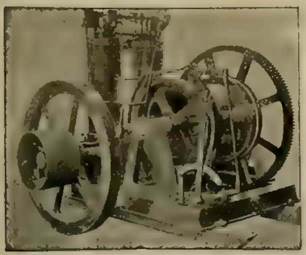
To Gold Miners!

Silver Plated Copper Amalgamating Plates

For Saving Gold in Quartz and Placer Mining.

ONLY BEST COPPER AND REFINED SILVER USED. OLD MINING PLATES BOUGHT OR TAKEN IN EXCHANGE FOR NEW PLATES. GOLD EXTRACTED FROM OLD PLATES AT A MODERATE COST. OLD PLATES REPLATED. GOLD, SILVER, NICKEL, COPPER AND BRASS PLATING.

Denniston San Francisco Plating Works,
632 Mission Street, Cor. Annie, San Francisco, Cal.
E. G. DENNISTON, ... Proprietor.
——:Send for Circular.:——



Mining Hoist.

THE GOLDEN GATE GAS ENGINE
Will raise more ore than any other **AT LESS COST.**
MANY IN USE, Giving Satisfaction.
Built for any Capacity and for any Purpose.
Pumping Water, Propelling Boats, Hoisting Ore, Machine Shop Power, Etc.
Send for Particulars and Catalogue.

ADAM SCHILLING & SONS,
213 & 215 Main St., San Francisco, Cal.

C. H. EVANS & CO., Machine Works,

183-185-187 FREMONT STREET,

Where, with Enlarged and Increased Facilities, they are better than ever prepared to do
First-Class Machine Work
Promptly, and at Reasonable Prices, and will continue the manufacture of

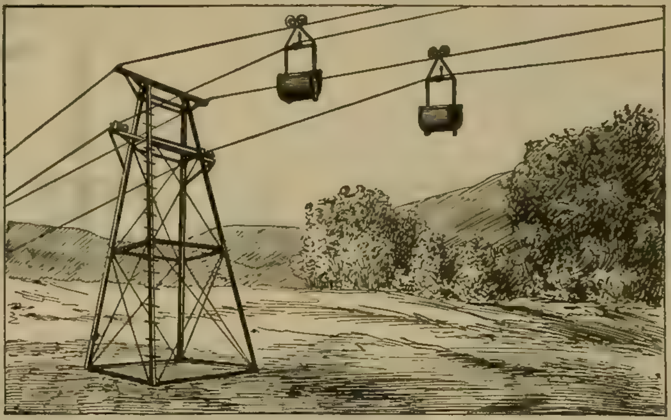
Thomson & Evans Steam Pumps,

Deep Well Pumps, Power Pumps, Etc.,
Also Marine Engines, Ship and Steamboat Work, Pipe Cutting, General Jobbing and Repairing.

VULCAN DOUBLE ROPE TRAMWAYS.

VULCAN ROPEWAYS (SINGLE ROPE SYSTEM).

AUTOMATIC LOADING AND DUMPING APPLIANCES



AND OTHER ROPE HAULAGE SYSTEMS.

SEND FOR CATALOGUE.

Vulcan Iron Works, Manufacturers of Mining Machinery, SAN FRANCISCO, CALIFORNIA.

Small Portable Saw Mills and DRAG SAWING MACHINES FOR RANCHES AND MINES.

Woodworking Machinery.

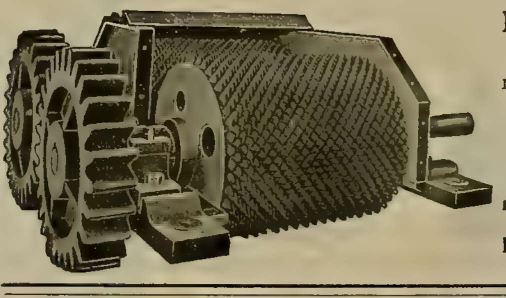
LINK BELTING, SPROCKET WHEELS,
ELEVATOR BUCKETS & BOOTS,
TAKEUPS, FRICTION CLUTCH
PULLEYS, ETC.

ALL STYLES AND SIZES IN STOCK FOR IMMEDIATE DELIVERY.

JNO. D. EBY,
17 & 19 MAIN STREET, - SAN FRANCISCO, CAL.

LINK=BELT

ELEVATORS —AND— CONVEYORS.



BREAKER ROLLS,
PICKING TABLES,
MALLEABLE IRON BUCKETS,
SHAFTING, PULLEYS,
GEARING, CLUTCHES, Etc.
Catalogue Upon Application.

LINK-BELT MACHINERY CO.,
Engineers, Founders, Machinists,
CHICAGO, U. S. A.
DENVER, 1328 17th St ,
A. E. LINDROOTH, Manager.

For handling Ore, Coal, Tailings and Dredgings. Catalogue mailed on application.
ROBINS CONVEYING BELT CO., Park Row Building, NEW YORK.

Are You Confronted With a Difficult Ore=Separating Problem?

THE WETHERILL MAGNETIC SEPARATING PROCESS

may prove the solution. Apply to Wetherill Separating Company, 52 Broadway, N. Y.

PIPE BARGAINS.

Suitable for Water Mains, Mining, Irrigation, Air, Oil, etc, etc. New Spiral Welded Asphalted Steel Pipe with any style coupling desired.

460 ft. 6-in. 3,480 ft. 10-in. 1,828 ft. 14-in. 1,077 ft. 18-in.
50,000 " 8 " 2,428 " 12 " 520 " 16 " 1,623 " 24 "

All Sizes Wrought Pipe, Well Casing and Straight Riveted Pipe in Stock. Equipment of All Kinds for Mine, Railroad and Contractors' Outfits. Write for Prices and Particulars.

BOWES & CO., 23 Lake St., Chicago, Ill.

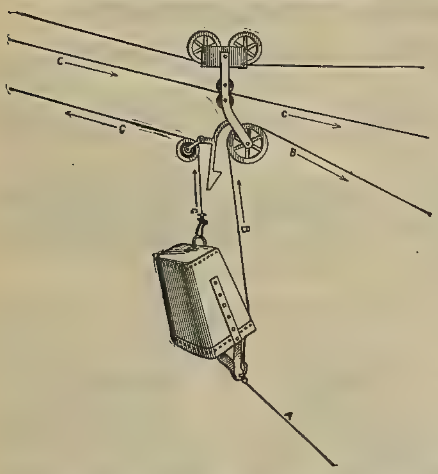
DEWEY, STRONG & CO., Patent Solicitors, 330 Market St., San Francisco, Cal.

WHO BUILD THE BEST

STAMP MILL?

FRASER & CHALMERS,

CHICAGO, ILL., U. S. A.
AND LONDON, ENGLAND.



Carriage and Bucket
—OF THE—
HALL
PATENT
CABLE HOIST CONVEYOR
—FOR—
Excavating Canals and Trenches.

Used in excavating the Suwanee Canal, Georgia.
Only system with a bucket that is absolutely self-filling.
Also adapted to the construction of levees and embankments.

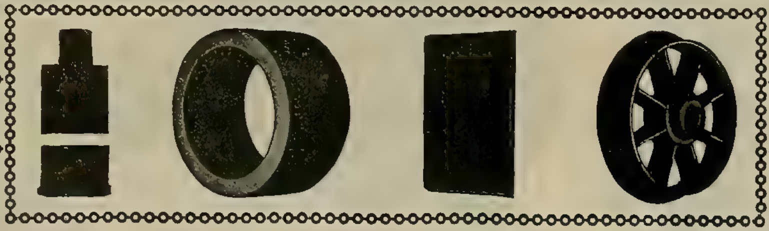
THE TRENTON IRON CO., Trenton, N. J., Manufacturers,

Also, Wire Rope Tramways, Surface and Underground Haulage Plants, etc. Wire Rope of all kinds for regular and special applications. Illustrated pamphlet on application.

For Particulars, Address, NEWTON M. BELL, Agent, 308 Market St., San Francisco.

☞A full stock of the Trenton Iron Co.'s Wire Ropes, made from "SPECIAL" Crucible and Plough Steel, carried in San Francisco.

HARD. TOUGH



TAYLOR IRON AND STEEL COMPANY,

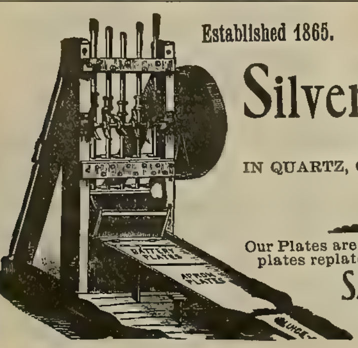
HIGH BRIDGE, NEW JERSEY, U. S. A.

Sole Licensees in America under the HADFIELD System and Patents for MANGANESE STEEL,

Best Metal Known for Roll Shells, Stamp Shoes and Dies, Crusher Plates and Side Liners,
Toggles and Toggle Bearings, Gyratory Cones and Concaves, or Liners,
Mine Car Wheels, Coal Crushing Rolls, Etc.

PACIFIC COAST PARTIES INTERESTED PLEASE ADDRESS PARKE & LACY CO., SAN FRANCISCO, CAL.

WRITE FOR INFORMATION AND PRICES.



Established 1865. NOTICE TO GOLD MINERS. Incorporated 1890.

Silver-Plated Copper Amalgamated Plates
FOR SAVING GOLD
IN QUARTZ, GRAVEL OR BEACH MINING. MADE OF BEST SOFT LAKE SUPERIOR COPPER.

AT REDUCED PRICES.

Our Plates are guaranteed, and by actual experience are proved, the best in weight of Silver and durability. Old Mining plates replated, bought, or gold separated. THOUSANDS OF ORDERS FILLED.

SAN FRANCISCO NOVELTY AND PLATING WORKS,

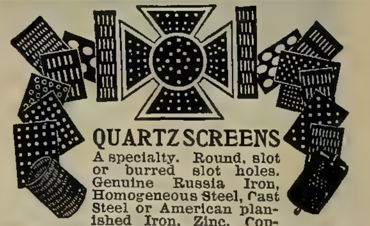
☞SEND FOR CIRCULARS. Telephone Main 976. 68, 70, 72, 74 and 76 FIRST STREET,
COR. MISSION, SAN FRANCISCO, CAL.

LARGE VARIETY.

Perforated Metal

THE ROBERT AITCHISON PERFORATED METAL Co
303-305 DEARBORN ST. CHICAGO ILLS.

SUPERIOR WORK.



QUARTZ SCREENS

A specialty. Round, slot or burred slot holes. Genuine Russia Iron, Homogeneous Steel, Cast Steel or American planished Iron, Zinc, Copper or Brass Screens for all purposes. CALIFORNIA PERFORATING SCREEN Co., 145 and 147 Beale St., S. F.

Mining Screens
A SPECIALTY.

Diagonal Slot,
Straight "
Burred "
Round Holes.

In American planished or Russian iron or steel for all purposes. GEO. WIMMER, 312 Iowa Street, San Francisco. Telephone Mint 1332.

—EASTERN PRICES BEATEN.—

SAN FRANCISCO
Pioneer Screen Works,
JOHN W. QUICK, Prop.

Improved Facilities! Finest Work! Lowest Prices!

Perforated Sheet Metals, Steel, Russia Iron, American Planish, Zinc, Copper and Brass Screens for All Uses.

MINING SCREENS A SPECIALTY.

221 and 223 First Street, San Francisco, Cal.

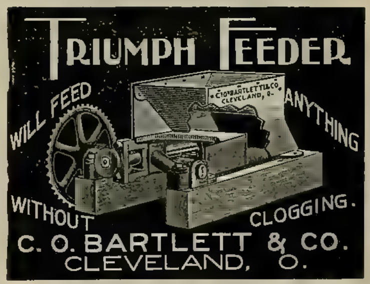
For Best Satisfaction
and Lowest Prices
—IN—
PERFORATED METALS
—AND—

MINING SCREENS

PLACE YOUR ORDERS WITH

Fraser & Chalmers,
CHICAGO, ILL., U. S. A.

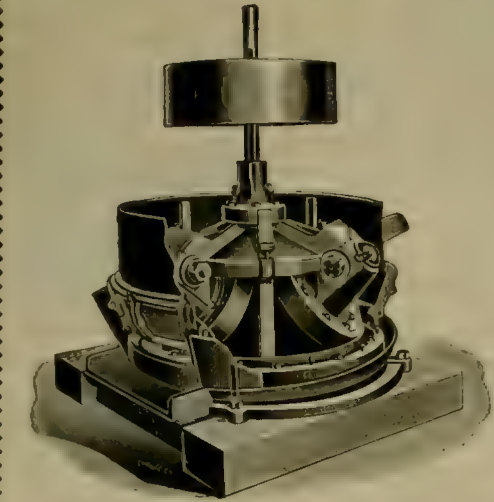
SEND FOR SAMPLES, MENTIONING THIS PAPER.


TRIUMPH FEEDER
WILL FEED ANYTHING
WITHOUT CLOGGING.
C. O. BARTLETT & CO.
CLEVELAND, O.
C. O. BARTLETT & CO.
CLEVELAND, O.

PRICE, $50.00.

MICHIGAN COLLEGE OF MINES.

An Engineering School with unique location, giving it unusual facilities. Distinctive methods of instruction. Special courses. For catalogue giving occupation of graduates, address
F. W. McNAIR, President, Houghton, Mich.

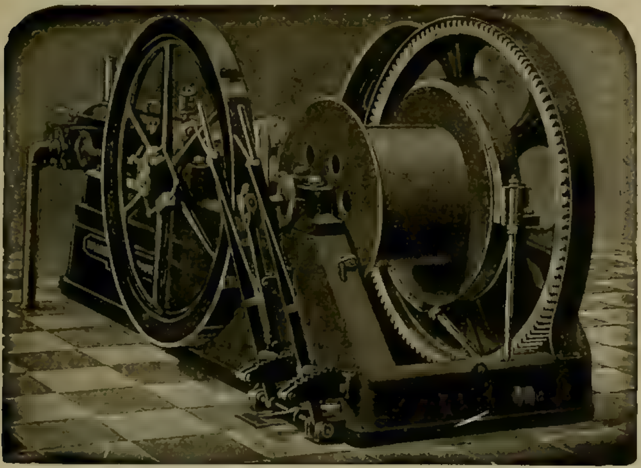


THE GRIFFIN
THREE ROLLER
ORE MILL.

The Griffin Three Roller Ore Mill is a simply constructed Mill, suitable for working all kinds of ores that require uniformly fine crushing by the wet process. This Mill is a modification of the well-known Chilian Mill, but the rollers run upon a crushing ring or die, which is inclined inwardly at an angle of about 30 degrees, the rollers themselves also being inclined to the central shaft of the Mill, thus utilizing the centrifugal force, as well as the weight of the rollers themselves as a crushing agent. The Griffin Three Roller Ore Mill is therefore a Mill of great strength, and has few wearing parts. We construct these Mills with extreme care, using only the best of raw materials, which are most carefully worked by men who are specialists as mill builders. We sell the Griffin Ore Mill on its determined merits, and will gladly supply full information regarding it to any one.

SEND FOR FREE ILLUSTRATED AND DESCRIPTIVE CATALOGUE TO

Bradley Pulverizer Co., Boston, Mass.



FAIRBANKS-MORSE
GASOLINE-DISTILLATE GEARED HOISTER.

An efficient and reliable combination of a Fairbanks-Morse Gasoline-Distillate Engine on the same base with a Friction Hoist. Modern and up to date. We publish a special catalogue describing our Hoister which we gladly mail prospective purchasers.

FAIRBANKS-MORSE GASOLINE-DISTILLATE ENGINES.
ALL SIZES UP TO AND INCLUDING 54 HORSE POWER.
For Pumping, Milling, Lighting, Air Compressors, Etc.

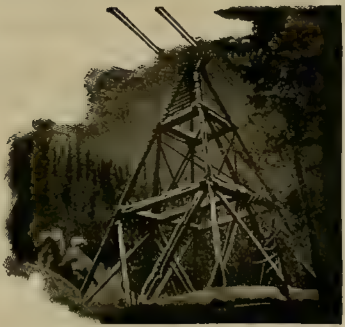
FOR CATALOGUES AND FULL INFORMATION, ADDRESS
FAIRBANKS, MORSE & CO.,
310 MARKET ST., SAN FRANCISCO, CAL.
201 N. LOS ANGELES ST., LOS ANGELES, CAL.
FIRST AND STARK STS. PORTLAND, OGN.
1600 SEVENTEENTH ST., DENVER, COL.
FRANKLIN AND MONROE STS., CHICAGO, ILL.

THE MINE AND SMELTER SUPPLY CO.,
DENVER, - - COLORADO.
Mining and Milling Machinery and Supplies.

We beg to call your attention to

THE FINLAYSON PATENT
WIRE ROPE TRAMWAY—

the latest and best system of double-rope automatic aerial tramway in the market.
If interested in the most economical system of transporting ores from mine to mill and to shipping stations, send for our special tramway catalogue.



We carry a complete stock of Machinery and Supplies for immediate delivery.

Send for our special catalogues on Mining Machinery, Milling Machinery, Wilfley Concentrators, Tramways, Power Transmission Machinery, Machine Tools, Etc.

THE MINE AND SMELTER SUPPLY CO.,......................Denver, Colorado
THE MINE AND SMELTER SUPPLY CO.,................Salt Lake City, Utah
THE MEXICO MINE AND SMELTER SUPPLY CO.,
No. 16 San Francisco St., City of Mexico.

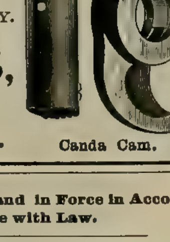
BOILERS, ENGINES, STEAM HOISTERS, ELECTRIC HOISTERS, ROLLS, CRUSHERS, WILFLEY TABLES, CARS, CAGES, ORE BUCKETS, RAIL, PIPE, FITTINGS, BELTING, ETC., ETC.

ADAMANTINE SHOES AND DIES.
CHROME CAST STEEL.
CANDA Improved Self-Locking CAMS.
TAPPETS, BOSSES, ROLL SHELLS AND CRUSHER PLATES.

These castings are extensively used in all the mining States and Territories of North and South America. Guaranteed to prove better and cheaper than any others. Orders solicited subject to the above conditions. When ordering, send sketch with exact dimensions. Send for Illustrated Circular.

Manufactured by **CHROME STEEL WORKS,** Brooklyn, N. Y.

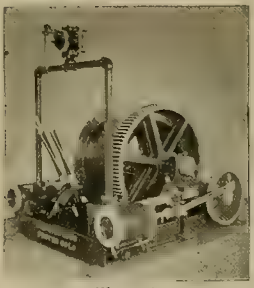
H. D. & H. W. MORRIS,
AGENTS,
Room 194 Crocker Building, San Francisco, Cal.



Canda Cam.

MINE BELL SIGNALS. Adopted, Used and in Force in Accordance with Law.

We print in legal size, 12x36 inches, the Mine Bell Signals and Rules provided for in the Voorhies Act passed by the California Legislature. The law is entitled "An Act to Establish a Uniform System of Bell Signals to Be Used in All Mines Operated in the State of California, for the Protection of Miners." We furnish these Signals and Rules, printed on cloth so as to withstand dampness. 50 Cents a Copy.
MINING AND SCIENTIFIC PRESS, 330 Market St., San Francisco, Cal.



The above cut illustrates my new and improved Hoister.

Hoisting Engines
A SPECIALTY.

REVERSIBLE, LINK-MOTION, GEARED and FRICTION CLUTCH HOISTS carried in stock.

Special Machinery Built to Order.

GEO. G. JACKSON,
1724-34 Wynkoop St., DENVER, COLO.

THE BUCYRUS COMPANY,
DESIGNERS AND BUILDERS OF
DREDGES, STEAM SHOVELS, EXCAVATING MACHINERY, WRECKING CARS, LOCOMOTIVE CRANES, PILE DRIVERS, CENTRIFUGAL PUMPS, WITH SIMPLE, COMPOUND OR TRIPLE EXPANSION ENGINES,
MACHINERY FOR PLACER MINING.
SOUTH MILWAUKEE, WISCONSIN.

PROFESSIONAL CARDS.

R. H. POSTLETHWAITE, M.I.E.E.
Hydraulic Mining Engineer.
River Dredging for Gold a Specialty.
1315 Leavenworth St........San Francisco, Cal.

THEO. F. VAN WAGENEN, E. M.
Consulting Mining and Hydraulic Engineer.
1508 Fillmore St., DENVER, COLO.

D. B. HUNTLEY,
Mining Engineer and Metallurgist,
De Lamar, Owyhee Co., Idaho.

BERNARD MACDONALD,
Consulting Mining Engineer.
General Manager British America Corporation, Ltd., Rossland, B. C.

DRAPER & McLEOD,
Assayers, Chemists, and Mining Engineers,
1736 CHAMPA STREET,
DENVER.................. ....COLORADO.

JOHN DWYER, Mining Engineer,
MEXICO.
Address 762–17th Street......East Oakland, Cal.

Established 1879.
CHAS. B. GIBSON,
Chemist, Metallurgist and Mining Engineer,
81 CLARK ST., CHICAGO, ILL.

W. C. WYNKOOP, M. E.
Woodbury (Cochiti District),
New Mexico.
Economic Geology and Mine Examinations.

E. H. BENJAMIN, Mining Engineer.
A. M. HUNT, Mechanical & Hydraulic Engineer.
WYNN MEREDITH, Electrical Engineer.
C. L. CORY, Electrical & Mechanical Engineer.
EXPERT EXAMINATIONS. ADVISORY REPORTS.
CONSTRUCTION SUPERVISION.
331 Pine Street,...........San Francisco, Cal.
Telephone Main 1870. Cable Address "Edben."

JOHN W. GRAY,
Mining and Hydraulic Work.

Prospecting Operations and Exploration Work.
Examinations, Surveys, Development, Equipment of Mines, Gold-Bearing Gravels, and Water Supplies.
923 Linden St.,.................Oakland, Cal.
Cable "Espra." Correspondence invited.

ABBOT A. HANKS,
CHEMIST AND ASSAYER.
Successor to Henry G. Hanks, est. 1866. The supervision of sampling of ores shipped to San Francisco a specialty.
—531—
California Street,
San Francisco.

RICHARD A. PEREZ, E. M.
Assayer and Analytical Chemist,
120 North Main St., - Los Angeles, Cal.

S. W. TYLER,
Mining and Metallurgical Engineer,
6 Windsor Hotel Block.
Cable: Retyl, Denver. DENVER, COLORADO.

The SPOKANE BUREAU OF MINING,
N. E. LINSLEY, Manager.
SPOKANE, : : WASHINGTON.
Consulting Mining and Milling Engineer.
Will Examine and Report on Mines.

DANIEL G. JEWETT,
Metallurgist and Assayer.
Specialty: The Mining and Smelting of Copper or Lead Ores.
P. O. BOX 5, GUFFEY, PARK CO., COLO.

CLARENCE HERSEY,
Assayer and Chemist,
(Established 1879.) LEADVILLE, COLO.
Gold, Silver and Lead..................$1.00.
Any two of above 75c; any one of above 50c.
Copper analysis..............................$1.00.
Platinum, Nickel or Tin, each..............$5.00.
Twenty-one years successful experience in the mining metropolis of Colorado.
Write for mailing envelopes and price list.

ALMARIN B. PAUL, M. E.,
ROOM 27, CROCKER BUILDING, SAN FRANCISCO.
Will act as AGENT for the sale of RELIABLE Mining Property. SPECIAL AGENT FOR
MacArthur-Forrest Cyanide Process
for California north of and including Mono, Madera and Merced counties; also for State of Nevada. Will act as agent for Eastern parties owning mining interests in California.

F. H. HARVEY,
GALT, CAL.,
Mining and Metallurgical Work in All Branches.
Assays, Chemical Analysis of Ores and experiments on rebellious ores for treatment by cyanide or other processes. Surveys and reports upon mining properties.

Simonds & Wainwright,
Mining Engineers,
Assayers and Chemists,
159 Front Street,
NEW YORK.

HUDSON H. NICHOLSON,
Consulting Mining Engineer,
Rooms 216 and 217, Boston Building,
DENVER, COLO., U. S. A.
Cable address: Aichen, Denver.
Expert examinations of and advisory reports on mining propositions.
Specialty: The chemical treatment of ores

CHAS. BUTTERS & CO., Limited.

E. S. LEAVER, Manager.

Ore Testing Works,
Chemical and Metallurgical Laboratory,
Assay Office,

DOOLY BLOCK, - SALT LAKE CITY, UTAH.

Telephone, MAIN 5104.
Cable Address, LUCKWARD.
—ESTABLISHED 1869.—
A. H. WARD.

C. A. LUCKHARDT CO.,

NEVADA METALLURGICAL WORKS,
71 & 73 STEVENSON STREET, - - - - SAN FRANCISCO, CAL.

Assaying, Analyses, Sampling.

PRACTICAL WORKING TESTS OF ORE BY ALL PROCESSES.
STAMP MILL AND CONCENTRATOR IN OPERATION ON PREMISES.

Thomas Price & Son,

Assay Office, Sampling Works

And Chemical Laboratory.

526 Sacramento Street, San Francisco, Cal.

DAVIDGE & DAVIDGE, Attorneys and Counsellors at Law, Corcoran Building, Washington, D. C. Practice in the Supreme Court of the United States, the Court of Claims, the Courts of the District of Columbia, and the General Land Office. Western Union Code.

W. J. ADAMS, E. M.,
Mining Engineer and Metallurgist.
Graduate of Columbia School of Mines.
Author of "Hints on Amalgamation," etc., etc.
ROOM 14, 434 CALIFORNIA STREET,
SAN FRANCISCO, CAL.

R. J. WALTER,
1452 Blake St., DENVER, COLO.
Mining Engineer and Metallurgist.
Reports on mining properties.
Assay office and chemical laboratory. Established in Colorado 1879.

SAM'L A. RANK,
MINING ENGINEER,
U. S. DEPUTY MINERAL SURVEYOR.
Mine Examinations and Reports.
514 Cooper Building,
DENVER.........................COLORADO.

EDWARD L. HAFF,
MINING ENGINEER,
U. S. DEPUTY MINERAL SURVEYOR.
Mine Examinations and Reports.
National Annex Block,
P. O. Box 21. CRIPPLE CREEK, COLO.

FRANK C. MANDELL,
MINING ENGINEER,
U. S. Deputy Mineral Surveyor for Idaho and Oregon.
Mine Examinations, Surveys and Reports.
HAILEY, IDAHO.

ERNEST H. SIMONDS,
Late Instructor in Assaying, University of California.
ASSAYS AND ANALYSES.
LABORATORY TESTS OF ORES.
Special Attention Given to the Instruction of Students.
521 Sacramento St., Cor. Leidesdorff, S. F., Cal.

RALPH E. STEVENS,
ATTORNEY AND COUNSELOR,
43–44 Jacobson Building, DENVER, COLO.
Special attention to examination of titles. Corporation, commercial, mining law. Collections receive prompt attention. Notary in office. Refers to Denver representative of Mining and Scientific Press.

School of Practical Mining, Civil,
Mechanical and Electrical Engineering.
Surveying, Architecture, Drawing, Assaying, Cyanide Process and Metallurgy.
933 Market St., S. F., Cal. OPEN ALL YEAR.
A. VAN DER NAILLEN, President
Assaying of Ores, $25; Bullion and Chlorination Assay, $25; Blowpipe Assay, $10. Full course of Assaying, $50. Established 1864.
☞ Send for Circular.

FRED H. BROWN,
Electrical Mining Expert.
Inventor of the Electro-Geodetic Mineral Locator. Patented March 20, 1900.

Will electrically survey mines and lands for mineral; furnish charts showing run of ore, extensions, pay streaks, and their approximate depth from surface.

References include scientific men, and miners for whom we have located rich mines.

Address, 1025 West 7th St.,
LOS ANGELES, CAL.

Geo. W. Schneider, E. M.,
Mining Engineer,
U. S. Deputy Mineral Surveyor.
Mineral Properties examined and reported on.
Central City, Colorado

A. F. WUENSCH, M. E.
Inspection and Valuation of Mines.
Ref. D. H. Moffat, Pres. 1st Nat'l Bank, Denver.
827 Equitable Bldg..................Denver, Colo.

WM. VAN SLOOTEN,
Consulting Mining Engineer and Metallurgist.
Cable address: "Yadoplata"
35 WALL STREET........... ....NEW YORK, N. Y.

MINERS' ASSAY OFFICE.
(JNO. HARRIGAN)
10 Stevenson Street, - San Francisco, Cal.
Telephone Clay 972.
Assaying, Analyses, Sampling, Grinding and Pulverizing of all kinds.
Practical Working Tests of Ore by all Processes. Mining Machinery Bought and Sold. Check Assays. Instructions given in Assaying. All Work Guaranteed. Mines Examined, Sampled and Reported on by M. P. BOAG, M. E. and Cyanide Expert

LOUIS FALKENAU,
STATE ASSAY OFFICE,
434 California St., near Montgomery.
Analysis of Ores, Metals, Soils, Waters, Industrial Products, Foods, Medicines, etc., etc.
Court Experting in all branches of Chemical Technology. Working Tests of Ores and Investigation of Metallurgical and Manufacturing Processes. Consultations on all questions of applied chemistry. Instructions given in assaying and all branches of chemistry.

E. E. BURLINGAME & CO.,
ASSAY OFFICE AND CHEMICAL LABORATORY
Established in Colorado, 1866. Samples by mail or express will receive prompt and careful attention
Gold & Silver Bullion Refined, Melted and Assayed OR PURCHASED.
Concentration Tests—100 lbs. or car load lots. Write for terms.
1736-1738 Lawrence St., Denver, Colo.

RELIABLE ASSAYS.

Gold...............	$ .50	Gold and Silver....	$ .75
Lead	.50	Gold, silver, copper	1 50

Samples by mail receive prompt attention.
Rich Ores and Bullion Bought.
OGDEN ASSAY CO.,
1429-16th St., Denver, Colo.

Independent Assay Office.
ESTABLISHED 1868.
D. W. Reckhart, E. M., Proprietor.
Agent for Ore Shippers.
Assays and Chemical Analysis.
Mines Examined and Reported Upon.
BULLION WORK A SPECIALTY
P. O. Box 88. Office and Laboratory:
Cor. SAN FRANCISCO & CHIHUAHUA Sts.
EL PASO, TEXAS.

J. W. RICHARDS,
(Late of Aspen, Colo.)
ASSAYER AND CHEMIST. 1754 Champa Street, DENVER, COLO.
Ore Shippers' Agent. Write for Terms.

JAMES ANGUS SNEDAKER,
Mining Engineer,
721–722 Equitable Building, Denver, Colo., U. S. A.

Samples by Mail or Express Will Receive Prompt Attention.
ALBERT I. GOODELL,
ASSAYER AND CHEMIST,
1430 Stout Street....................DENVER, COLO.

Brunton's Pat. Pocket Mine Transit.

1-3 ACTUAL SIZE.

The engraving herewith illustrates Brunton's Pat. Pocket Mine Transit as it appears when folded ready for the pocket.

The working parts are enclosed by an aluminum case, the outside dimensions of which are but 2¾x2¾x1 inches and the total weight but 8 ounces.

There are over two hundred of the above instruments in daily use at the present time, and those using them unite in pronouncing them the most convenient, accurate and reliable pocket instruments on the market. Send for Catalogue B to

WM. AINSWORTH & SONS,
(Successors to WM. AINSWORTH.)
Denver, Colorado, U. S. A.

F. W. Braun & Co., Los Angeles, Cal., Agents for balances and the Brunton Patent Pocket Transit.
John Taylor & Co., San Francisco, Cal., Agents for balances and the Brunton Patent Pocket Transit.
H. S. Crocker Co., San Francisco, Cal., Agents for the Brunton Patent Pocket Transit.
Pacific Optical Co., Los Angeles, Cal., Agents for the Brunton Patent Pocket Transit.

HERMANN J. VAN DIEREN,
Assayer and Metallurgist,
1407 Seventeenth St., DENVER, COLO.

Stamp Mill and Reduction Works: 19th St. and Platte River.

Buyer of every description of Ores and Precious Stones. Rights for sale for process of treating refractory gold ores; also process for treating low grade copper ores. Write for particulars.

HENRY E. WOOD,
ASSAYER,

1734 Arapahoe St., DENVER, COLO.

Ore Tested in Carload Lots.
Write for Circular.

ALVIN PHILLIPS & CO.,

Chemists, Mining and Metallurgical Engineers,

1761 MARKET STREET,

DENVER, - COLO.

Complete Ore-Testing Works — capacity ten pounds to two tons. Modern Methods of Lixiviation, Cyanide and Chlorination. Concentration on Bartlett Table. Assaying and Bullion Refining. Chemical Analyses of Oils, Coal, Water, and all solutions. WRITE FOR PRICES.

The State Ore Sampling Co.

DENVER, COLO.

We buy Gold, Silver, Lead, Copper, Bismuth, Uranium, Wolframite, Cobalt, Molybdenite and Antimony Ores. We have modern sampling mills, also test ore for the new processes of ore reduction.

Our long experience in the market enables us to obtain the highest prices for all marketable ores. Write for our "Reference Book." Send analysis of your ore for prices and information.

BAILY & MONNIG, Managers.

Hoskins' Patent Hydro Carbon Blow-Pipe and Assay Furnaces.

No dust. No ashes. Cheap, effective, economical, portable and automatic.

SEND FOR PRICE LIST TO

W. HOSKINS, 81 South Clark St., Room 55, CHICAGO, ILL.

SMITH & THOMPSON,
Manufacturers of Fine
ASSAY BALANCES.
Write for Catalogue.
2219 Stout St.,
Denver, Colo.

THE ROESSLER & HASSLACHER CHEMICAL CO.,
100 William Street, New York.

CYANIDE

Peroxide of Sodium

Hyposulphite of Soda

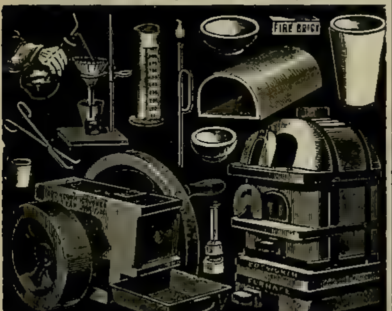
Chloride of Lime

Sulphide of Iron

And Other Chemicals for Mining Purposes.

THE DENVER FIRE CLAY CO.,

1742 to 1746 Champa St., DENVER, COLO.



Manufacturers, Importers and Dealers in
Chemicals, Apparatus and Assayers' Supplies, Fire Brick and Tile.
Sole Agents for the "AINSWORTH BALANCES."
WRITE FOR CATALOGUES.

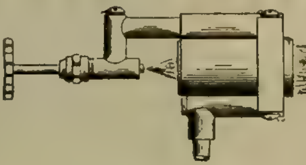
10,000 Boiler Feed Waters Are Being Treated by Dearborn Methods.

Send us a jug of your feed water for analysis and let us prepare you a compound to suit.

DEARBORN DRUG & CHEMICAL WORKS,
Manufacturing and Analytical Chemists. Makers of Boiler Compounds.
29, 30, 31, 32 and 33 Rialto Bldg. - - - CHICAGO, ILL.

Taylor's Coal Oil and Gasoline Burner

(PATENTED)



A new heating burner for Assayers and Chemists, or for brazing, in which coal oil at 33 deg. to 45 deg., Beaume and 150 deg. fire test, or gasoline at 74 deg. test can be used for fuel. Adapted to crucible, muffle and brazing work. Price $6. For sale by

JOHN TAYLOR & CO.,
63 FIRST STREET,
SAN FRANCISCO, CAL.

MINE AND MILL SUPPLIES.
Importers and Manufacturers of Assayers' Materials, Chemicals and Acids, Etc.
CATALOGUE ON APPLICATION.

IMPROVED BONE ASH.

It is 100% better than Bone Ash now being used; will absorb more lead, will never crack or split in the Muffle, can be dropped before or after using without breaking. Cupels can be made and used at once; no drying required. Excessive heat has no effect on them. Will stand shipping any distance. It takes up none of the precious metals in cupeling Cupels much quicker. Once used always used. Sold under a positive guarantee or money refunded. Now being used by all smelters and assayers who have tried it.

Price of Improved Bone Ash, $60.00 per ton; $3.50 per 100 lbs.; or manufactured Cupels, $1.50 per hundred.

J. J. CUMMINGS & CO., Sole Mfrs.,
Telephone Clay 972. 10 STEVENSON ST., SAN FRANCISCO, CAL.
For Sale also by Justinian Caire Co., Dealers in Assay Goods and Mining Supplies, 521-523 Market St.

PIONEER REDUCTION CO.

Established 1858. **Nevada City, Cal.**

Buyers of Gold, Silver and Copper Ores and Concentrates.

HIGHEST PRICES PAID FOR COPPER ORES.
WRITE FOR RATES.

ESTABLISHED 1856.

Controls AND Check Assays

(A SPECIALTY.)

MARINER & HOSKINS,
ASSAYERS AND CHEMISTS,
Mining Engineers and Metallurgists.

SEND SAMPLES BY MAIL OR EXPRESS.
MAILING SACKS ON APPLICATION. : :

81 South Clark Street.
Rooms 51-55,
CHICAGO, ILLINOIS.

ST. LOUIS SAMPLING & TESTING WORKS,

1225 and 1227 Spruce St.,
ST. LOUIS, MO.

The Largest and Most Complete Ore Testing Works in Existence for Making all Kinds of Practical Working Tests of Ore, etc., to Determine the Most Suitable Method of Treatment.

PLANT FOR COAL WASHING, COKING AND STEAMING TESTS OF FUELS. ASSAYS, ANALYSES, CHEMICAL AND PHYSICAL INVESTIGATIONS OF ALL KINDS. MINERAL PROPERTIES, MINES AND METALLURGICAL PROCESSES EXAMINED AND REPORTED UPON. CORRESPONDENCE SOLICITED.

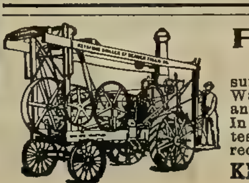
New Process of Copper Extraction.

CHEAP, CLEAN AND EFFECTIVE.

THE GARDINER LEACHING PROCESS FOR COPPER ORES.

TESTS MADE ON ANY QUANTITY OF ORES AT REASONABLE RATES.
FULL PARTICULARS ON APPLICATION.

THE AMERICAN COPPER MINING & EXTRACTION CO., DENVER, COLO.



Prospecting Machinery.

Multitudes in use for testing for minerals. Sizes and equipments to suit any and all conditions. Unexcelled for Placer Testing, Oil Wells, Water Wells, testing for Lead and Zinc, Iron and Coal; goes through anything; brings up everything. Large sizes drill as much as 1500 feet. In use all over the world. Every purchaser pleased. Used on boats for testing river and lake beds. Water no hindrance. No skilled labor required.

KEYSTONE DRILLER CO., Beaver Falls, Pa., U. S. A.

Ammonia Process.

The practical success of this process is well known and is demonstrated chemically, technically and mechanically in every detail on a large scale. Refractory ores and tailings containing gold, silver, copper and zinc are extracted successful and profitable. Mail average sample and $10 and receive full report about the extraction.

Pocketbook, Ammonia Process, full description, $1.

Instructions in Chemistry and all successful and practical Lixiviation Processes.

Office and Laboratories:
334 KEARNY STREET, SAN FRANCISCO, CAL.
H. HIRSCHING,
Mining Engineer and Chemist.

ELEVATING CONVEYING MACHINERY FOR MILLS-POWER HOUSES-FACTORIES.

THE JEFFREY MFG. CO.
COLUMBUS, OHIO.
·U·S·A·

OUR SPECIALTIES INCLUDE, STANDARD AND SPECIAL CHAINS - SPROCKET WHEELS - ELEVATOR BUCKETS - BOOTS - BOLTS - SCREENS - SPIRAL CONVEYORS - CABLE CONVEYORS - DUMP CARS - SKIP CARS - COAL AND ASHES HANDLING MACHINERY - COAL AND COKE CRUSHERS - DREDGES - RUBBER BELT CONVEYORS - COAL MINING MACHINERY - COAL WASHING MACHINERY - LABOR SAVING APPLIANCES ETC.
SEND FOR CATALOGUE.
COLUMBUS. NEW YORK. DENVER.

Western Branch, Equitable Bldg., Denver, Colo.

THE LITTLE ALASKA GOLD WASHER.

Price **$6.** Saves the Gold. *Weighs only* 7 1-2 Lbs.

After several years' practical use in different fields, our washer has established its superiority over all placer or beach washers. It is just the washer for Cape Nome; it was used extensively in Alaska last year with every success. In working the operator does not have to wet his hands and can stand in an upright natural position. It is just the washer for the poor man who has not the money to put in expensive machinery. It will do the work of ten men with gold pans. It is just the washer for the prospector, being light and easy to pack. Don't fail to write us if in need of a washer; we can save you *time, labor* and *money.* RUSSELL & KINSEY, 1237 Magnolia Ave., Los Angeles, Cal

---

PIPE PIPE

PIPE for Hydraulic Power and Irrigation.
OIL STORAGE TANKS.
GENERAL SHEET IRON WORK.
Lacy Manufacturing Co.,
LOS ANGELES.

Mining, Mill, Driving Lamps
—AND—
Locomotive Headlights.

◆◆◆◆◆◆

SIZES ON HAND:
24-inch,
20 "
17 "
14 "
12 "
10 "
8 "
6 "

Boesch Lamp Co.,
Pacific Lamp and Reflector Factory,
585 MISSION STREET, : : : : : SAN FRANCISCO.

HEALD'S

BUSINESS COLLEGE.
24 Post Street, - - - San Francisco.

MINING AND CIVIL ENGINEERING DEPARTMENT: Mathematics, Draughting, Strength of Material, Chemistry, Assaying, Blow-Pipe Analysis, Geology, Mineralogy, Surveying, etc., under the direction of Prof. O. H. Packer, an engineer of national reputation.

ELECTRICAL DEPARTMENT: Theory and Practice; Construction,

BUSINESS: Bookkeeping, Shorthand, Typing, Modern Languages, etc.

Twenty teachers; individual instruction; can enter at any time; Catalogue and Journal free.

SELBY SMELTING AND LEAD CO.,

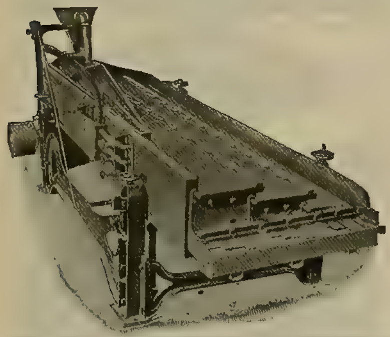
REFINERS OF GOLD AND SILVER BARS, GOLD DUST, ETC.

Buyers of Gold, Silver, Lead and Copper Ores, Gold Concentrates, Lead Bullion, Cyanide Product, Etc.

ORE AND BULLION ASSAYERS.

Works at VALLEJO JUNCTION, CAL. Office, 416 MONTGOMERY ST., SAN FRANCISCO, CAL.

THE IMPROVED BARTLETT CONCENTRATING TABLE.



The BARTLETT CONCENTRATING TABLE has been GREATLY IMPROVED recently by the substitution of iron in place of wood wherever possible. It is now built with SOLID IRON TOP, PLANED TO A TRUE SURFACE AND POLISHED; all parts are made by template and EACH PART BEING INTERCHANGEABLE. As now constructed, the table has no special wearing parts and will last for many years. It has a CAPACITY OF FROM FIFTEEN TO FORTY-FIVE TONS IN TWENTY-FOUR HOURS, according to the class of ore worked. It is the only table in the world which will take the place of jigs and do away with all costly and complicated machinery.

It is Especially Designed for Separating Zinc from Lead.

Send for our illustrated catalogue, containing all the latest information on the concentration of ores.

THE COLORADO IRON WORKS CO.,

Established 1860. DENVER, COLO., U. S. A.

CHAS. C. MOORE & CO.,

—ENGINEERS AND DEALERS IN—
MAGNOLIA ANTI-FRICTION METAL,
HAMILTON CORLISS ENGINES, N. Y. SAFETY AUTOMATIC ENGINES,
BABCOCK & WILCOX BOILERS, McINTOSH & SEYMOUR ENGINES,
GREEN'S ECONOMIZERS, HOPPES LIVE STEAM PURIFIERS,
WHEELER CONDENSERS, BARNARD-WHEELER COOLING TOWERS,
EDMISTON FEED WATER FILTERS, BUNDY STEAM TRAPS,
SNOW STEAM PUMPS, QUIMBY SCREW PUMPS,
GOUBERT FEED WATER HEATERS, STRATTON STEAM SEPARATORS,
SPENCER DAMPER REGULATORS, HYATT ROLLER BEARINGS.

Contracts for Installation of Power Plants, Any Capacity.

SEND FOR CATALOGUES AND FULL INFORMATION.

32 FIRST STREET, SAN FRANCISCO, CAL.

SEATTLE BRANCH.............313 FIRST AVE. SOUTH.
LOS ANGELES BRANCH.......103 SOUTH BROADWAY.

THE

Pelton Water Wheel Company

Gives exclusive attention to the development and utilization of water powers by the most modern, economic and improved methods. An experience of more than fifteen years, involving both the theory and practice of hydraulic engineering as relates to power development in its widest range of application, is at the service of its customers.

Nine Thousand Wheels Now Running,

Averaging some 700,000 H. P.

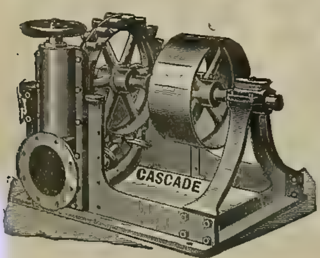
ELECTRIC POWER TRANSMISSION.

Pelton wheels afford the most reliable and efficient power for such service and are running the majority of stations of this character in the United States, as well as most foreign countries. Highest efficiency and absolute regulation guaranteed under the most extreme variations of load.

The Pelton Water Wheel Company,

121 & 123 MAIN STREET, SAN FRANCISCO, CAL.

TURBINE AND CASCADE WATER WHEEL



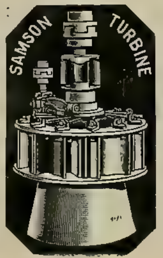
Adapted to all Heads from

3 Feet to 2000 Feet.

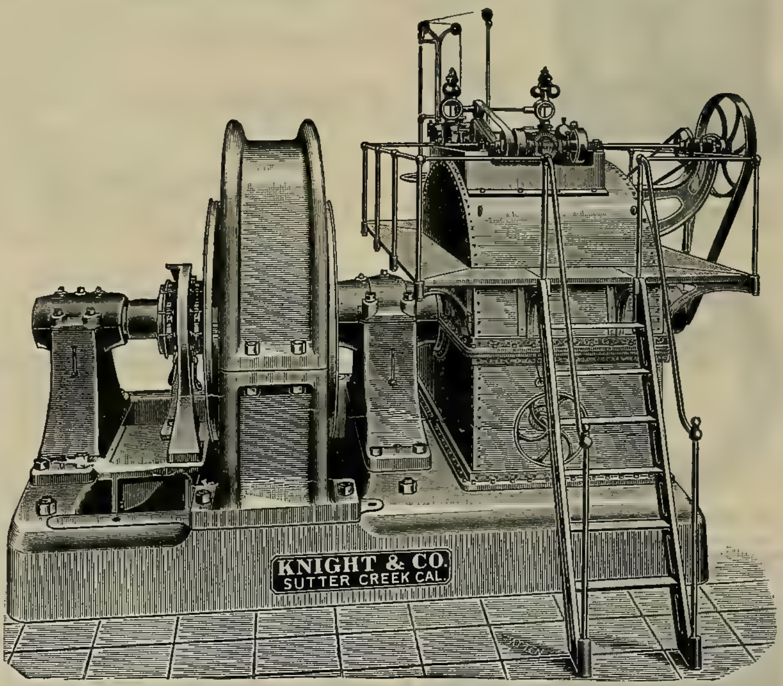
Our experience of 38 YEARS building Water Wheels enables us to suit every requirement of Water Power Plants. We guarantee satisfaction.

State your Head and requirements. Send for pamphlet.

JAMES LEFFEL & CO.
SPRINGFIELD, OHIO, U. S. A.



KNIGHT'S WATER WHEEL.


KNIGHT & CO.
SUTTER CREEK CAL.

The accompanying cut shows the general arrangement of **The Knight Water Wheel**, direc-coupled to a 750 kilowatt generator, with governor mounted on top of wheel casing.
These wheels are designed for **100 to 2500 H. P. Highest efficiency and regulation guaranteed.**

WHEELS FROM 6 TO 24 INCHES, ENCLOSED IN CAST-IRON CASING.

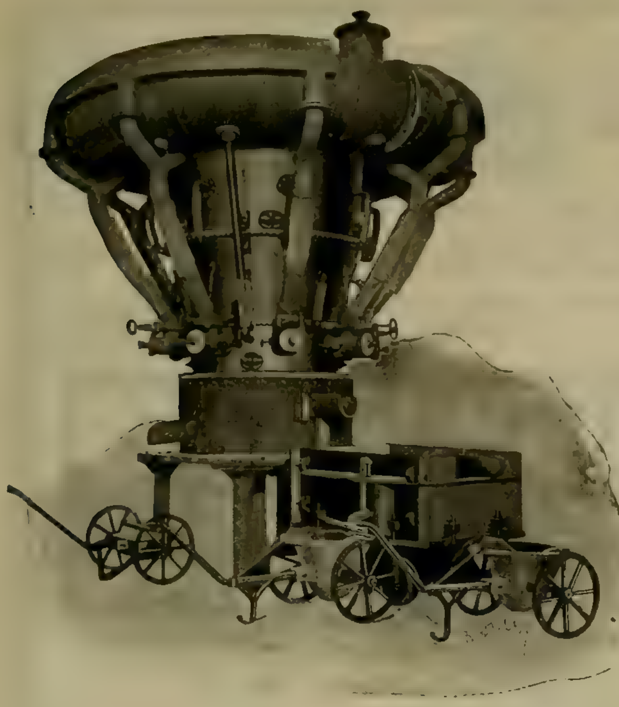
Wheels for mill and reversible hoisting works a specialty.

KNIGHT & CO., Sutter Creek, Cal.

For full particulars, send for descriptive catalogue.

STRICTLY **C. P. ACIDS** and **C. P. AMMONIA**

MANUFACTURED BY
The Western Chemical Co.,
DENVER, COLO.
For Laboratory Use and Fine Chemical Work.
PURITY GUARANTEED.
Also COMMERCIAL ACIDS.



THE COPPER FURNACE

Here illustrated has OUR PATENT

WATER VAPORIZING ATTACHMENT.

Experience has proven this to be the best of all methods for applying water for the cooling of jackets. It has the further great advantage of using only about one-eighth the usual amount of water needed for that purpose, and all jackets are kept at the same temperature.

We Manufacture Smelting Furnaces and Equipments

FOR THE TREATMENT OF

GOLD, SILVER, LEAD, COPPER and NICKEL ORES.

of any desired tonnage capacity above forty tons per day, and put them into successful operation under guarantee. Write for catalogue showing different styles of furnaces.

We also design, manufacture and erect Smelter Sulphide Mills for crushing and sampling ores. We are the originators of the Narrow Face, Large Diameter, High Speed Crushing Rolls. A full description of our Crushing Machinery is given in a special catalogue, which will be sent on application.

THE COLORADO IRON WORKS CO.

ESTABLISHED 1860.

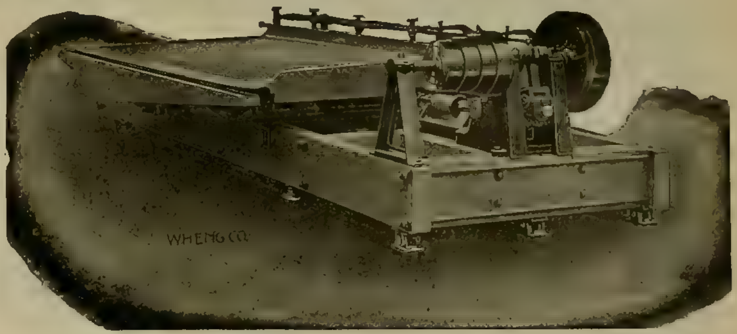
DENVER, COLO., U. S. A.

THE : CAMMETT : CONCENTRATOR.

Designed with some Regard for the Laws of Concentration.

From **The Denver Evening Post,** July 15th, 1900.

* * * "Now about concentrating tables. Here's a fellow who says there's nothing equal to the Wilfley, and I am trying to convince him that old man Woodbury over in California makes the finest table in the world." "No, sir," said his comrade, "you're way off. I've tried the CAMMETT too thoroughly to believe there's anything made to equal it."



Manufactured Under U. S. Patent No. 632,892; Dated Sept. 12, 1899.

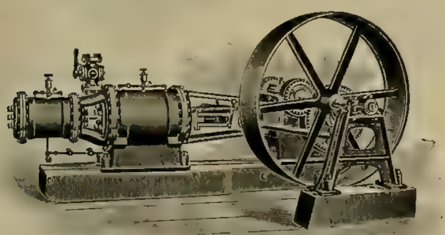
Denver Engineering Works,---Shepard & Searing,---Sole Manufacturers,

30th and Blake Streets, - - - - DENVER, COLORADO.

WHY NOT have our catalogues, specifications and prices before you purchase

AIR DRILLS OR COMPRESSORS?

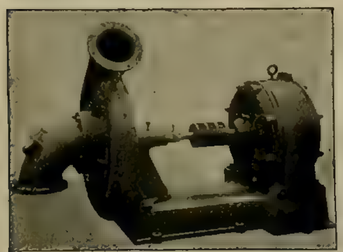
Our guarantees are strong; our customers are satisfied. We can satisfy YOU.



J. Geo. Leyner,

729 Seventeenth St.,

DENVER, COLO.



CENTRIFUGAL PUMPS

—FOR—

Mine Draining or Hydraulicking.

WE DESIGN PUMPS FOR ALL CONDITIONS.

WRITE FOR CATALOGUE.

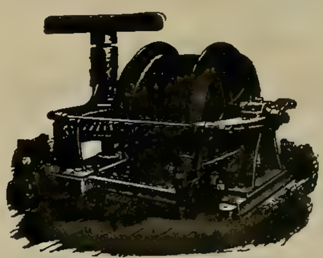
BYRON JACKSON MACHINE WORKS, - SAN FRANCISCO, CAL.

JOSHUA HENDY MACHINE WORKS,

No. 42 FREMONT STREET, SAN FRANCISCO, CAL.

—BUILDERS OF—

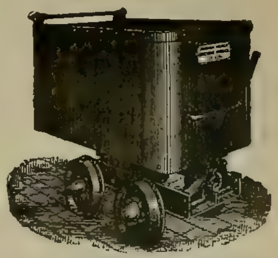
"Davis" Horse Power Whims. Ore and Rock Cars.



Specialty of
PROSPECTING,
MINING and
MILLING
PLANTS.

ORE and WATER
BUCKETS.

"T" RAIL OF
USUAL WEIGHTS,
EITHER NEW
OR SECOND-HAND,
FOR SALE
CHEAP.

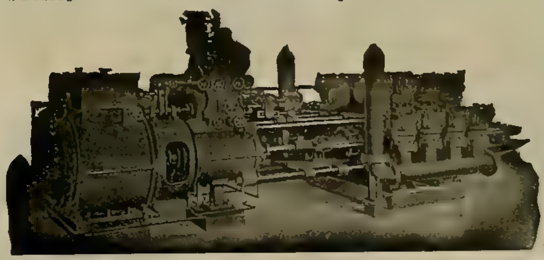


The Best MINE PUMPS in the World.

COMPOUND CONDENSING AND TRIPLE EXPANSION STATION PUMPS.

We carry in our Denver store a stock of Improved Pattern Sinkers and Duplex Station Pumps, with duplicate parts for repairs.

Write for Catalogue and Estimates.



Jeanesville Iron Works Co.,
JEANESVILLE, PA.

Western Office,
Columbia Hotel Building,
1328 17th St.
Denver, Colo.
Telephone 2298 A.
A. MIDDLEBROOK, Manager.

THE CAL. ANTI-CALORIC COMPANY,

Tel. Main 5752. Office, 217-219 Mission St., San Francisco, Cal.

Sole Manufacturers of CAL. ANTI-CALORIC SECTIONAL COVERINGS AND BLOCKS FOR BOILERS. PLASTIC (dry) for Steam Domes, Etc. Sole Agents for the Boston Asbestos Paper Co. Asbestos Goods of All Kinds. Send for Information. Factory, Potrero.

Founded by Mathew Carey, 1785.

HENRY CAREY BAIRD & CO.,

INDUSTRIAL PUBLISHERS, BOOKSELLERS & IMPORTERS,

810 Walnut St., Philadelphia, Pa., U. S. A.

☞ *Our New and Revised Catalogue of Practical and Scientific Books, 92 pages, 8vo; a Catalogue of Books on Steam and the Steam Engine, Machinery, etc.; a Catalogue of Books on Sanitary Science, Gas Fitting, Plumbing, etc., and our other Catalogues and Circulars, the whole covering every branch of Science applied to the Arts, sent free and free of postage to any one in any part of the world who will furnish his address.*

ASSESSMENT NOTICES.

GOULD & CURRY SILVER MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Virginia, Storey County, Nevada.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 6th day of August, 1900, an assessment (No. 91) of fifteen (15) cents per share, was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, room No. 69, Nevada block, No. 309 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 8th day of September, 1900, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 1st day of October, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

ALFRED K. DURBROW, Secretary.

Office—Room No. 69, Nevada block, No. 309 Montgomery street, San Francisco, California.

BEST & BELCHER MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Virginia District, Storey County, Nevada.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 3d day of August, 1900, an assessment (No. 71) of fifteen (15) cents per share, was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, room 33, Nevada block, No. 309 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 7th day of September, 1900, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on FRIDAY, the 28th day of September, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

M. JAFFE, Secretary.

Office—Room 33, Nevada block, No. 309 Montgomery street, San Francisco, California.

ALLIANCE EXPLORATION & MINING COMpany.—Location of principal place of business, San Francisco, California; location of works, Ophir, Placer County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 3d day of August, 1900, an assessment (No. 3) of five (5) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 236 Sutter street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 11th day of September, 1900, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 2nd day of October, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

S. GOLDSMITH, Secretary.

Office—236 Sutter street, San Francisco, California.

EUREKA CONSOLIDATED DRIFT MINING COMpany.—Location of principal place of business, San Francisco, California; location of works, Forest Hill, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 9th day of August, 1900, an assessment (No. 26) of one (1) cent per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 214 Pine street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 8th day of September, 1900, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on SATURDAY, the 29th day of September, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

GEO. W. DIXON, Secretary.

Office—214 Pine street, San Francisco, California.

SAVAGE MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Virginia, Storey County, Nevada.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 13th day of August, 1900, an assessment (No. 101) of ten cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Rooms 20-22, Nevada block, No. 309 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 18th day of September, 1900, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 8th day of October, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

JOHN W. TWIGGS, Secretary.

Office—Rooms 20-22, Nevada block, No. 309 Montgomery street, San Francisco, California.

AMERICAN OIL AND REFINERY COMPANY.—Location of principal place of business, San Francisco, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 21st day of August, 1900, an assessment of ten (10) cents per share was levied upon all the subscribed capital stock of the said corporation, payable immediately to J. C. Anthony, secretary of said corporation, at its office, at room No 323 of the Parrott building, Nos. 825 to 855 Market street, in the City and County of San Francisco, State of California.

Any stock upon which this assessment shall remain unpaid on the 26th day of September, 1900, will be delinquent and advertised for sale at public auction; and, unless payment is made before, will be sold on MONDAY, the 29th day of October, 1900, to pay the delinquent assessment, together with costs of advertising and expenses of sale.

By order of the Board of Directors.

J. C. ANTHONY, Secretary.

Office—Room 323 Parrott building, Nos. 825 to 855 Market street, San Francisco, California.

INVENTORS, Take Notice!

L. PETERSON, MODEL MAKER,

544A MISSION STREET, bet. First and Second Sts., SAN FRANCISCO. Experimental machinery and all kinds of models. Tin and brasswork. All communications *strictly confidential.*

DELINQUENT SALE NOTICE.

COLUMBIA ATHLETIC CLUB (INC.)—Location of principal place of business, San Francisco, California.

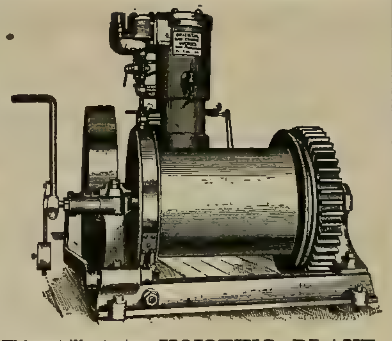
Notice.—There are delinquent upon the following described stock, on account of assessment (No. 4) levied on the 27th day of June, 1900, and payable Saturday, June 30, 1900, the several amounts set opposite the names of the respective shareholders, as follows:

Name.	No. Cert.	No. Shares.	Amt.
Daniel F. Crowley........... ...		15	$50 00

And in accordance with law, and an order from the Board of Directors, made on the 27th day of June, 1900, so many shares of each parcel of such stock as may be necessary, will be sold at public auction at the office of the club, 1200 Market street, San Francisco, California, on THURSDAY, the 30th day of August, 1900, at the hour of 12:30 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

JNO. H. EFFINGER, Secretary.

Office—1200 Market street, San Francisco, California.



This cut illustrates our 4 H. P. to 8 H. P. **HOISTING PLANT.**

Larger sizes built to suit the demands of our customers.

It is strong and exceedingly simple and durable, being entirely under the control of the operator, by the use of a single hand lever for hoisting, while the lowering is governed by a foot lever and brake.

No better device has been designed for this purpose. For prices and further information address the builders.

Oriental Gas Engine Co., 227 Folsom St., S. F.

DENVER & RIO GRANDE R.R.
SCENIC LINE OF THE WORLD

The ∴ Mining Man's Favorite Route

BETWEEN

Denver, Colorado Springs, Pueblo and Florence, Cripple Creek, Leadville, Glenwood Springs, Aspen, Gunnison, Lake City, Creede, Durango, Silverton, Telluride and Ouray,

Reaching all the Mining, Milling, Cyaniding, Chlorinating and Smelting centers in Colorado and Utah, and all mining points in California, British Columbia and the Pacific Northwest by close connections and a perfect system of through car service.

Pullman Palace and Tourist Sleeping Cars between Denver and San Francisco and Los Angeles, and Pullman Palace and Tourist Sleeping Cars and Free Reclining Chair Cars between Denver and Portland. : : A Perfect Dining Car Service on All Through Trains. : :

For Illustrated Pamphlet, address

W. J. SHOTWELL, G. A. D. & R. G. R. R., 126 California St., San Francisco, Cal.	S. K. HOOPER, G. P. & T. A., Denver, Colo.

THE MINES OF
Eastern Oregon

Which are now attracting so much attention are reached only by the lines of the

OREGON RAILROAD & NAVIGATION CO.

For Descriptive Pamphlets, Through Rates, Etc., Address

E. C. WARD, Gen. Agt.,
630 Market Street, San Francisco.

COLORADO'S GOLD

Output for 1899 is unequaled by any State in the Union. Cripple Creek, Leadville, and all the important mining towns are reached by

THE COLORADO & SOUTHERN RY...

For copies of our publications on the Swandyke and Pine Creek Gold Districts, or our pamphlet "Hints to Prospectors," address

**T. E. FISHER, GEN. PASS. AGT.
DENVER, COLO.**

EFFECTING ECONOMY IN

Steam and Power Plants

IS MY BUSINESS.

DOES IT INTEREST YOU?

Howard H. Fielding,
1328 Seventeenth St., DENVER, COLO.

THE DAVIDSEN

PATENT TUBEMILL.

FOR FINE GRINDING,

Uniformity of Output, Effectiveness, Simplicity, or Economy of Operation and Maintenance, "THE DAVIDSEN" HAS NO EQUAL.

ENORMOUS GRINDING SURFACE. ✤ SLOW SPEED. ✤ ANY DEGREE OF FINENESS.

WRITE FOR CATALOGS.

F·L·SMIDTH & CO
ENGINEERS

66 MAIDEN LANE, NEW YORK
COPENHAGEN, VESTERGADE 29.K. LONDON, 9 BRIDGE ST., S.W.

THE SMIDTH BALLMILL

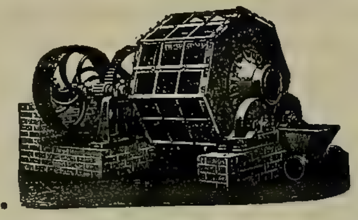
Crushes, Grinds and Sifts in One Operation, Working Continuously.

AMONG ITS SPECIAL FEATURES OF MERIT ARE:

Maximum Output, Slow Speed, Low Horse Power, Absolute Uniformity, Ease of Access, Slight Cost of Repairs.

OUR AUTOMATIC FEEDER INSURES REGULARITY AND EFFECTIVENESS.

THE SMIDTH BALLMILL.



BEST. CHEAPEST. MOST SIMPLE.

Wonderful Saving in Steam Consumption.

THE ERWIN STEAM RAM

HAS A GUARANTEED EFFICIENCY OF 50 TO 150 PER CENT OVER A DUPLEX STEAM PUMP.

A New and Remarkable Invention for Elevating Water from Tubular or Other Wells, or from Rivers, Lakes, Etc.

Made in 14 Sizes, Varying in Capacity from 400 to 7800 Gallons Per Hour.

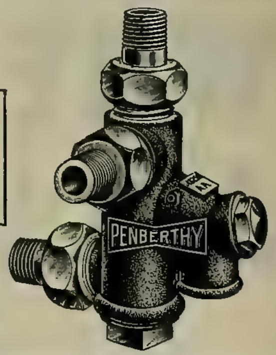
Will Elevate Up to 60 Feet with 75 Lbs. Steam Pressure.

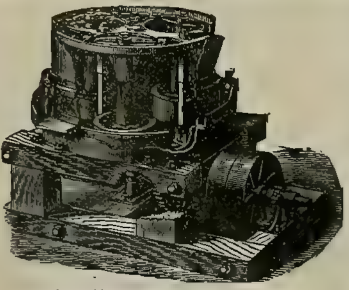
Full descriptive circular showing comparative tests of Ram and Steam Pump sent on request.

Manufactured and Guaranteed by the Makers of the World Renowned

TRADE PENBERTHY MARK.

AUTOMATIC INJECTOR.
Standard Boiler Feeder of the World.
Over 200,000 in Use.
PENBERTHY INJECTOR CO.,
DETROIT, MICH.





Centrifugal Roller Quartz Mill.

F. A. HUNTINGTON,

—Manufacturer of—

CENTRIFUGAL Roller Quartz Mills.

CONCENTRATORS and ORE CRUSHERS.
Mining Machinery of Every Description.
Steam Engines, Shingle Machines.
Room 1, 3d Floor, Mills Building,
SAN FRANCISCO, CAL.

TELEPHONE MAIN 5303

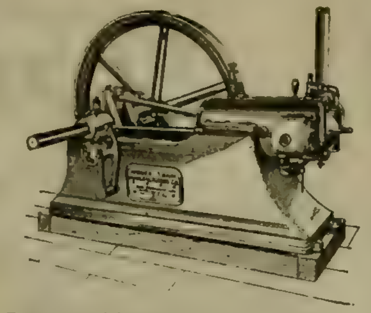
Union Photo-Engraving Co.

DESIGNING HALF-TONES ZINC ETCHING

523 MARKET ST
SAN FRANCISCO, CAL.

Thousands of engineers can testify to their efficiency. We want your endorsement also. Buy a Lubricator from your jobber. We guarantee it to give perfect service or money refunded. Jobbers on Pacific coast sell them.

The Wm. Powell Co.,
Cincinnati, Ohio.



Distillate Engines and Hoists.

Air Compressors.

HADWEN SWAIN MFG. CO.,
215-217 SPEAR ST., SAN FRANCISCO, CAL.
CATALOGUES MAILED.

WITTE GASOLINE HOISTS

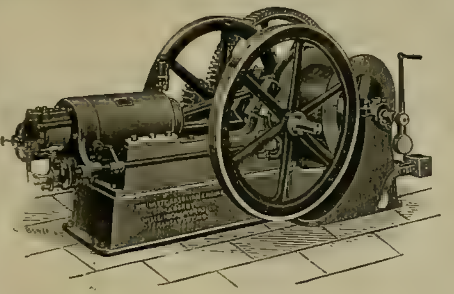
ARE MONEY EARNERS.

Made for use in places far from factory. Are built in parts and in duplicate. Renewals easy and quick to get. Strong, substantial and reliable.

Operate on GAS, GASOLINE or DISTILLATE.

There Are Others, but None as SAFE AND RELIABLE.

Write for Illustrated Catalogue G.



WITTE IRON WORKS CO.,
515 WEST 5th ST.,
KANSAS CITY, MO., U. S. A.

Hendrie & Bolthoff Mfg. & S. Co., Denver, Colo.
C. B. Boothe & Co., Los Angeles, Cal.
Tracy Engineering Co., San Francisco, Cal.

THE MARION STEAM SHOVEL CO.,

Steam Shovels
Dredges and
Traction Dredges

Suitable for all kinds of **Excavating Work**, making a specialty of

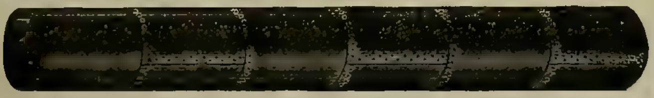
PLACER MINING MACHINES,

separate or self-contained, either as a dry land excavator or floating dredge.

The Marion Steam Shovel Co.
MARION, OHIO.

GEO. W. BARNHART, No. 4 Sutter St., San Francisco, Cal.

RIVETED IRON AND STEEL PIPE



FOR HYDRAULIC MINES, IRRIGATION AND POWER PLANTS. Manufactured from the best grades of IRON or STEEL by MODERN MACHINERY.

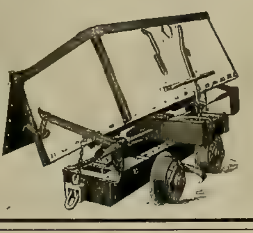
AGENTS FOR THE Celebrated **CANTON STEEL.**

Schaw, Ingram, Batcher & Co.,
539 Mission St., SAN FRANCISCO.
211 to 219 J St., SACRAMENTO.

OUR CARS HAVE BEEN IN USE FOR NINE YEARS.

TRUAX ORE CARS

CARS ALWAYS IN STOCK TO FILL RUSH ORDERS.



CUT REPRESENTS OUR SIDE DUMP CARS.

SEND FOR PAMPHLET.

CARS MADE FOR ALL KINDS OF WORK.

TRUAX MFG. CO.
69 Stevenson St., S.F.

TO SECURE GOOD RESULTS BUY

JESSOP'S STEEL

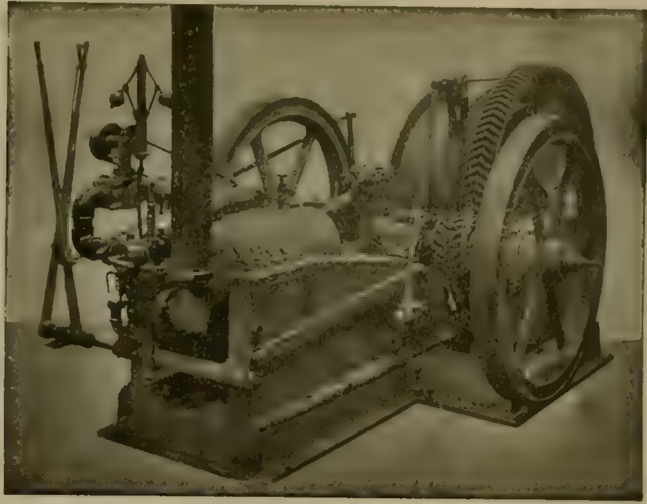
FOR TOOLS, MINING DRILLS, ETC.

Chief American Office,
91 John St., New York, N. Y.

Wm. Jessop & Sons, Ltd.
Manufactory, Sheffield, England.

I. WILLARD BEAM, Agent,
29 MAIN STREET,
SAN FRANCISCO, CAL.

HERCULES HOISTS Are Sold the World Over.

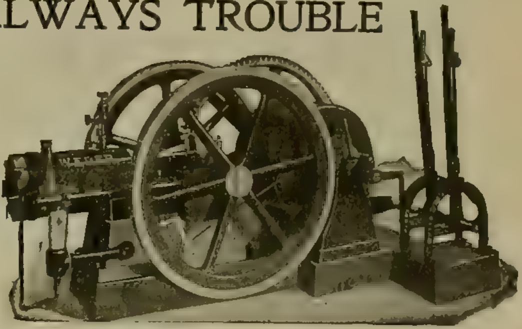


Hercules Gasoline Hoist--Speed 385 Ft.; Load 2500 Lbs.

HERCULES GAS ENGINE WORKS,............141-143 FIRST STREET, SAN FRANCISCO, CAL.

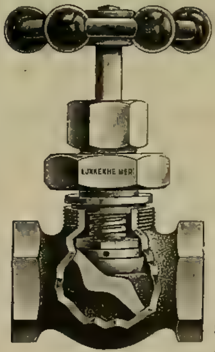
THERE IS ALWAYS TROUBLE

with a second-class Gasoline or Oil Engine or Hoist, and there is no good excuse for buying that kind when the Weber is so easy to get. Write for particulars.



WEBER GAS & GASOLINE ENGINE CO.,
P. O Box 1132-I,
Kansas City, Mo.

REGRINDING VALVES



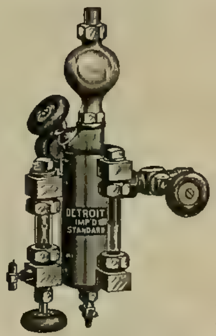
On U. S. Battleships, Cruisers, Torpedo Boats, Locomotives, Lake and River Boats, In Power Plants, Factories, Rolling Mills, Refineries, Everywhere You Will Find

THE LUNKENHEIMER REGRINDING VALVES.

Extensively used. They have no equal for high-class service. In screw and flange ends, ½ to 4 inches for 175 and 350 lbs. working pressures. If you want them *specify* "Lunkenheimer" make, and see that name is cast in shell; none genuine without. Supplied by dealers everywhere. Catalogue gratis.

THE LUNKENHEIMER CO., Cincinnati, Ohio, U. S. A.,
SOLE MANUFACTURERS.

BRANCHES: NEW YORK, 26 Cortlandt St.; PHILADELPHIA, Bourse Bldg.; LONDON, S. E., 35 Gt. Dover St.; MEXICO CITY, Puente de San Francisco No. 6.



ALL ABOUT Sight Feed Lubricators.

Our new catalogue for 1900 is ready for distribution. It explains in detail the principles governing the operation of **Sight Feed Lubricators**, using sectional view to show the internal construction, and containing cuts of the different styles in parts before being assembled into the complete lubricators, thus enabling every one to understand their construction and operation thoroughly.

In addition it shows our full line of **Glass Oilers, Oil Pumps, Oiling Devices, Multiple Oilers, Valves, Etc.** It will be sent to any address on application.

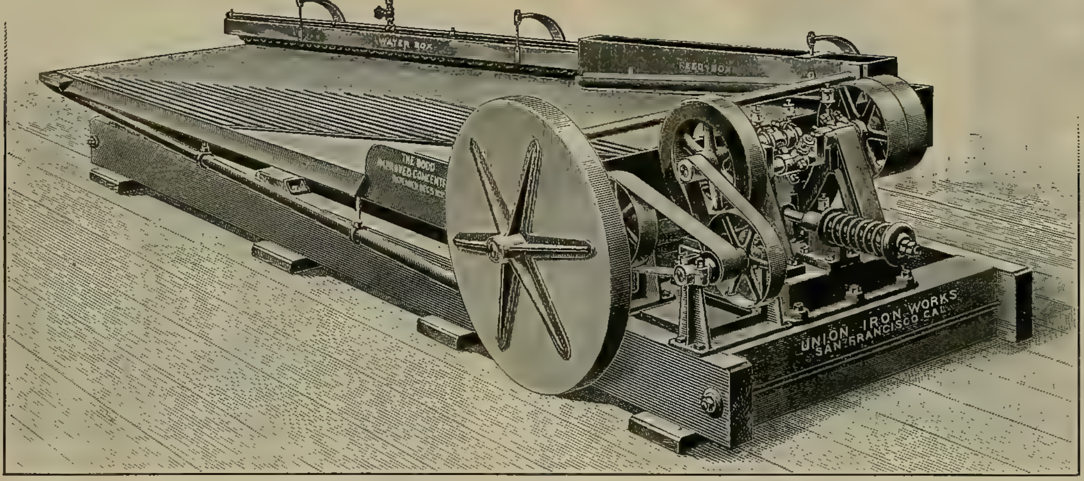
DETROIT LUBRICATOR CO., DETROIT, MICH.

MACHINERY BARGAINS.

I have some splendid Air Compressors, Hoisting Engines, Rock Drills, Rock Crushers, Channeling Machines, Steam Pumps, Boilers, Steam Shovels, Locomotives and Relaying Rails, all in splendid condition. Send for printed list and specify your requirements. I can save you money. WILLIS SHAW, 627 New York Life Building, CHICAGO.

UNION IRON WORKS,

222 Market Street, San Francisco, Cal.


WATER BOX
FEED BOX
THE DODD IMPROVED CONCENTRATOR
UNION IRON WORKS SAN FRANCISCO CAL.

Patented Dec. 5, 1899; May 29, 1900.

THE DODD CONCENTRATING TABLE,

which we illustrate herewith, is the latest and most improved machine of this class now made.

This type of machine is so well known that little or no description is required. It is specially adapted for ores carrying a heavy percentage of sulphurets; has a large capacity and effects a clean separation.

The operating mechanism can be easily adjusted to meet the requirements of any character or condition of ore; it is simple, durable and efficient, and gives universal satisfaction.

For further particulars, address UNION IRON WORKS, San Francisco, Cal.

THE HALLIDIE ROPEWAY

For Transporting Ore, Fuel, Earth, Sugar Cane, etc., by Wire Ropes.

SIMPLE, ECONOMICAL, PRACTICAL, DURABLE.

LOADS MECHANICALLY. DUMPS AUTOMATICALLY.

WIRE TRAMWAYS (Single and Double Rope Systems),

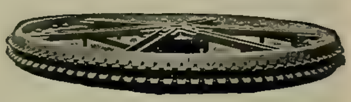
Cableways, Transmission by Wire Ropes,
Incline Planes, Cable Grips,
Logging by Cables, Automatic Loaders,

PLOWING, SCRAPING AND TRANSPORTING by Wire Ropes,

DESIGNED, SUPPLIED AND ERECTED. Estimates Furnished.

Improved GRIP PULLEY.

Patents Nos. 483,442; 610,353.



EFFECTIVE, SIMPLE, AUTOMATIC.

Saves Wear on Wire Rope and Cable.

Send for Illustrated Pamphlet.
Correspondence Solicited.

CALIFORNIA WIRE WORKS, - 9 Fremont St., San Francisco, Cal.

TRIPLE DISCHARGE
Two and Three Stamp Mills.

HOISTING AND PUMPING,
MINING, MILLING AND SMELTING MACHINERY.

Sole Manufacturer **Dodge Mining Machinery,**

Including Pulverizers, Wet and Dry Jigs, Amalgamators,
Distributor and Sizing Boxes, Rock Breakers.

We Carry in Stock: Horizontal, Vertical and Portable Engines and Boilers, Rock Breakers, Cornish Rolls, Pulverizers, Concentrators, Ore Feeders, Hoisting Engines, Horse Power Hoisting Whims, Water Wheels, Steam Pumps, Ore Cars, Wire Rope, Ore Buckets, Water Buckets, Skips, Blowers and Exhaust Fans, Shafting and Pulleys, Belting, Oils and Mine Supplies.

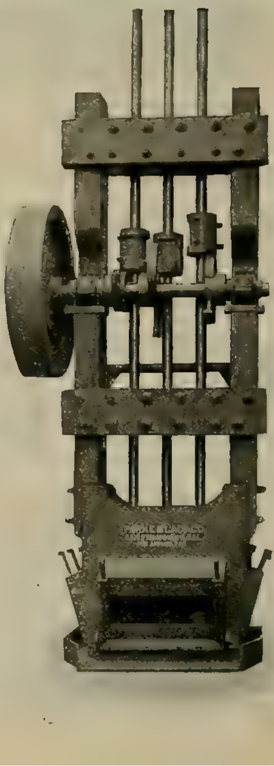
PARKE & LACY CO.,

21 & 23 Fremont St., San Francisco, Cal.

AGENT FOR

KNOWLES PUMPS AND PULSOMETER PUMPS, BULLOCK DIAMOND DRILLS,
INGERSOLL-SERGEANT ROCK DRILLS AND AIR COMPRESSORS.

CATALOGUES FREE ON APPLICATION.



This Pa
to be taken
the Library.

MINING AND SCIENTIFIC PRESS.
AND PACIFIC ELECTRICAL REVIEW.

No. 2094.—VOLUME LXXXI. Number 10. SAN FRANCISCO, SATURDAY, SEPTEMBER 8, 1900. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

Some Modern Explosives.

Gunpowder is not a definite chemical compound like gun cotton and lyddite, but a mixture in a state of unstable equilibrium. On explosion six-tenths of its weight remains in the solid form, giving rise to the well-known dense clouds of smoke. Cordite is an explosive that has come into wide use. It is made in many various forms, usually in fine threads woven into a cord. Though originally intended for small arms, cordite has been largely employed of late in charging heavy guns. The absence of smoke renders its use advantageous in warfare. When fired in a gun the time taken to consume the charge is only a small fraction of a second. It burns in air without explosion, but it will not burn in the absence of oxygen. When placed in a confined space the combustion is attended by explosive force. Cordite may be burned under water, because the heat developed during combustion is so excessive as to supply the atmosphere necessary for combustion to continue.

Ballistite, a mixture of nitro-cellulose and nitroglycerine, is used as an explosive. It is made in various forms, commonly in square slabs, cubes or cylindrical tubes. Nitro-cellulose has a serious defect in that when a certain pressure is attained this substance has the remarkable property of still further increasing that pressure. Picric acid is largely used in the production of lyddite shell. It is fusible and difficult to ignite, burns slowly, and is not free from smoke. The green smoke referred to by war correspondents is due to imperfect methods of preparation.

Of the many explosives now in use cordite is inferior to none in ballistic power. In considering the relative explosive force of one explosive with another, it should be remembered that the method of igniting has much to do with the effect, as seen in the case of cordite. A slab of gun cotton might be burnt in air without any other unpleasant effect than that produced by the smoke. If, however, a few grains of fulminate of mercury were struck smartly in its neighborhood, an explosion would be the result.

Following is a condensed account of the use and manner of preparation of different fulminates:

Fulminate of mercury is used for filling percussion caps. It is prepared on a large scale by dissolving one part of mercury in twelve of pure nitric acid of 1.36 specific gravity, and adding twelve of spirit of wine, when a violent reaction takes place, which is kept in check by adding gradually more alcohol. First, the liquid becomes black by the separation of metallic mercury, which, however, soon disappears. When the liquid becomes cool, the fulminate of mercury separates as a crystalline powder. It is nearly insoluble in cold water; from a boiling solution it is obtained in white prismatic crystals. When kindled in the open air, it burns away like gunpowder, but, by percussion, it is decomposed with a violent detonation. The explosion of the fulminate is so violent and rapid that it is necessary to moderate it for percussion caps. For this purpose it is mixed with potassium nitrate or chlorate. For gun caps, potassium chlorate is generally mixed with the fulminate, and powdered glass is sometimes added to increase the sensibility of the mixture to explosion by percussion. After a little of the composition has been introduced into the cap, it is made to adhere by a drop of solution of shellac in spirit of wine, which renders it also water-proof.

Fulminate of silver is prepared by dissolving ten grains of pure silver at a gentle heat in seventy drops of concentrated nitric acid of 1.42 specific gravity and fifty drops of water. As soon as the silver is dissolved, the heat is removed and 2000 drops of alcohol are added. If the action does not commence after a short time, a very gentle heat may be applied until effervescence begins, when the fulminate of silver will be deposited in minute needles, and may be further treated as in the case of fulminate of mercury. When dry, the fulminate of silver must be handled with the greatest caution, since it is exploded far more easily than the fulminate of mercury. It should be kept in small quantities, wrapped up separately in paper, and placed in a pasteboard box. The violence of its explosion renders it useless for percussion caps, but it is employed in detonating crackers.

Fulminating platinum is obtained by dissolving binoxide of platinum in diluted sulphuric acid and mixing the solution with an excess of ammonia, when a black precipitate will result which detonates violently at about 400° F.

Fulminating gold is obtained as a buff-colored precipitate when ammonia is added to a solution of terchloride of gold. It explodes violently when gently heated.

Open Cut, North End Lucy Mine, Showing Ore "in the Grass Roots" and on Shipping Platform, Dakota M. & M. Co., Black Hills, South Dakota.—See Page 284.

MINING & SCIENTIFIC PRESS.

Face of Ore Header in Anderson Stope, Gunnison Mine, Dakota M. & M. Co., Black Hills, South Dakota.—See Page 284.

MINING AND SCIENTIFIC PRESS.

ESTABLISHED 1860.

Published Every Saturday at 330 Market St., San Francisco, Cal.

ANNUAL SUBSCRIPTION:

United States, Mexico and Canada..$3 00
All Other Countries in the Postal Union 4 00

Entered at the S. F. Postoffice as second-class mail matter.

J. F. HALLORAN..Publisher.

Special Representatives:

EASTERN.
E. H. HAVEN........................150 Nassau St., New York City.
MIDDLE WEST.
CHAS. D. SPALDING..................153 La Salle St., Chicago, Ill.
INTER-MOUNTAIN.
W. A. SCOTT.....................43 Jacobson Building, Denver, Colo.
SOUTHERN CALIFORNIA.
W. D. CURTIS..................223 W. Second St., Los Angeles, Cal.

San Francisco, September 8, 1900.

TABLE OF CONTENTS.

LLUSTRATIONS.—Open Cut, North End Lucy Mine, Showing Ore "in the Grass Roots" and on Shipping Platform, Dakota M. & M. Co., Black Hills, S. D.; Face of Ore Header in Anderson Stope, Gunnison Tunnel, Dakota M. & M. Co., Black Hills, S. D., 277. Prospecting on the Desert; Looking Down the Colorado River from the S. P. Bridge, Yuma, Ariz.; At the Mouth of Fiege Gulch, on the Colorado River, 280. Laborers Working in Mica Mines, Behar, India; Trimming Mica for Market at Behar, India, 281. Latest Mining and Metallurgical Patents, 282. Cam Shafts and Fasteners; Electric Tower at the Pan-American Exposition; Electricity Building at the Exposition, 283. Entrance to Gunnison Tunnel, B. & M. and Elkhorn R. R. Elkhorn Engine Hauling Ore from Gunnison Loading Dump, Dakota M. & M. Co., Black Hills, S. D., 284. A San Francisco Workshop Interior, 286.
EDITORIAL.—Value of Mines and Mining Stocks; Broken Hill Proprietary; New Concentration Process, 278.
MINING SUMMARY.—287-288-289-290.
LATEST MARKET REPORTS.—291.
MISCELLANEOUS.—Some Modern Explosives, 277. Concentrates, 279. The Oldest Gold Mining Camp; Mine Blasting, 280. Mica Mining in India and the United States, 281. Latest Mining and Metallurgical Patents, 282. Cam Shafts and Cam Fasteners; A Coming Electrical Exposition, 283. Some Further Mill Practice in Cyaniding the Silicious Ores of the Black Hills, South Dakota; Silver Smelting in Mexico, 284. The Small Gas Engine, 285. Keeping and Indexing Notes; A San Francisco Workshop; Paris Fair Awards; Electricity in Various Things, 286. Personal; List of U. S. Patents for Pacific Coast Inventors; Notices of Recent Patents; Recently Declared Mining Dividends; Catalogues Received; Commercial Paragraphs; Obituary, 290.

Value of Mines and Mining Stocks.

The usual number of letters are being received, mostly from Eastern investors, who have either bought or are about to buy mining stocks and want an opinion as to the advisability of such purchase as investment. Small investors are necessarily compelled to depend to a great extent upon the representations of others, and such representations are usually made by those whose interest lies in effecting sales. It is a favorite method among some mining companies to capitalize, when incorporating, for 1,000,000 shares at $1 per share, par value, and then offer the stock for from 1 to 5 cents a share.

California is given credit for originating such system, though it would appear to be another case of the pupil outdoing the instructor. The inception of such enterprise is in the gambling spirit, with which so many are imbued. A buyer of 1000 shares at 5 cents a share figures that he can not lose much and will make big returns if "things come his way." Usually business men forming companies for the legitimate development of mines now endeavor to restrict capitalization within the limit of the amount needed for development work, and with little intent to put stock on the market.

As a general thing the public does not care for that kind of stock. It prefers to take a flyer in various enterprises, and it is in deference to that sentiment that the mining companies referred to usually capitalize for say $1,000,000 at $1 a share, offering the stock at 1 to 5 cents a share. The result of the 1,000,000 shares at $1 a share sold at 5 cents a share is about the same as having a capitalization of $50,000 at par. The only difference is that the latter would have little show of general purchase, and it were much easier to sell the 1,000,000 shares at 5 cents than 50,000 shares at $1 a share.

The fact, too, that many a thousand shares of stock bought at 5 cents a share has yielded the investor from $1 to $5 a share tends to perpetuate belief in continued possibility of such infrequent profit. The temptation to fritter the money away realized from the sale of 5-cent stock ofttimes overcomes the original intent to do the work necessary to make the prospect of sufficient value to recoup the original purchasers or afford them any possibility of profit, so that the first consideration would be personal belief, justified by inquiry and knowledge, of the individual integrity of those offering the stock for sale.

The second difficulty is the correct or intelligent estimate of the value of a mine property—a conclusion that is difficult to correctly reach on the part of anyone. A mine may be worth $1,000,000, that is, there may be in the limits of the claim treasure to that amount, but if idle or unworked it might not be worth $1000. The property might have no particular value until by judicious and systematic development its worth were made manifest. All the great mines of the country were once nothing but prospects—some valued lightly if not wholly discredited. Because a mine has not been developed it can not be said that it is not contingently worth $1,000,000. The man who buys 1000 shares of stock for 5 cents a share, though the stock may represent at par value $1000, must well understand that he is not getting $1000 value for the $50 that he pays for the stock. He naturally expects that development or demand or some other contingency may make his stock, for which he pays $50, worth some greater value up to $1000, and the fact of his buying stock shows he is willing to take the risk involved in the purchase—that is, pay $50 with the expectation of getting more. Such a purchaser must know that he is gambling on futures and must recognize the usual percentage in favor of the game. If he wins he considers himself pretty clever; if he loses he can not blame anybody but himself. All he can expect is that the company shall honestly manage and faithfully develop the property to the best of its ability. He has a right to expect that the company whose stock he buys has legal title to real property. He should not assume too much, nor take anything more for granted than he can help. He should make his inquiries before instead of after purchasing the stock, and he should never put up a cent in the purchase of such mining stock that he could not afford to lose. If he buys stock in a California mining corporation he is subject to assessment, no matter what representation may be made to him. In Colorado and other States stocks are non-assessable under the law, but by special agreement stock in any mining company anywhere, may be made assessable.

The mining investor in a small way should always try to be able to make the distinction between a gamble or flyer in mining stocks and a bona fide investment. He should always try to remember that a thing is usually worth what it will fetch; that gold is always worth $20.67 an ounce; that brass can be bought for less money; that if he can buy a thousand shares of mining stock for $2.50 he must bear in mind that that has no relation to the value of bona fide investment in developed, paying mines.

All this is on the principle of caveat emptor: "let the buyer beware." Meanwhile, there is probably no form of investment more profitable than the intelligent purchase of shares in a properly conducted mining company. All mining prospects have a prospective value, aside from any visible value of the claim; such prospective values being dependent upon the location and surrounding conditions. A mine may be worth $1000 to-day, and $100,000 to-morrow. The rules regulating the organization of manufacturing enterprises and the purchase of stock therein work well in all cases, even in the purchase of mining stock. A man can get up a scheme for manufacturing a certain article and sell stock in his corporation at an absurdly low price as compared with its par value to those who think they can afford to take the chances in the possibility of his success, as some contingency in business conditions may occasion almost immediate enhancement of such values.

In general it does not help the mining interests to take a 10-foot prospect hole worth $100, incorporate it as the Copper Gong, or the Silver Lyre, or the Golden Monarch, for $1,000,000, and sell the stock to unsuspecting clerks, clergymen, servants and widows; as such action, when ordinarily unsuccessful from the point of view of the investor, helps to keep alive the suspicion that all mining enterprises have a slight taint of fraud, the result being that deserving properties often lie idle for the want of capital, just as a fraudulent sale and failure of a mining property hurts the surrounding districts for years after. Mines are easily made on paper, and it were better all around if the mine was not sold for more than the original price of the property, with the addition, in some cases, of a sufficient sum to put the workings down to a certain specified depth, and other attendant development. Then, those who secured stock in that concern could have some certainty as to how the money was being expended, provided the proceeds were so judiciously placed. No law, no advice and no amount of experience can entirely prevent misrepresentation of facts or fully compel meretricious mining companies to faithfully expend the proceeds of treasury stock in development. By a little judicious prior inquiry before the purchase of stock, those who by reason of their condition and surroundings know little of mining stocks would sometimes be saved subsequent regret.

New Concentration Process.

In the issue of July 14 appeared an extended notice of the Elmore concentration process, in which petroleum plays a prominent part—an entirely new departure, and a proposition that from its novelty has elicited comment.

The whole subject of concentration is justly assuming such prominence in the mining world that any proposition concerning it that seems based on scientific principles is entitled to consideration. Especially is this the case in such instances where the originators have taken time to make experiment on a commercial scale before announcing their claims to public approval. The article referred to was the substance of a paper read by C. M. Rolker before the London Institution of Mining and Metallurgy, and was the subject of subsequent discussion, in which it was stated that at the Glasdir mine, Wales, a practical plant had treated fifty tons a day for over two years, with satisfactory result; that the success or failure of the process depended largely on the amount of oil lost in the operation, and that the process "acted entirely independent of the specific gravities of the materials to be separated." This last we consider the most novel feature of the proposition, as, ordinarily, the different specific gravities of the several minerals constitute a most important factor in the problem of concentration, and if, in this case, such factor can be eliminated, it would tend to simplify results.

It was thought through the discussion briefly alluded to, that 80% of the Glasdir ore values could be saved, and that before using it on an ore containing a large percentage of sulphurets the great bulk of the sulphide material could best be separated by ordinary concentration methods.

The inventor was present through the discussion, and in answer to inquiries stated that he had obtained excellent results with galena ores and tellurides; with zinc ores the work was not so good; that he had practically confined his attention to copper ore, but as a matter of scientific interest the oil would "pick up" free gold, but would not pick up metallic aluminum.

Broken Hill Proprietary.

Economical advance in mining and metallurgical methods was shown two years ago in the annual report of the Broken Hill, New South Wales, Australia, Proprietary Co., where the average cost per ton of ore treated had then been reduced from £6 15s 4d to £2 3s 7d. The company's report for the six months ending May 31st, 1900, submitted at the meeting of the company July 27th, shows continued economical working and magnitude of operation. During the six months the refinery treated 16,036 tons silver-lead bullion, the most of which was shipped to China. The output of silver for the half year was 2,320,172 ounces fine, the price of which on the date of the report was 2s 5$\frac{13}{16}$d per ounce. In the same time were produced 15,472 tons lead, at a stated price of £16 17s 6d per ton. The gross profit for the half year was £129,576 16s 5d. Manager Delprat states that by the improvements in the 5000-ton concentrator there were passed through 132,165 tons ore, as against 117,996 tons during the previous half year "at a much reduced cost, and an increased recovery of metallic contents." During the half year 18,035 tons ore treated in the chlorination plant gave 96 ounces gold, 213,957 ounces silver, and 178.93 tons lead. The smelting plant treated 96,113 tons ore, the average extraction per ton being 15.91 units lead, 20.41 ounces silver. The usual elaborate schedules of mine costs accompany the report.

Concentrates.

A ROUND tank, 73½ inches high and 20 inches inside diameter, will hold 100 gallons.

THE wear and tear of shoes and dies varies from thirty to forty-five pounds per 100 tons ore crushed.

THE U. S. duty on imported quicksilver is 7 cents per pound. Copper matte is imported free of duty.

LIQUID AIR is still a chemical curiosity. It boils at 300° F. below zero, and cannot be confined for commercial use.

THE annual meeting of the American Smelting & Refining Co. will be held at 83 Montgomery street, Jersey City, N. J., Sept. 12th.

IN Gilpin county, Colo., all mill ore is estimated by the cord, meaning eight tons; smelting ore is transported and sold on the ton basis of 2000 pounds.

ONE essential to success in mining work is to know enough to know how little one knows, and how much there is to be known; close application and hard work.

THE issued folios of the U. S. Geological Survey can be had upon application to Director Walcott, U. S. G. S., Washington, D. C. They cost from 25 cents to 50 cents each.

IN the third line of the first complete item in the third column on page 247 of the issue of the 1st inst. there was a stupid mistake; the words "nitrate of ammonia" should have been omitted therefrom.

TO AID in welding steel the following, ground and thoroughly mixed, is efficacious: Carbonate of ammonia, ½ pound; soda of borax, 2 pounds; muriate of ammonia, ½ pound; black oxide of manganese, ¼ pound.

THE Copper King mine in Fresno county, Cal., and the Mountain Copper Co.'s property in Shasta county indicate the extent of the Sierra foothill copper belt, extending northwesterly and southeasterly over 400 miles.

SULPHATE OF IRON colored with Prussian blue is sometimes sold for sulphate of copper, when it does not contain 10% sulphate of copper. Commercial pure sulphate of copper is usually sold on a basis of containing 98% crystallized sulphate of copper.

TAXING the net proceeds of mines has always seemed questionable. If Jones in January pays taxes on $5000 net proceeds of his mine, and having put that into real estate Jones in June again pays taxes on $5000, it would seem to entail hardship on Jones.

"PRACTICAL" men make the best "theoretical" men; they are more likely to have a correct "theory," knowing more the lines on which a correct "theory" can be constructed. Anything that is of importance in the mining or scientific world was once nothing but a "theory" till some one with sufficient knowledge put it into tangible, workable form.

LANDS formerly in the north half of the Colville, Wash., reservation will be open for entry at noon October 10th. No settlement must be attempted on any of the lands before that date and hour. The lands in the north half of the reserve are partly in two land office districts. The Waterville office has plats of sixteen townships; ten townships are open for filing at the Spokane office.

THE South African stamps are of the kind generally used for free milling ore, heavy, rapid drop, low discharge through coarse 30-mesh—900 holes—screen, with a duty of from 3 to 4½ tons per stamp per twenty-four hours. The New Zealand stamp is more for pyritic ore, light, very long drop, sometimes 18 inches, thirty to the minute, high (20-inch) discharge through a fine screen (60-mesh, 3600 holes) where the gold is fine, saving more on the plates, the concentrates chlorinated.

THE present production of petroleum in the United States is estimated to be 150,000 barrels per day. It costs the Standard Oil Co. 1 cent a gallon to deliver its oil from refineries to mercantile dealers in Nebraska, and from ½ cent to 1½ cents a gallon to the States in general. There are two grades of crude oil produced. The present total capitalization of the Standard Oil Co. is $202,233,700. Since the formation of the trust in 1882 it has paid 280% in dividends, or $280,000,000. The dividends so far this year are $38,000,000.

SINCE Nov. 1, 1893, the date of the repeal of the purchasing clause of the Act of July 14, 1890, the purchase of silver bullion by the U. S. Government has been limited to the silver contained in gold deposits at the U. S. mints, the small fraction of silver for return in fine bars, the amount retained in payment of charges, surplus silver bullion returned by the operative officers of the mint at the annual settlement, and mutilated domestic silver coins purchased for the subsidiary silver coinage under the provisions of sec. 3526, Rev. Stat.

AT the works of the Bede Metal & Chemical Co., Hebburn, England, large quantities of copper are extracted from pyrites cinders by the wet method, the amount being too small to be profitably removed by the ordinary dry processes, averaging 3% in the unburnt pyrites, which, after being roasted, yield about 5%. The cinders are first ground with salt and heated in muffle furnaces, whereby the copper is converted into chloride. This is leached out in tanks by means of acidulated water derived from the gaseous products of the roasting. The liquor obtained contains a notable quantity of silver and a minute quantity of gold, which are precipitated by the addition of the requisite amount of sodium iodide, and the precipitate reduced by metallic zinc, the iodine being thus recovered as zinc iodide. The copper is now removed by the addition of scrap iron and purified by refining in the usual way. The leached pyrites residue is in demand for steel furnaces, as it contains 70% of metallic iron. For this purpose it is dried into masses of suitable shape.

IF an engineer or buyer, upon seeing an analysis of a certain coal, multiplies the percentage of ash given by three, he will have approximately the percentage of ash that that coal will yield under a boiler. It is not always the weight so much as the volume of ash that occasions trouble. If the percentage of ash given in the analysis be multiplied by five, it will about represent the percentage of ash by volume under the average boiler. Proper maintenance of a boiler requires that it be shut down and examined thoroughly inside and outside at least every three months.

SECTION 2511 of the Civil Code of California says: An express agreement to become partners or to share the profits and losses of mining is not necessary to the formation or existence of a mining partnership. The relation arises from the ownership of shares or interests in the mine and working of the same for the purpose of extracting the minerals there. Section 2516 of the Civil Code of that State says: One of the partners in a mining partnership may convey his interest in the mine and business without dissolving the partnership. The purchaser, from the date of his purchase, becomes a member of the partnership.

TO DETERMINE the temperature of steam at different boiler pressures, find the height of a column of mercury due to the pressure carried; extract the 6th root—that is, the square root of the cube root; multiply this by 177.2; subtract 100 from the product; the remainder will be the temperature. Suppose the steam carried registers 100 pounds by the gauge, which would be 115 pounds absolute pressure. To change pounds to inches of mercury divide by .49; 115 divided by .49 = 234. The 6th root of 234 = 2.5; that multiplied by 177.2=443. That minus 100 = 343° F., the temperature of the steam at that pressure.

IF tungsten were produced in sufficient quantities it might be more largely utilized in alloying aluminum. The alloys of aluminum and tungsten have for the past few years been especially popular for rolled sheets and plates to be afterwards spun. Under the trade name of wolfram aluminum the metal has been largely used for military equipments. The alloys of aluminum and tungsten can be advantageously used with the addition of copper and also with the triple hardeners, tungsten, copper and iron, or tungsten, copper and manganese. As usually made the aluminum is hardened with some copper; tungstate of soda and ferro-manganese are added to the bath, making an alloy of aluminum, copper and tungsten, manganese and iron.

MINING for gold in gravel is a sound and reliable form of mining investment; for, with requisite precaution, it can be made as certain as any form of work can be approximated. Where needed surveys are made, where the ground is thoroughly tested and the quantity and quality of the gravel ascertained, where proper calculation is made as to needed water, power; where the proper form of mechanism is correctly determined and the needed capital duly provided, the proposition can have nearly every element of risk eliminated from it, and becomes a simple matter of what may be considered steady output of the finished product from the raw material, the cost and profit as readily determined as in the case of the manufacture of any article for which there is a constant and unlimited demand.

PURE COPPER diminishes in strength as its temperature increases, and with alloys of copper and tin there is a rapid fall in strength and elongation at temperatures exceeding 180° to 200° C., but in some cases the strength is maintained up to 250° C., as is always the case with phosphor-bronze. Aluminum bronzes between 80° and 150° C. show a sudden drop in strength, which is much greater for cast specimens. Common brass rapidly diminishes in strength and elongation from 250° to 300° C., the breaking stress at 250° C. being only 15% of the value at ordinary temperatures. Brasses containing 1% of aluminum have a resistance of more than 28,000 pounds per square inch, with considerable elongation up to 260° C. These brasses have a higher resistance at high temperatures than bronze or rolled brass. The strength of iron and steel diminishes for temperatures between 60° and 100° C., after which it increases to its maximum at about 250° C., decreasing rapidly beyond 300° C. The reduction in section diminishes continuously from the ordinary temperature up to 300° or 350° C., while above 400° C. it increases rapidly, becoming very marked at 700° or 800° C.

PURE aluminum has a specific conductivity 67% that of pure copper. With ½% of impurity the conductivity is reduced to 61%, while with 1% impurity the conductivity is 59%. It is when are compared the castings made in the two metals that aluminum shows to best advantage, for, although both must be alloyed with other metals to give sound castings, the reduction in conductivity on this account is relatively greater with copper than with aluminum. Good nickel aluminum castings can be made having a conductivity of 45% to 50% that of rolled copper, but it is very seldom that ordinary copper alloy castings such as are used every day for switch work and similar purposes exceed this figure. There is little difference in the tensile strengths. For some time there was a difficulty in getting good aluminum alloy castings, but this has now practically disappeared owing to brass founders and others having learned by experience the peculiarities of the metal. Soldering and brazing, although they can be performed, are still the drawbacks when compared with copper, but there is this to be considered: that in most practical purposes mechanical joints may be used.

THE presence of aluminum has been found to lower the point at which alloys containing it become fluid, such alloys being fluid at lower temperatures than either gunmetal or ordinary brass mixtures. The use of aluminum in cheap ordinary brass mixtures has sometimes occasioned the complaint that the surface of the brass castings is made black by its addition. This is due to the sweating out of the lead from the brass mixture which the impure brass has contained. It is not advisable to use aluminum in brass which is to be dipped in acid, as the aluminum, even in small quantities, makes the metal withstand the action of the acid so completely that the dipping is not successful. For this reason brass, which is subject to corrosion, is found to withstand this corrosion much better if it contains a proportion of aluminum, up to, say 10%. The main objection to the considerable addition of aluminum to brass is the increased shrinkage of the alloy occasioned by the use of the aluminum. This has to be provided for by pouring the metal not too hot and using large gates and risers. Aluminum brass has an elastic limit of 30,000 pounds per square inch, and an ultimate strength of 40,000 to 50,000 pounds, with an elongation of 3% to 10% in 8 inches.

SULPHUROUS ACID, or sulphur dioxide (SO_2), is prepared by burning sulphur in dry air or oxygen gas, or by removing the elements of water, and an additional atom of oxygen from sulphuric acid by heating it together with copper chippings or mercury. The resultant gas is purified by washing, and it is collected either by displacement or over mercury. It is completely colorless, has the overpowering odor of burning sulphur, neither supports combustion nor respiration, is 2.247 times heavier than air, is easily condensed, is liquefiable by cooling down to 14° F., under ordinary atmospheric pressure, and congeals into a transparent solid at temperatures below 168° F. This gas deviates considerably from Boyle's law of pressures, and occupies less space for equal increments of pressure than does air under like conditions, this variation becoming more marked as the temperature is reduced. Sulphurous acid is extremely soluble in water, one volume of the latter at a temperature of 50° F. being capable of dissolving 51.38, and at 68° 36.22 volumes of the former. It has a molecular weight of 65 and a density of 32. The latent heat of vaporization of this liquid is 182, and it boils at a temperature of 14° F. at the tension of the atmosphere.

WITH a given tension of belt, nearly three times as much power can be transmitted by a leather-covered pulley as with a smooth iron surface. It is comparatively easy to cement leather to the face of a pulley so that it will stay for an indefinite length of time—in fact, until the latter is worn out or it is forcibly torn from the pulley. It is as easy to make such a cement joint as it would be if cementing to wood or other porous substance. Any good glue can be used, if suitably prepared and carefully spread on the iron surface. For such purposes a given amount of glue should be covered with an equal weight of water, and the whole let stand for twenty-four hours until the water is completely absorbed by the glue. The mass should then be heated in a water bath until the glue is melted. This makes a concentrated glue solution. This is to be spread on the surface of the pulley after the leather has been suitably prepared. A strong solution of tannic acid should be used for moistening the leather before it is applied to the glued surface. The solution should be applied warm. The surface of the pulley should be roughened by cross-filing, or the use of acid before the glue is applied, and the glue should be warm when the application is made. The leather used for covering pulleys may be pieces of old belting or split leather. The size of the pulley can be increased considerably by the use of the leather covering.

IN the following States resident aliens enjoy the same privileges as citizens: Alabama, Arkansas, California, Colorado, Connecticut, Florida, Georgia, Louisiana, Maine, Maryland, Massachusetts, Michigan, Missouri, Mississippi, Nebraska, Nevada, New Hampshire, New Jersey, North Carolina, North Dakota, Ohio, Oklahoma, Oregon, Rhode Island, South Carolina, South Dakota, Tennessee, Texas, Vermont, Virginia, West Virginia, Wisconsin and Wyoming. Aliens who have declared their intention of becoming citizens have the same rights as citizens in Arizona Territory, Delaware, District of Columbia, Idaho, Illinois, Indiana, Kentucky and Minnesota. Aliens can only hold real estate under certain conditions in Iowa, Kansas, Montana, New York and Utah. Aliens could only hold property by inheritance or collection of debts in New Mexico Territory, but this law has been changed by act of Congress. Aliens are not permitted to remain in the Indian Territory without the permission of the Interior Department. In Washington State aliens may hold lands containing valuable deposits of minerals, metals, iron, coal or fireclay, and the necessary land for mills and machinery to be used in the development thereof and the manufacture of the products therefrom; and real estate, other than the above, can be held on declaring intention of becoming a citizen. In Pennsylvania aliens may buy lands not exceeding in quantity 5000 acres, nor in net annual income $20,000, and hold the same as citizens may. Other aliens may take and hold, without limit, real estate acquired by devise or descent.

The Oldest Gold Mining Camp.

Written for the MINING AND SCIENTIFIC PRESS by
THEO. VAN WAGENEN.

Americans are accustomed to date the history of mining in the western United States from the days of '49; but, nearly half a century before that time, copper mining at Santa Rita, New Mexico, was a flourishing business, while thirty years back of that date (about 1770) there was a producing gold mining camp on the California banks of the Colorado river about 100 miles above its mouth—that is, productive from a Mexican point of view. The region is now known—after the rude manner of the American prospector—as the Pot Holes, but in the olden times it was first included in the settlement called San Dyonisius, and later was a part of the Mission of the Concepcion. It is no easy matter to disentangle from what remains of the ancient Spanish records the true sequence of events as they occurred in this part of the world since the white men first entered it. Perhaps one should begin with that old explorer Coronado, half priest and half soldier, who as early as 1539-40 traversed the country from the head of the Vermillion sea (Gulf of California) to Santa Fe, making good Indians out of the aborigines wherever he met them, either through baptism or the sword, as they preferred. In this trip the dry placer districts of northern Sonora were discovered, and also the mysterious ruins in the Gila valley known as the Casa Grande, but it does not appear that Coronado's trip was followed by any attempts to colonize those parts of Arizona explored, from which it may be safely concluded that no other deposits of precious metals were found on the route. So, for considerably more than 100 years following there was peace in the desert, as far as recorded history goes.

Prospecting on the Desert.

Towards the end of the seventeenth century, however, a most indefatigable and zealous Jesuit named Father Kino appeared on the scene. His normal field of labor seems to have been the county now known as Sonora and Chihuahua; but apparently it was not large enough for his ambition, for in 1692 he crossed over into Arizona—which was then called Pimeria Alta—and established a Mission in the vicinity of the now flourishing city of Tucson, which he called San Xavier del Bac. Two years later, using this post as a base, he journeyed northward to the Gila river, rediscovering on the way the Casa Grande ruins, and celebrating the incident by holding a service of the mass there. In 1697, accompanied by twenty soldiers, thirty friendly Indians and ten retainers of his own, and starting from a point in the San Pedro valley not far from the present site of Tombstone, he made a second trip to the Gila and explored its valley between Solomonville and Tempe. Again, in 1699, he crossed Pimeria from Sonoita, via Quijotoa to Gila Bend, and then working around the north ends of the Big Horn, Eagle Tail and Castle Dome ranges, struck the Colorado river about 20 miles above Yuma. In the following year he returned by a slightly different route and established on the Colorado, above the mouth of the Gila, the San Dyonisius station. In 1701 he revisited the spot, and after working among the Yuma Indians of the vicinity took boat and followed down the stream to the sea. His journal states that these Yumas had an abundance of ornaments and charms of gold which they obtained from washing the dirt of the hillsides on the California side, just across from his newly established post.

In 1711 the good father died without meantime having returned to Arizona, and for a score or more of years the field seems to have remained untilled by his successor. In 1736, however, there was a renewal of efforts at San Xavier, which was followed in 1736–41 by a great silver mining excitement close to the Arizona line and probably not far from the existing camp of Oro Blanco. Here the white metal was found in planchas or "chunks" weighing up to thirty and forty pounds. In 1750 Father Sedelmair revisited the old outpost on the Colorado, planted by Kino in 1700. He found little left, but again his records indicate the existence of a primitive gold producing industry in the vicinity. In 1771 Father Garces came up from the south, and meeting with an encouraging reception from the natives (Yumas and Cocopalis) he sent Father Anza to them in 1774, who, at the upper end of the rich alluvial plain enclosed by the great bend of the Colorado above Yuma on the California side, established the Mission of the Concepcion. One may still trace the outline of its adobe walls. It seems to have been located for the especial benefit of the miners, for the region now called the Pot Holes begins within a half mile of the ruins. What are left of the records of the Mission indicate that its establishment was followed by an immigration of Mexican miners from Sonora, who for many years worked peacefully and in a small way alongside the Indians on the hills. Previous to 1860 the gold won probably went south to Altar in Sonora; but when the United States Government established a military post on the river and made a stage route across the desert a possibility, American miners came in and the gold obtained went to Los Angeles or San Francisco. But there was never enough wealth in the vicinity to maintain an active Anglo-Saxon population. Gradually the Pot Holes retrograded into the condition of a neglected and nearly deserted camp and has remained so ever since, though each year there is always a production of nuggets and dust amounting to a few thousand dollars in value.

Looking Down the Colorado River From the S. P. Bridge, Yuma, Arizona.

Just above the Pot Holes the Colorado cuts its way through a chain of mountains which are known on the Arizona side as the Chocolate hills and on the California side as the Picacho range. Both are simply continuations of the San Bernardino range of southern California. On the Arizona side this divide extends northeastwardly to the Bradshaws, between Phœnix and Prescott, then bends northwesterly around the headwaters of the Bill Williams fork, then again northeasterly around the head of the Verde, until it culminates in the San Francisco mountains north of Flagstaff. On the California side the San Bernardino bears off northwesterly, separating the Mojave from the Colorado desert, and finally unites with the Coast range east of Santa Barbara.

Before the Colorado cut its channel to its present depth through the low point in this long divide, the region now known as the Mojave desert, together with a considerable area in Arizona, was a great fresh water lake whose shore line can be easily traced at many points, and the Colorado desert below was a part of the Gulf of California. Only the low Chocolate and Picacho ranges separated the two, and in several of the saddles in its crest can be found small gravel deposits richly spotted with gold, as if at some time part or all of the outlet had passed through them. One of these is now occupied by the wagon road leading from the Pot Holes to the Duncan Flats, and from it several dry ravines fall away to the east and southeast. The Pot Holes is the name given to the region of these ravines, the principal one of which is perhaps 1½ miles long and is called Fiege gulch. All of them fall into the Colorado. The prevailing rock of the locality is a dark blue and very hard granite, intersected with several dykes of basalt having a northeast and southwest course, and also with numerous small veins of white quartz, many of which are mere threads. The hill slopes (as might be expected) are steep and very rugged, very barren, and with but a slight cover of soil. But on both sides of the saddle, and in it, and wherever on the slopes bordering the ravines that fall away from it the rugged bedrock is level enough to hold soil, there gold can be found in pockets and streaks and strata. Some spots have yielded hundreds of dollars for a few hours' work; others have produced 50 cents to $1.25 per day for years. Every winter the locality is visited by a few days of torrential rain. After these are over, most of the spots already previously worked may be attacked again with favorable results. And so it has gone on from decade to decade.

At the Mouth of Fiege Gulch, on the Colorado River.

The mouth of each ravine has been filled up by successive overflows of the river to flat, triangular parks. At the upper ends of these, close to the rocky hill slopes, very many prospecting holes have been dug from time to time in the expectation of finding rich pockets of gravel on the bedrock. Some of these have been profitable and others have not. In most cases, the water seeping in from the river has stopped work.

Between June 15th and September 1st the hillsides and ravines are deserted, for human beings could not work in the fierce heat of that season; but during the balance of the year there are always a few score of men at work. As no water is to be had, a form of dry washer has been evolved in which the material is screened and shaken and fanned until the yellow grains are freed from the soil. The gold thus gathered is coarse and angular; probably most of the fine dust is lost in the tailings. What is saved has all the appearance of material that has traveled but a short distance, if at all. Perhaps as much as $10,000 a year comes from the district. This is not great, but as the industry has been alive there for 100 years certainly and perhaps much longer, the Pot Holes have claims for consideration. It is by no means clear whence is the source of the gold. Nuggets worth $10 to $20 are not uncommon; a few are found each year. But the bulk of the output is in grains, many of which under microscopical examination prove to be parts of crystals. The metal brings $18.25 to $18.60 per ounce at the mint. A dredger is now being built at Yuma which will explore the mouths of the Pot Hole ravines.

Mine Blasting.

Written for the MINING AND SCIENTIFIC PRESS by L. J. SAFLEY.

The first requisites are good materials. The fuse should be cut somewhat according to the number of holes fired; for instance, for six holes, cut fuse from 21 to 36 inches, lighting the long fuses first and so on down. If one hole or more is intended to break first, cut fuse for the same somewhat shorter than the one intended to fire last.

A good quality of fuse burns about 18 inches per minute. Cut fuse somewhat with a rolling motion so it will be straight across; then pull the end cut between thumb and forefinger so such will be a little smaller on end. This will then enter the cap with facility, first noticing that there is nothing in the cap except fulminate of mercury, in a paste-like form, with glue or mucilage to hold the same.

To hold the cap on, if not already tight, take the shank of a pocket knife and press on cap just where the fuse protrudes from it, being careful not to molest the other end with pressure, as there is more danger with cap than powder and as much strength or more for same quantity. If such is intended for a wet hole draw the fuse through the hand, with some tallow or common rosin soap in it, being careful to get some at mouth of cap, there rubbing some in alongside of fuse.

This being done, prepare primer by opening the end of cartridge and forcing a hard, sharp-pointed stick the size of fuse or little larger down in the center of powder, somewhat longer than cap, then placing the cap in the aperture with gentle force so it will be covered by powder, doubling the end paper back as conveniently as you can or tie string around the same, closing powder up to the cap, making it more impervious to water. This being done, cut off a part of stick of powder if you do not want to use all for a primer.

Next, having the holes clean of mud with spoon or swab, know the length of hole; cut one or more sticks lengthwise, tamping one or a part at a time in hole until you have enough to use; then place the primer down on last tamped and pour some loose dirt, then tamp again, holding on to fuse, being careful not to pull cap out of powder. Do not use a tamping rod too large and especially not one of metal such as iron or steel.

The hole being tamped full, it is now ready to blast. The fuse sticking out several inches, split end and hold lighted candle underneath far enough to light and not be put out by fuse sputtering. Then skip!

In charging deeper holes it may be necessary to spring them. This consists in hole, say, 16 feet deep in hard rock, of putting one or more sticks of powder down and dropping a primer on the same with an 18-inch fuse lighted. This has a tendency to make a pot hole at the bottom, and if not satisfactory the first trial, to be repeated until space is large enough, taking care after each trial to clean hole and wait until there is no fire; if doubtful, use a little water. The idea is to get most of the powder together and well confined, as by doing so it will do better execution.

Then start to load as previously stated, using 6 feet of fuse or more and loading hole to within 5 or 8 feet of surface, or according to judgment. If several holes are to be shot together, better give all the holes the same preliminary treatment and shoot all at once, cutting fuse according to firing. A hole that length and sprung that way will take about seventy sticks of powder and should be well tamped; taking knife and splitting sticks will facilitate some. Giant powder will generate about 6000° F. on being fired.

It is a matter of conjecture if stick containing primer or cap should be down any great depth in powder that is tamped, as it might set the same on fire from fuse before exploding cap and powder.

Any number of holes may be shot on surface by doing as directed (without battery), viz., splitting fuse on end and placing giant powder in the same with a little pressure so it will stay until lighted. Then build a fire so as to get some fire brands; with one, or more, light and scoot out for safety.

Mica Mining in India and the United States.

Several varieties of mica are found in India, especially in Behar and in the Northern Circars. It readily splits into transparent elastic flakes, and consists of nearly equal parts of silica and magnesia and about 6% lime. Slips of mica afford a convenient substitute for platinum foil in chemical experiments on the effect of heat on organic bodies, and they are useful for covering photographs. Mica occurs usually in thin tabular plates or scales, resembling glass. It is rarely crystallized in four or six-side short prisms or long-sided pyramids. It melts before the blowpipe into a greyish spongy glass; it is soft, pliant and easily scratched; its colors are white, yellow, brown and black; specific gravity, 2.654. In China mica is used medicinally. In the Northern Circars mica mines are to be found in the upland valleys of the Godaveri, Kistna and Vizagapatam districts.

The principal mica mines of Behar are situated on the northern face of the Vyndhia hills, where the three districts of Behar, Monghyr and Ramghur meet. The most westerly mine is 37 miles southeasterly from Gya, in the district of Behar; the most easterly, 60 miles distant in Monghyr, the whole of the intermediate 60 miles being more or less productive of the mineral.

In the Northern Circars, as elsewhere, the mica reaches the surface in three different states, viz., the good, hard and serviceable mineral; the soft, wet, flimsy mineral, and the chipped and powdered mineral. The tests as to whether the mica is good for anything, or whether, as the natives say, "it is alive," are its firmness, its specific gravity and the power of reflecting the countenance free from contortions, the last showing the perfect parallelism of its individual plates and consequent likelihood to split well. The heavier the mineral and the more perfect the reflection the more valuable is the mineral considered. All the plates not standing the necessary tests are of a soft and flimsy nature, without any of the brilliant sparkle of the better sort. The natives call this the "dead mica," and it appears to be in a state of decay.

The plates of the superior kind are used in all the large Gangetic cities and towns by the native draughtsmen, by the lamp and toy makers, by the Mohammedans for ornamenting their taziahs or taboots, for ornamenting boats and umbrellas, and making artificial flowers. The second and third kinds are pounded and used for ornamenting toys, pottery and the inside of houses, for sprinkling over cloths and turbans, the sparkle from which by torchlight resembles diamonds; but the great consumption of the inferior kind takes place during the Hooli festival, during which period the "abir" or pounded mica, mixed with flour and some red coloring matter, is freely sprinkled over the votaries of those bacchanalian orgies. It is the soft, shiny, scaly part of granite and is liable to decay from constant damp. It passes into a greasy or soapy earth or loam. Mica is mixed with lime to form a glistening plaster for native buildings.

The mode of opening a mica mine is as follows: A small and convenient hill having been selected for commencing operations upon, a party of the wild hill tribes first propitiate the local tutelary deity by offerings of flesh and liquor. They then ascend to the top of the hill and commence sinking a series of pits, the whole way down the profile of the hill, about 3 feet in diameter each and a few feet apart. These pits are not continued vertically downwards, but in a zigzag shape, but nevertheless not so much out of the vertical proper as that a basket containing the mineral cannot be hauled up from the bottom of the pit to the top, the zigzag shape of the shaft being formed by sinking the shaft first inclining to the left a few feet, the head of each cut or notch forming a landing place or step, and thus the necessity of ladders is obviated, the projecting of salient angles of the notches forming a perfect flight of steps from the top to the bottom of the pit, which seldom reaches to a greater depth than 40 feet, when, darkness interfering with the workman's progress, the pit is abandoned and another commenced on a few feet farther down the hill.

A slight framework of faggots, cut from neighboring trees, is placed over the mouth of each pit. On this a man sits waiting till the signal from below is given to haul up the basket containing the mica and rubbish, which has been dug from the sides of the pit by the aid of a rude pick. On arrival at the surface the good and bad materials are separated, the earth and rubbish shot down the precipitous side of the hill. The good mica, which arrives at the surface of the pit in ragged masses about 18 inches in length and 6 inches broad and 3 inches in thickness, after having its ragged edges trimmed off with a reaping hook-looking instrument, is placed by itself in a heap, and the bad or refuse—that is, the softer kind—is also placed aside in a heap by itself.

Laborers Working in Mica Mines, Behar, India.

In the Northern Circars the mines are worked by native merchants and by at least one large European firm of Madras. In Behar they are worked by Mahajans or native merchants who reside at Patna. In northern India the excavators or miners are Bandatuis, or inhabitants of the hills, a race allied to the Kols, Bheels and Santhals.

The mines, both in Behar and the Circars, are worked during the months of January, February, March and April only, for during the hotter months the great heat dries up all the water for many miles around the mines, and during the rainy season the pits fill with water, and subsequent to the rains the unhealthiness of the dense miasmatic jungles in the neighborhood prevents the work commencing before January.

The accompanying engravings illustrate the primitive native methods of mining mica and preparing it for market.

In the United States, as previously noted at considerable length, mica is not uncommon, nearly every part of the mineral area furnishing deposits more or less profitable. In New Mexico the Standard Mica Co. operates a group of claims near the Denver & Rio Grande Railway line in Rio Arriba county. They are making regular shipments of mica to Denver and Cleveland. Last week 60,000 pounds were shipped. Its chief uses nowadays are for electrical purposes and for the manufacture of wall paper. The best mica for electric purposes is imported from India and from Canada, the latter being a bronze mica, which is much in favor in the industrial lines. Some of the mica shipped from New Mexico is used for electrical purposes, but the bulk of it is ground for the wall paper manufacturers. Occasionally a choice pocket is opened that yields a high grade of sheet mica, and this goes into the makeup of illuminated stoves and lamp chimneys. However, there is not much profit in this feature of the business, because of the care that must be used in handling the mica and preparing it for market, so that the best demand for New Mexico mica at this time comes from the wall paper people and the manufacturers of electric appliances. "We are in the market for good mica," says Supt. Fleming, "all the time, anywhere. If I could contract for 10,000 pounds to-day at $1 a pound I would be glad to do so."

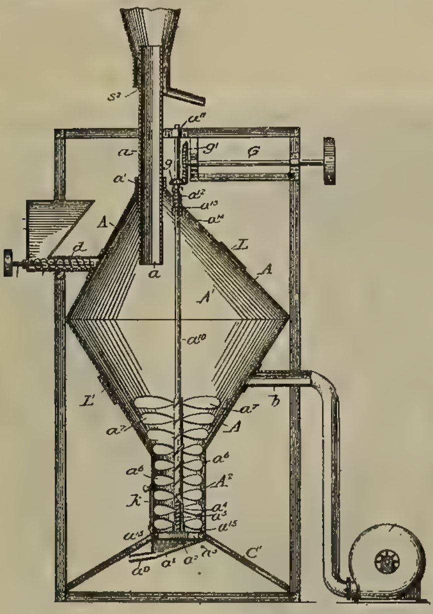
Trimming Mica for Market at Behar, India.

Mining and Metallurgical Patents.

Patents Issued August 28, 1900.

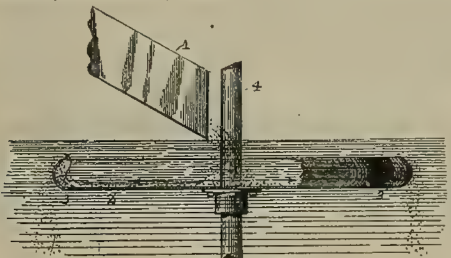
Specially Reported for the MINING AND SCIENTIFIC PRESS.

ORE CONCENTRATING AGITATOR.—No. 656,674; A. H. Stebbins, Little Rock, Ark.



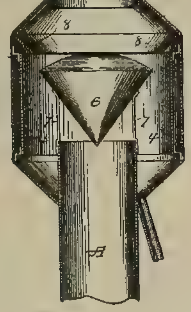
In an ore concentrating agitator, combination of casing having enlarged central portion constituting an agitating chamber, an exit pipe leading from chamber and extending thereinto, throwing device in lower part of chamber, feeder, air inlet for conducting blast of air into chamber below feeder and above throwing device and door in lower part of casing opposite throwing device, stud projecting upward from bottom of lower portion, shaft seated on stud, and carrying throwing blades fitted to lower portion, other throwing blades of larger size above reduced lower portion, and means for operating shaft.

PROCESS OF SEPARATING ORES.—No. 656,728; H. C. Robinson, Cincinnati, Ohio.



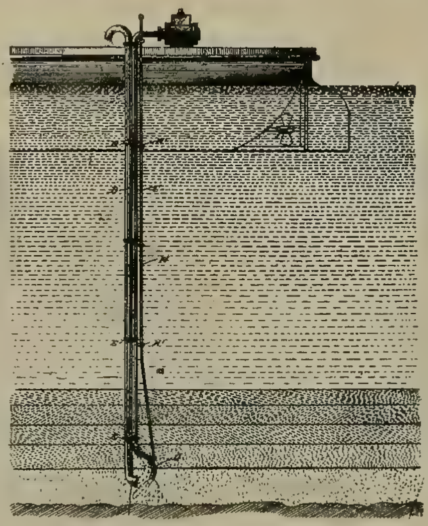
The process of separating heavier from lighter materials of conglomerate, consisting in rotating materials on submerged horizontally rotating surface at speed sufficient to develop centrifugal force only slightly in excess of that necessary to overcome inertia of heavier material resting on support whereby conglomerate is subjected to prolonged, but gentle disintegrating action by the comparatively still water by which lighter is lifted and carried off support, heavier gradually driven toward periphery of rotating support, soft bank of sand being maintained at periphery under which heavier material sinks and is then protected from currents tending to lift it off of support.

EXHAUST HEAD.—No. 656,989; F. Maranville and W. Warden, Akron, Ohio.



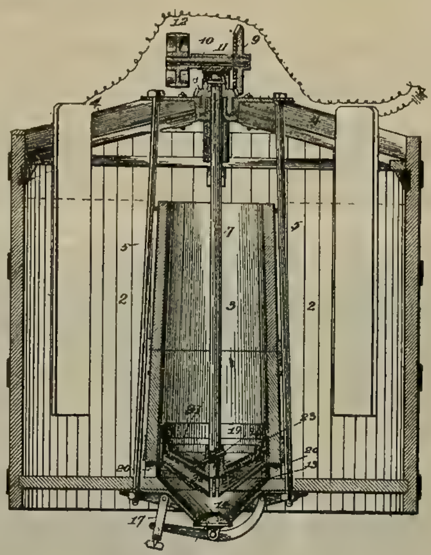
In an exhaust head, combination with casing and steam pipe projecting through and terminating above lower end of casing, of deflector or condensing wall within casing and spaced inwardly from wall thereof, terminating at lower end below upper end of steam pipe, inclined deflector ring overhanging annular space between deflector or condensing wall and wall of casing, conical deflector disposed over and supported by steam pipe, wall of conical deflector being approximately in line with inclined deflector ring, an outlet at lower end of casing.

APPARATUS FOR REMOVING MATERIAL FROM BELOW THE SURFACE.—No. 656,994; H. F. Munn, New York, N. Y.



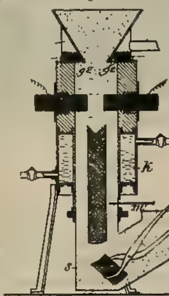
An apparatus for removing low or bedrock strata of material, comprising pump, pipe connected therewith, for forcing fluid under pressure by pump through pipe into material to be loosened, nozzle pivoted on lower end of pipe and under control of operator, adapted to discharge fluid under pressure into material to be treated, to loosen same, discharge pipe having an entrance mouth extending into material, nozzle being arranged to operate in conjunction with mouth, to force loosened material up through discharge pipe.

APPARATUS FOR ELECTROLYZING ORES.—No. 657,032; A. M. Rouse, Denver, Colo.



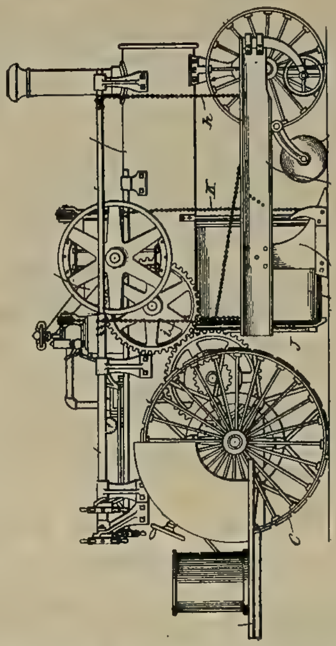
An apparatus having anode and cathode suitably arranged therein, combination of tank having outer compartment, tube located within tank having open upper end provided at lower end with communication from compartment, driving shaft projecting within tube, inner and outer cups carried by shaft and wings arranged intermediate of cups; wings carried by cup, outer cup carried by wings, discharge duct, valve arranged to close duct.

ELECTRIC FURNACE.—No. 656,930; W. Borchers, Aix-la-Chapelle, Germany.



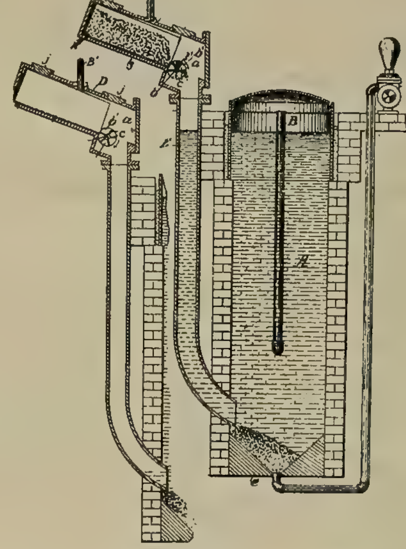
In an electric furnace, combination with downwardly extending furnace and oppositely disposed electrodes arranged therein, of water jacket on discharge end of furnace, toothed roller arranged transversely to discharge end of water jacket, conveyor for conveying off products fed thereto by toothed roller chisel movably arranged transversely in wall of furnace for breaking up carbid after it leaves roller and before it is discharged by conveyor.

AUTOMOBILE DITCHING AND GRADING MACHINE.—No. 656,715; M. G. Bunnell, Chicago, Ill.



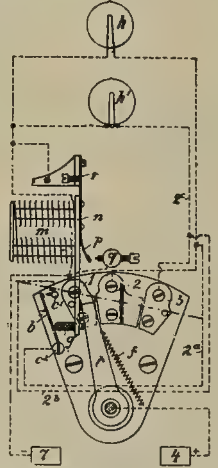
Combination of horizontal boiler mounted upon front steering wheels and rear traction wheels, plow arranged in advance of one traction wheel having beam extending alongside one steering wheel, bracket bearings secured to boiler projecting laterally therefrom, shaft and sleeve mounted in bearings provided with hand wheels, chains connecting shaft and sleeve with plow, draft connection between plow and forward running gear.

PROCESS OF MAKING ACETYLENE GAS.—No. 656,863; E. S. Titus, Hempstead, N. Y.



Process of making and purifying acetylene gas in first forming volume of acetylene gas within closed chamber which contains carbid of calcium, then passing carbid of calcium through volume of gas into volume of water at substantial distance below surface of water without passing carbid from surface of water downward, and collecting washed or purified gas from surface.

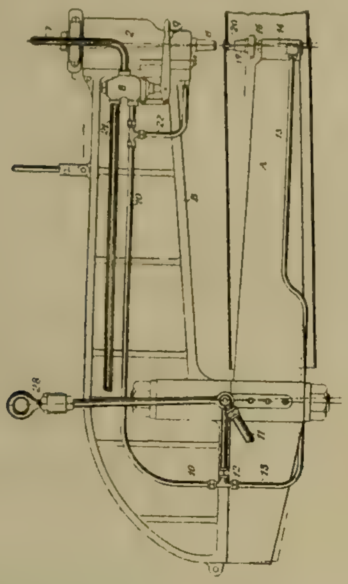
ELECTRIC LAMP FOR MINERS' USE.—No. 656,977; L. Horwitz, Berlin, Germany.



A miner's lamp, comprising two glow lamps, hand switch, battery, casing therefor, contacting strips for battery and casing, automatic switching device comprising electromagnet armature of which actuates contacting device switching in or out either lamp, contacting strips of battery and casing being so arranged that after each fresh charge of battery the latter may be placed in apparatus so that one pair of strips on battery comes in contact with different pair of strips on casing whereby direction of current is reversed and any residual magnetism in apparatus is neutralized.

◆

HYDRAULIC PLATE CLOSING AND RIVETING DEVICE.—No. 656,801; J. H. Batcher, Sacramento, Cal., assignor to Schaw, Ingram, Batcher & Co., same place.



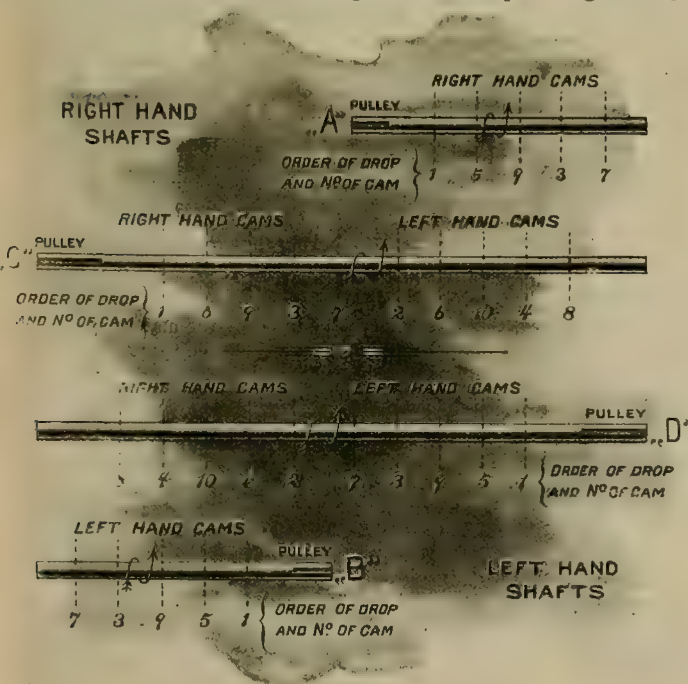
Hydraulic plate closing and riveting apparatus consisting of suspended upper section having hydraulic ram and riveting tool, mandrel plate closing hydraulic pressure device carried thereby, rivet-heading tool concentric therewith, lever suspended between its ends having one end fulcrumed, other serving as handle, by which the parts are brought into line with rivet holes of pipe sections, valve actuating lever by which water is admitted to actuate ram whereby pipe mandrel and parts carried thereby are movable in unison with movements of ram to bring them into contact with interior of pipe whereby plates or pipe sections are closed together, rivet introduced and head formed thereon.

◆

Cam Shafts and Cam Fasteners.

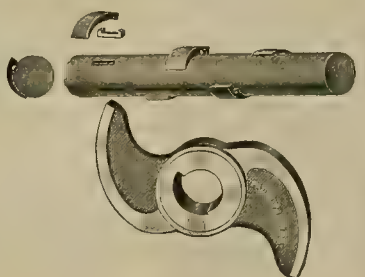
The Edward P. Allis Co., Milwaukee, Wis., furnish illustration of their system of right and left hand cam shafts and their method of numbering cams, the intent being to obviate any misunderstanding in the ordering of cams and cam shafts.

In a description accompanying the above cut, the Edward P. Allis Co. say: "The question of whether a cam shaft is right or left hand is determined by the location of the pulley on the shaft. A cam shaft is right hand when the pulley is to the left of the observer standing so that the top of the cam shaft revolves from him, and left hand when the pulley is to the right of the observer standing in the same position. By referring to the cut, it will be noted that shaft A for a 5-stamp battery is designated as a right-hand shaft. The cams on this shaft are all right-hand cams. Shaft C, which is for ten stamps, is also a right-hand shaft, the five cams next to the pulley being right-hand and the other five cams being left-hand. Shafts D and B are left-hand shafts because the shaft extends to the left of the pulley."



Right and Left Hand Cam Shafts.

Herewith is also illustrated their Reliance patent involute cam fastener, the use of which, it is claimed, makes unnecessary the carrying of a complete set of extra cams for repairs. The distinctive feature of this fastening is that, the wedge being involute, there is continuous full contact between the wedge and the cam. Another advantage claimed by the Edward P. Allis Co. in using this fastening illustrated is that all cams are alike and will fit any place on the shaft.



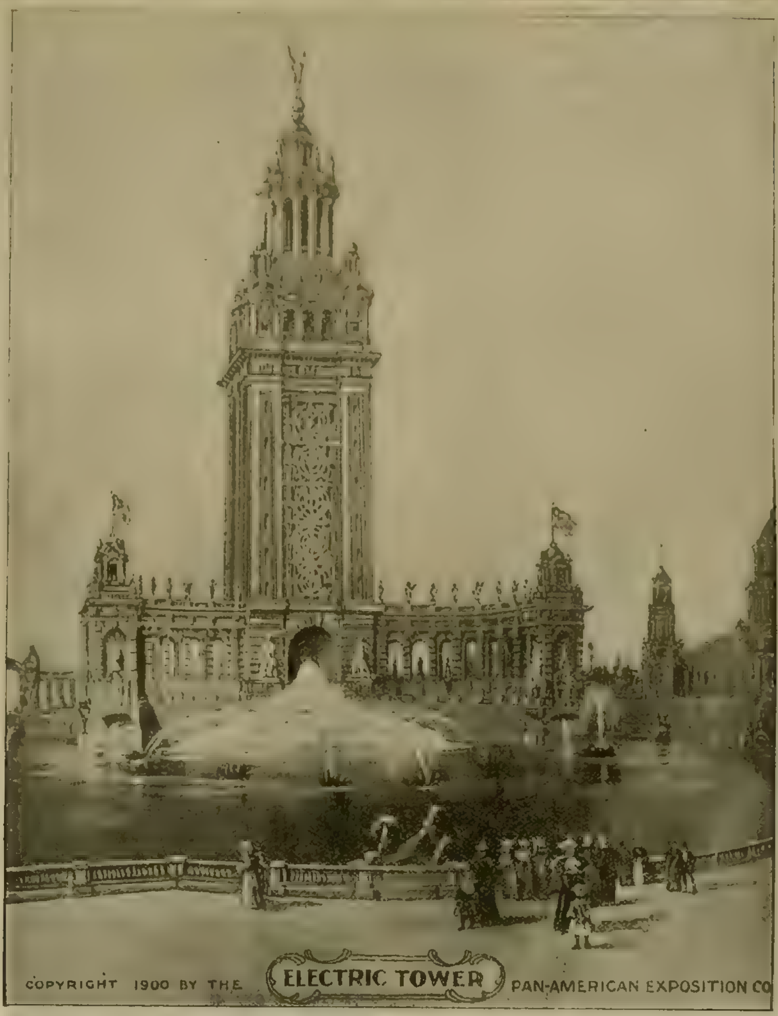
Reliance Pat. Involute Cam Fastener.

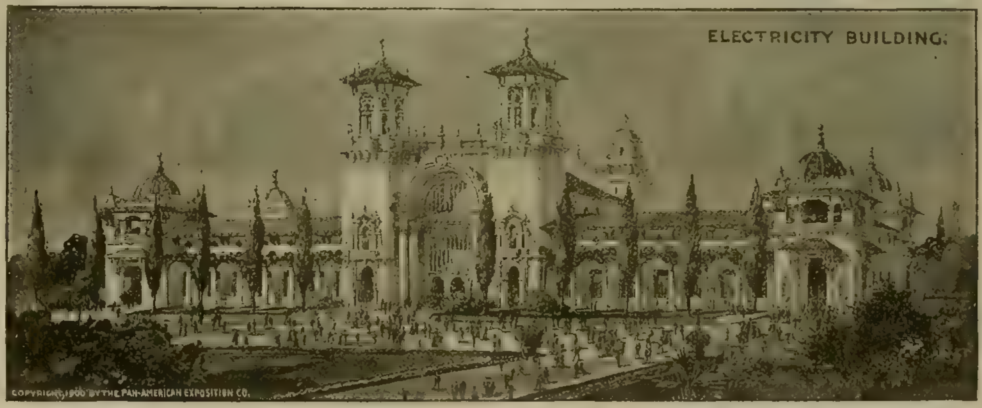
A Coming Electrical Exposition.

◆

The Pan-American Exposition at Buffalo next year bids fair to be rich in electric interests. There is particular reason why it should be. The exposition is but half an hour's ride from Niagara Falls, which has been put in harness by electric engineers and part of its immense power turned to industrial uses. On the American side there are two corporations utilizing the current of the Niagara river for developing electric power used in many industries at the falls. The power thus generated by one of these corporations is also transmitted to Buffalo, 25 miles distant, for use for the electric lighting of the city, for operating a great electric trolley car system and in many manufacturing establishments. The power thus transmitted will likewise be extensively used for the purpose of the Exposition.

There will be a special building, of which a picture is given herewith, which will contain displays of all kinds in the practical and artistic uses of electricity, together with complete exhibits of electrical machinery and appliances. The designs contemplate a handsome and commodious building, 500 feet from east to west, and 150 feet wide, giving an exhibition space of 75,000 square feet.


COPYRIGHT 1900 BY THE PAN-AMERICAN EXPOSITION CO
ELECTRIC TOWER


ELECTRICITY BUILDING.
COPYRIGHT, 1900 BY THE PAN-AMERICAN EXPOSITION CO.

A more conspicuous and popular feature of the electricity display at the Pan-American Exposition will be the Electric Tower, which will form the center piece of the whole affair. The height of the Tower, shown in the accompanying picture, is 348 feet above the surface of the broad basin in which it stands. The main body of the Tower is 80 feet square. From the surface of the water to the top of the colonnades is 75 feet. The shaft of the Tower is treated with great simplicity. The center of each side is paneled with fantastically perforated work, through which is indistinctly revealed the massive framework of the Tower. This feature is calculated to produce a remarkable effect when lighted from within. A spiral staircase within the colonnade leads to the stage of the Tower, the cupola, over whose soaring dome is poised the superb figure of Electricity, thus dominating the entire Exposition, which owes so much to electrical power.

From the water to the feet of the figure of Electricity is a vertical distance of 331 feet. The figure is 17 feet in height. The entire exterior of the Tower will be studded with myriads of electric lights, so arranged that a variety of effects can be secured.

◆

THOS. A. EDISON is reported about ready to make public details of his newest invention, a machine for the generation of electrical power without the use of engines and dynamos, said to approximate almost exactly the production of electricity directly from coal.

Some Further Mill Practice in Cyaniding the Silicious Ores of the Black Hills, South Dakota.

Written for the MINING AND SCIENTIFIC PRESS by JNO. M. HENTON.

Since writing the article on "Wet Crushing and Cyaniding the Silicious Ores of the Black Hills of South Dakota," which appeared in the MINING AND SCIENTIFIC PRESS of March 10th last, the mill of the Dakota M. & M. Co. at Central City, S. D., has been in continuous operation, with the exception of hanging up a day or two occasionally for some needed repairs. The method of wet crushing in cyanide solutions has been continued with such satisfactory results in economy of chemicals and percentage of saving of the greatest possible extractions that it would not be changed, and is regarded by the management as the best method of treating these ores. While the practice has been the same as indicated in that article, some changes in detail of operating have been found to secure a larger tonnage increase. The sands become too light to separate readily in the agitator, and the "V" box was introduced. This change proved of great advantage and made it possible to increase by one-half the amount of the ore milled.

Entrance to Gunnison Tunnel, B. & M. and Elkorn R. R. Elkhorn Engine Hauling Ore From Gunnison Loading Dump, Dakota M. & M. Co., Black Hills, South Dakota.

The ore pulp, coming from the batteries, passing a six-mesh woven wire screen, is delivered by the centrifugal pump to the "V" box, where a separation of the sands from the slimes is made by the principle of that device. The slimes are run from the "V" box to the agitator vat, where the slime particles settle and the clear solution is siphoned off and run to the sump ready to use again. The sands are run from the "V" box into the percolating vats, where, the drain cock being left open, the solution drains off and passes through the zinc box to the sump to be used again. All this is continuous until the sand vat is full, when the stamps are hung up and the slimes are treated by agitation, first cyanide being added to build up the stock solution, and then run to the slime vats, as described in the former article. The treatment in the slime vats is by means of a rubber hose connected with a pump, and to the other end of which is a 5-foot section of 1-inch gas pipe, by means of which the slimes can be very well washed. The sands are treated entirely with stock solution containing from one to two and one-half pounds of cyanide per ton of solution. It has been found, by many experiments of continuous work for weeks at a time, that just as good and quick an extraction can be made on the Gunnison mine ore with a solution containing one pound of free KCN as with a solution of greater strength. This is of much importance, as great economy in cyanide is thereby made possible. How much weaker a solution can be used has not been determined, as the present practice comes within the limits of reasonable economy in chemicals. The total consumption of KCN for the month of July was less than one pound per ton for the ore treated. No attention whatever is found necessary to the strength of the solutions in KCN in the effect on the zinc precipitation, as the results are equally good with all strengths.

It would be very interesting to know the form and combination of gold in this ore. Perhaps it will be possible to determine this in the near future. Samples taken for the purpose of determining the value of the ore milled were run through the assay office rock-breaker, and then the fines screened out through the twenty-mesh screen. The two samples thus secured assay the same value. Samples of the foam on the solutions flowing from the batteries have at times been found of double the value of the ore, and never been found of less value than the ore, the solutions carrying the foam having a value of only about one-fourth that of the ore. Precipitation suggests itself as a possible explanation, which might arise from the possible carbon in the ore shale, but there is no evidence of loss. Another strange fact is that the saving from the two products—the slimes and the sands—vary but a few cents from each other, and, one being known, the other can be closely predicted. The extraction from the slimes is better than from the sands.

The best method of preparing mill solutions by evaporation for assaying was recently made a matter of experiment in the laboratory of this company. Six samples were taken, each having a different gold value, and ranging from moderately rich to very poor, the latter representing the outflow from the zinc box. These samples were treated in six different ways. Ten assay tons were used in all, except the lead trays, in which two were used. All values are reduced to single assay ton values. The first assay of the first sample was run in duplicate and allowed to burn black to see if accurate results could be had in this way. The results were as follows:

Method.	No. 1.	No. 2.	No. 3.	No. 4.	No. 5.	No. 6.
Evap. rapidly without lith.	$ 7.30 4.00	.... $11.64	.... $4.90	.... $0.90	.... $0.24	.... Trace
Evap. slowly without lith..	12.60	11.68	5.46	0.72	0.24	$0.20
Evap. rapidly, lith. at finish.	14.40	12.30	6.30	0.71	0.24	0 90
Evap. rapidly with litharge.	14.20	11.70	5.80	0.88	0.20	Trace
Evap. slowly with litharge.	14.60	12.90	6.00	0.76	0.24	0.16
Lead tray......	11.00	11.60	5.30	0.75	0.30	None

Only such care was given as is practical in every day laboratory work, and the differences in results are just such as may be expected from following the method. The assays which check probably represent the true value of the solution. The variation from this check value, whether above or below, is probably due to imperfect cleaning of the pans in which the evaporations were made. The results seem to show that results sufficiently satisfactory for mill work can be had by any of these methods. In evaporating in the pans without litharge, care must be taken to finish on a square of asbestos paper, and without burning. Evaporating in pans with litharge at beginning gives the least trouble, and the use of the pan has the additional advantage over the lead tray that all errors are divided by ten, which quantity is not practicable with the lead tray. The flux used is the ordinary ore flux for a half assay ton, the litharge being omitted in such as it has been used in while evaporating. The pan is scoured—first being slightly moistened—with half the flux, and emptied upon the mixing cloth, and then a second scouring is made with the remaining flux. It is then run in a crucible, as any ordinary crucible assay. To determine how well this method cleaned the pans, the writer once took ten pans which had been poorly cleaned and recleaned them with an acid wash and assayed the washing, with the result of $11. As these ten pans had had 100 assay tons evaporated in them, the error amounted to an average of 11 cents, but these had been very carelessly cleaned, and it is not probable that the average error of the usual practice is more than one-fourth that amount. Such an approximate result is as accurate as the other factors of mill work can be made, and the labor is the minimum.

There is one feature in the mill practice of this company which should commend itself. It is the practice to hang up the stamps on Sunday. There is no more apparent reason why a quartz mill should run seven days in the week than a flour mill or a cotton mill, and these latter close for Sunday. J. M. Buckley, L. L. D., in the July Century Magazine says: "The observance of one day in seven by a complete change in subjects of thought, and the suspension of modes of activity required for six days, would be philosophical even though it had no basis in religion. In the French revolution the attempt was made to have a holiday once in five days, and again once in ten. The intervals were too frequent under the first plan, and did not occur often enough under the second. The superintendent of one of the largest hospitals for the insane declares that nineteen out of twenty of the business and professional men who come under his care have been in the habit of carrying business on their minds for seven days of each and every week." The men who are employed in quartz mines and mills are certainly as much in need of a weekly day of rest as any other class of men, and the business will as well adjust itself to the necessary arrangements and maintain a profit-making condition as any line of manufacturing.

In connection with the subject of cyaniding silicious ores, Mr. Henton sends three photos depicting some mining operations of the Dakota M. & M. Co., two engravings from which appear on the front page and one on this page.—ED.

Silver Smelting in Mexico.*

NUMBER VII.—CONCLUDED.

The bricked flue dust is an excellent material to make a furnace run fast, and is especially useful in smelting barrings and fine material like roasted tierras and roasted matte. But in most cases it has to be put on the ore charge to get it out of the way. If much of this material is on the ore charge, the weight of 1000 pounds can not be maintained, on account of its great bulk.

The work at the blast furnaces, steam engines and boilers and at the calciners is performed in two shifts of twelve hours each. All the other workmen, mechanics and ordinary laborers, work ten hours, or less if they are assigned a task (tarea).

There were employed on an average 612 men and boys a day, whose wages aggregated $641.90. Of this force, 32 were whites (Americans and Europeans), 2 American negroes and the balance of the Spanish-American and Indian races. The white men occupy all the prominent and responsible positions, as engineers, head mechanics, assayers and foremen; the negroes are the head firemen at the boilers, and were the only ones who could keep the steam up in the hot season. The Mexicans of the Spanish-American race fill the positions of under-foremen and mechanics; for positions of trust they are unfit. The great bulk of the workmen are Mexican Indians, who earn 37 cents a day as water boys to $1.75 as picadores. Considering what they eat and where they sleep, they work very well under proper supervision; but they are unsteady, and will leave en masse when the sugarcane is ripe and they can get work at a plantation. They are liable to stay away from work if a rain storm sets in shortly before a change of shifts, or if a sudden spell of cold weather occurs, or when the furnaces are running too fast in hot weather. They are apt to strike when they get a new foreman or even superintendent, or when their mode or character of work is to be changed. They even object to working at a new furnace if they suspect that their work will be increased thereby. These prejudices and superstitions will, however, gradually be overcome. Twenty years ago it was an impossibility to get any workmen at all in the "Semana Santa," that is, the week before Easter; at the present time it is possible to run furnaces during that period, although not at full capacity.

Like all people of low education, they are addicted to stealing in a small way if an opportunity offers, and this propensity is fostered by the many buyers of stolen goods who may be found in every Mexican market place. Bullion thefts were a daily occurrence for several years, until at last the Governor of the State suppressed a small smelter at Sta. Catarina, near Monterey, that subsisted entirely on stolen bullion and ore. Such parasites are met with in almost every mining camp of note.

The prevailing disease of the Mexican workmen is malarial fever; acute lead poisoning is rare, in spite of the indigestible food they eat and their aversion to ablutions; chronic lead poisoning is unknown. Accidents are, however, frequent, owing to carelessness.

The arrangement of the repair shops, as carpenter, machine, electrical, blacksmith and tinsmith shops, is adequate to the requirements of the smelter. The laboratory and assay offices are susceptible of improvement.

---

*Describing the Guggenheim Smelter at Monterey.

The various buildings composing the works are all constructed of wood and galvanized corrugated iron, painted on both sides with red iron paint or with graphite paint. In spite of these precautions, the iron is destroyed very rapidly by the action of the atmosphere, which is especially annoying in the case of the roofing. In California and Arizona a non-metallic roofing is now used extensively on industrial buildings, which is known under the name of "P. & B. ready roofing," and gives good satisfaction. The subjoined summary will illustrate the work performed during the year under discussion: Ore smelted, 183,230 Mexican tons, dry weight; ore purchased, 172,018 Mexican tons, dry weight.

COST OF SMELTING PER TON (ROASTING INCLUDED).

Coke	$2 50
Coal and wood	35
Charcoal	01
Limestone	05
Labor	1 28
Tools and supplies	20
Repairs	30
Ore sacks	09
Federal extraction tax	70
Bullion excess tax	16
Bullion taxes	12
Stamp taxes	10
General expenses	63
General agency expenses	11
New York office	21
Interest	02
Insurance	03
Total (Mexican currency)	$6 86

N. Y. exchange rate, $1.89⅝.
Average N. Y. silver quotation 67.05 U. S. currency, per ounce of fine silver.

AVERAGE ASSAY OF THE ORE SMELTED.

Silver..........37.04 ounces per 2000-lb. ton.
Gold........... 0.14 " "
Lead ....13.98%.

Cost of ore smelted, per ton	$44 09
Mexican tons of bullion produced	24,425
Silver in bullion and matte shipped	6,179,589 ozs. Troy
Mexican tons of limestone consumed as flux	14,594
Mexican tons of coke	34,408
Mexican tons of charcoal	281

The percentage of losses and gains is, of course, variable, and is kept secret by everv smelter. I can say this much: that in gold there is no loss—more generally a gain—on account of the accumulation of traces, which, as such, have no determinable value. Some smelters also make a gain in silver, which is due more to commercial than to technical skill.

Two more furnaces of larger dimensions than the old ones were erected and housed in a building constructed of iron and steel throughout. Two 475 H. P. triple-compound steam engines, two 150 H. P. marine boilers, 9 feet in diameter, and a number of blowers were added, and a third locomotive for hauling slag was acquired. According to communications from the designer of the furnaces, Paul Johnson, their section at the tuyere level is 44 inches by 144 inches wide. The water jackets forming the side walls have a bosh, and are 18 inches wide by 4 feet high; they have a tuyere opening in the center, and there are eight tuyeres in each side. The end jackets are straight and have no tuyere openings. Owing to the intense heat caused by the application of a blast of a higher than the ordinary pressure (2½ to 3 pounds per square inch), it has been found expedient to interpolate another tier of water jackets between the deck plates and the regular jackets. The side walls above the water jackets are also flaring towards the charge door, to such a degree that the area of section at top is twice the area of section at tuyeres. This is done in order to diminish the speed of the escaping gases and thereby the formation of flue dust. The exact height from tuyeres to charge door I do not remember; some informants give it at 20 feet, others at 25 feet. In the Raschette furnace the proportion of the area at the tuyeres to the area at the charge door is as 1 : 1½, and the height of the smelting column is 16 feet 5 inches. From this comparison it would appear that the principle of the Raschette construction is receiving deserved recognition and is being enlarged upon. It is claimed for these furnaces that the production of flue dust is very slight, and that the formation of wall accretions is greatly diminished. One of the new furnaces was put in blast in April of this year, and the second soon after. Their capacity was rated at 175 tons of charge in twenty-four hours; but, as is usually the case, no such figure was ever reached, 136 tons being the maximum of which I have heard. The cubic contents and the pressure of the blast are not the only factors which determine the capacity of a furnace. The increase of the furnaces in height has brought about a decrease in the consumption of fuel and the possibility of making a more acid slag, and, hence, of smelting more siliceous ore. The present consumption of coke, per ton of charge (exclusive of slag), is 12, as against 14 to 16 in the 14-foot furnaces. The slag is composed of: SiO_2 36, FeO 32 = 25 Fe, CaoO 18, not determined 14; total, 100. It carries 1½% of lead and 1½ ounces silver per ton, with bullion at 400 ounces.

The settling of the matte which flows from the furnace with a large current of slag presents some difficulties. The rectangular settler of the Orford form does not seem to have given satisfaction and has been replaced by a twin-pot settler. This is the old Colorado Iron Works twin-pot, with this alteration, that one bowl is elevated above the other sufficiently to allow the slag to overflow from the higher into the lower one through a spout. The elevated bowl is placed directly under the slag spout of the furnace, and catches the largest portion of the matte. The slag from the lower bowl overflows by means of a spout into an ordinary twin-pot, which is hauled away to the edge of the dump by a locomotive. After removing the twin-pots four times, the settling twin-pot is also hauled out and replaced by a new one. At a short distance from the furnaces the matte and slag are poured from the settler into smaller pots, and the shells are saved for resmelting. The waste slag twin-pot is emptied as usual, but the shells are dumped into a separate place for further treatment, as they run just as high in lead and silver as the shells from the small slag pots, in spite of the double settling. This system of matte settling is rather complicated and will be superseded, I understand, by settling in a reverberatory furnace, as at the Arkansas Valley Works, Leadville, Colo., and the El Paso Smelting Works, Texas. This reverberatory furnace is designated as a "separator." From latest accounts I note that all the 42x120-inch furnaces are to be replaced by the 44x144-inch size, and that the blowers are being broken up to serve as desulphurizing flux on the charge.

The Small Gas Engine.*

It would seem one of those rigid, but withal, just laws of nature that each new creation of man shall have its own sphere of usefulness, squeezing up the spheres of some of its older companions, modifying those of others, but completely crowding out none. Of the available powers for doing work, man, animal, wind and water powers have gone along peacefully for ages. Each has filled its place without puff or bluster, and probably will do so for ages to come. Of the more modern powers, steam, electricity and gas, what a zealous, wiry lot they are! Each would make good his position in this world by a revolution heralded by a million printer's ink trumpeters, but as the rank and file contains only his own offspring (decidedly immature in all cases) the initial skirmishing is soon over with, the newcomer being compressed into a very small but proper sphere to begin his last but continuous campaign, during which he will reach a position just so high or important as he is capable of maintaining and no higher. This triangular competition has been on for some years, and it may be of interest to examine somewhat the relative status of the participants as indicated in the title of this article.

The small gas engine may get its supply of energy either from a gasoline tank or from the gas main, while the electric motor has but one source, the electric main.

As to the cost of power from these three sources, if we take into account only the actual horsepower developed by each under fair to good conditions, putting aside all other considerations, under the present ruling rates for these forms of energy the gasoline would come first, the gas engine second and electricity last.

But power alone is not what is wanted by mankind, but that power applied. A 1000 H. P. engine is worth thousands of dollars to run a steamship, but is not worth 2 cents to run a coffee mill. In other words, power is of value only as it is applied, so that it is the relative cost of the power as applied that we must consider and not that of generation alone. Let us consider, then, such properties of construction and operation of the gas engine and electric motor as would seemingly effect the ease of applying the power which they generate.

Briefly, the working parts of small gas engines (and large ones as well) are supported either in a horizontal or vertical position on a comparatively heavy base or bed plate. The principal part consists of the cylinder, into which is drawn an explosive mixture of gasoline vapor or gas and air, which mixture is then compressed and ignited, creating a pressure which acts upon the piston, driving it forward. The external parts, with the exception of the admission, exhaust and ignition mechanisms, are so arranged as to convert the reciprocating motion of this piston into motion of rotation, the same as in the so-called trunk steam engine. So far we are in a well beaten track. It is only necessary to proportion these parts properly to have a well-behaved piece of machinery which is easily understood and easily managed.

Not so, however, with the other parts mentioned. It is probably safe to say that practically all failures or difficulties with small gas engines arise from faulty construction or lack of proper adjustments in the parts controlling the three operations of admission, exhaust and ignition.

It is not necessary at this point to explain the construction nor to detail the possible ailments of these parts to substantiate the statement that the mechanism included by these three heads is not at all easily understood, especially as to the results of their action upon the good or bad working of the engine.

But the fact that this mechanism is not readily understood is not of itself a serious feature at all. We who are interested in mechanical affairs expect to make such efforts as are necessary to gain at least a working understanding of the machines that come under our care, else how void of interest the great mass of our work would be.

But the real question is: when once this mechanism is understood, will it prove reliable? That is, when put in adjustment by one thoroughly understanding the engine, will it remain that way?

The Corliss valve gear is far from an easily understood piece of mechanism to one who has never placed a moment's thought on it until he meets it as part of a machine, which he must operate, but this is counted as no objection to it, for it can be understood, and, when once properly set and adjusted, is exceedingly reliable.

Judged from the standpoint of any form of the steam engine or the electric motor, these parts are not reliable in the sense mentioned, and there is nothing in either the steam engine or the electric motor which corresponds at all to them in this regard. It must not be inferred from this fact that the modern small gas engine is an unreliable motor, for it is not. But this does mean that it must receive attention and be accessible in a way that is not at all necessary with small electric motors.

The other points that should be mentioned here are as follows: In all makes of small gas engines there is but one impulse, acting on the piston in one complete revolution, and in the majority but one impulse in two revolutions, which necessitates a very heavy fly-wheel, and which results in a rather unsteady motion. Again, they are not readily started under load or otherwise. They can not be reversed and if loaded beyond their capacity will stop.

Unlike the gas engine, the electric motor is so well known in its construction and operation that it will only be necessary to point out the things that should enter into this discussion.

There are three materials entering into the construction of an electric motor, iron, copper and the fibrous materials used for insulation. This insulation is, in all forms, weak mechanically, but the enormous amount of experience which has been accumulated has made it possible to so introduce and protect this comparatively frail material that there is no mechanical weakness from this source. Motors will not stand moisture, however, unless especially built to do so. On the other hand, they give rotative motion directly, with but one moving part, they will start readily under any load up to full load and run with an almost fixed speed, with no impulses of any kind. They can be run in either direction and if properly designed will, for short intervals, stand overloads much in excess of their rated power. They can be run in any position whatever and can be set up, changed or removed in a very short space of time.

In all the good makes they are self-oiling and the absence of exhaust valves of any kind is of great importance in any small motor.

Where then is the place to put the small gas engine with reference to the small motor? Or, to put our question in another form (since the small gas engine is practically the newcomer), can the gas engine, in general, place a part of its sphere within that of the small electric motor? Let us sum up.

Gasoline is universally obtainable, electricity only partially so. This means there are thousands of small shops where the small gasoline engine has the entire field to itself. It is far superior to the small steam engine for such places, and so long as current is unavailable there can be no competition with electric motors. Absolutely constant speed is not at all necessary in this field and there is no question but the gas engine is here giving splendid satisfaction.

Next comes the same kind of a situation with the addition that current is available. This would include all kinds of small shops and places where small powers are used in cities and fair sized towns. Here the inflexibility of the gas engine as against the extreme flexibility of the electric motor comes into striking evidence.

Floor space is valuable. As a result the motor goes up on the ceiling, wall or an odd post. On a large job some distance from the shop it would save money to have a power tool or two at the building. Down comes the motor and in an hour is up again on the other side of the city. It is started and stopped with the machines, and if every advantage is taken of the flexibility available small individual motors will be placed on each machine, doing away with the use of shafts, pulleys or belts external to the machine.

Here enters in the plainest possible way that question of cost of power delivered at the machine. In cases where a few machines are run intermittently, but frequently, necessitating the running of a gas engine continually, the motor can readily compete in cost of power on account of the fact that the motor under the same conditions can be stopped and started as power is required.

The direct attachment to the machine of the power to run it opens up an exclusive field for the small electric motor, which, from all indications, is as free from intrusion as that of the small gas engine where current is not available.

In the intermediate field where both powers can be used, circumstances and taste will influence very largely which will be decided upon. If cost of running alone is considered the gas engine will be selected. If extreme regularity as to speed, or reliability without systematic inspection is required, the electric motor should be selected.

---

*A. R. Curtis in the Engineer.

Or again, if absolute independence of external sources of power is required, together with reliability, decide on a reliable make of gas engine, spend a small amount of time to systematically inspect the same, lay in a sufficient supply of gasoline and your independence will be complete and secure.

We conclude then that the small gas engine has created a field of its own in which it seems quite secure. Also that it has intruded and can intrude but little upon the broad sphere now firmly established by the small motor.

Keeping and Indexing Notes.

Written for the MINING AND SCIENTIFIC PRESS.

The keeping of notes is generally recognized among engineers as of great value, and, though attempted by many, is often given up, sometimes through the lack of a little perseverance, but more often because the system adopted does not meet the requirements. The ideal system permits of keeping and classifying notes in whatever form they are obtained—whether as personal memoranda, clippings, sketches or photographs. They must be indexed according to subject; must permit of easy reference; should not be too bulky; all notes relating to one subject should be together, and, finally, it should be possible to discard obsolete matter, or matter that is no longer of use to the engineer with his increased knowledge and experience.

Note books, with notes often accompanied by sketches, furnish a fairly convenient form, but the entries must be made consecutively, and not according to subjects. This makes indexing rather difficult, and may scatter information on any given subject through half a dozen books, which greatly impairs the usefulness of the system for reference purposes. Moreover, no convenient provision can be made for clippings, and they must either be copied or provided for separately. The same applies to photographs, which often serve to preserve a useful idea or suggestion.

The following system has been tried by the writer and has proved a success. It is simply an adaptation of card catalogues, which have lately come so much into vogue for similar purposes. The requisites are a box of catalogue cards, such as are now made a specialty of by many office supply houses; a note book with detachable leaves, preferably ruled in the same manner as cross-section paper, and a package of large envelopes. Even better than the latter are pieces of letter paper, cut to about 8½ inches square. By folding these in the middle, there results a package 4¼ inches wide by 8½ inches long, which I find a very convenient size. They are held together by a rubber band.

The envelopes, or folded pieces of paper, are now numbered on the outside consecutively near the top, and on each one is placed the heading under which its contents come, with such sub-headings or notes as may seem necessary. For example, we might have the following:

No. 1.—MINING, COSTS.—Bullion mine, Excelsior mine, stoping; John Bull mine, shaft sinking.

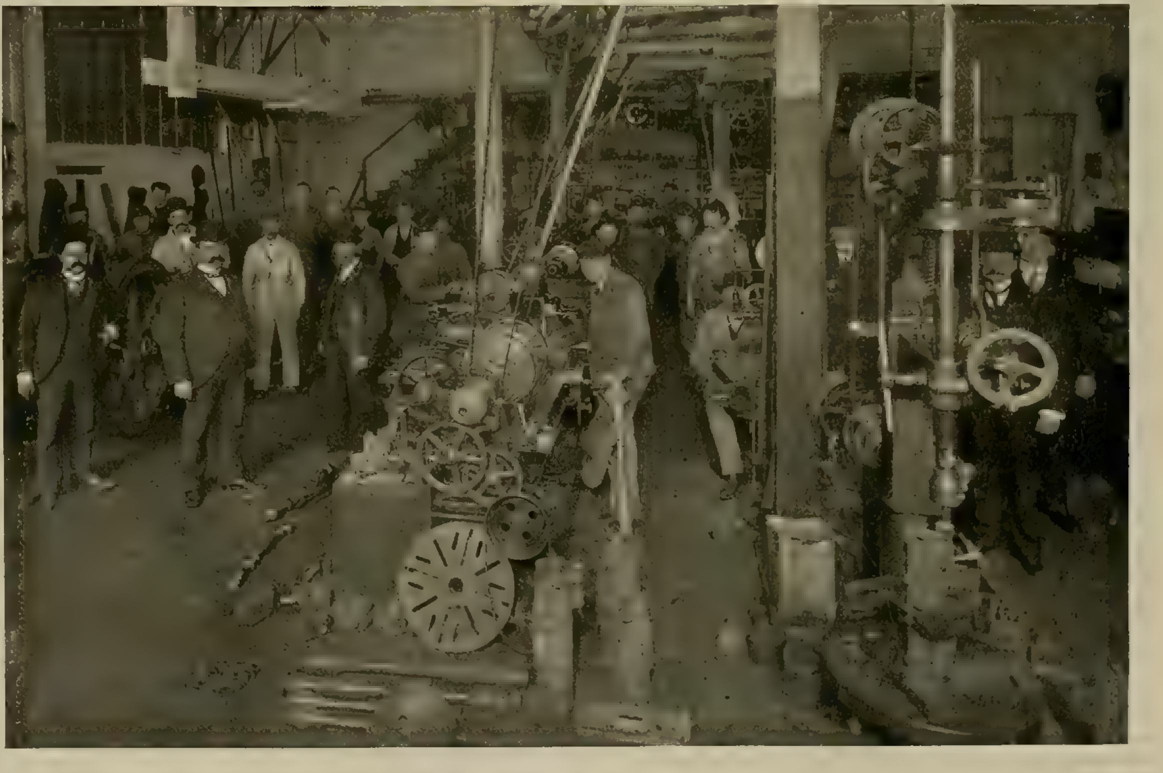
No. 2.—POWER, COSTS.

No. 3.—DYNAMITE.—Handling; composition.

Notes on the different subjects are slipped into the corresponding envelopes, entries are made on the cards as follows: MINING (to be written on the top line in the middle of the card), and COSTS (on the same line, but near the right hand edge), and then below. Notes on the cost of mining. See No. 1. And in the same way with the other subjects.

Since it very often happens that the cost of power depends on the amount of fuel used, the information might be sought for under the heading "FUELS." It is therefore best to put this heading on a card, and under it to write: Fuels, consumption of, etc. See under Power, Costs, No. 2.

For the same reason, one card is headed "DYNAMITE" and another "POWDER," but both will refer to the same envelope. As a rule, one heading will suffice, and it is seldom that more than two will be necessary. It is true that one objection to be urged against this system is that there will sometimes arise a doubt as to what heading an entry should be classified under, but the above method of double indexing will in a large measure remedy this trouble, and to this may be added the suggestion that it is usually better to classify under headings with a broad scope than to go too much into detail. For example, it is better to have one envelope for "ASSAYS," rather than to use a separate envelope for notes on the assays of each individual metal. Also, to occasionally look over the notes and to familiarize oneself with them, will make reference to them easier and will increase their usefulness.


A San Francisco Workshop Interior.

With each entry I think it very advisable to give its source. If a clipping, give the periodical from which it is taken, with date or number of the issue. If a personal memorandum, sketch or photograph, state when and where made, and give the authority for any statement included. It is then possible to know what weight to attach to the notes when they are made use of long after having been collected, and when the precise circumstances of each case may have been forgotten.

Short entries can oftentimes be advantageously placed upon the cards themselves. If in the form of short clippings, and folded papers are used instead of envelopes, it is well to attach the clippings by means of mucilage, otherwise they may easily be lost. With long clippings there is little danger of this.

Few, if any, men are interested in all branches of mining, or of any of the other engineering professions, and it is generally better for a man to confine the notes he collects to those relating to things in which he is interested, and not to include notes on subjects in which there is only a possibility that he may be interested in the future. In this matter every man must draw the line for himself.

The advantages of the system are manifest. It is compact, yet provides for all kinds of notes, and of various forms, and the information desired can be easily found. The one source of information is the box of cards, and it is found either on the cards themselves, or they refer to an envelope which can be quickly picked out by number. Everything is indexed according to subject, and all data on any one subject are to be found in one place, and not scattered. The system may be expanded to include an index of magazine articles, by subject and titles only, but this is of doubtful value. What is wanted is information that is available on the spot, and a list of magazine articles is seldom of use unless a library is within reach. If a library is near at hand, it is easy, when the occasion arises, to look over the files of the magazine, a task that is much facilitated by the index that most magazines print at the end of each volume. An index of books is of greater value, and less bulky. Wherever a man is, he can almost always send for a book. The cards should be arranged according to subject, and, if possible, should give author, title, name of publishers, size, edition, date of edition and date of entry, pages and price. It is true that many publishing houses issue lists of books, both of their own publications and that of other houses; but the lists are seldom all inclusive, and if a man sees or hears of a book that he is likely to want, it is better to make a note of it at once.

Zacatecas, Mexico, Aug. 20.

A San Francisco Workshop.

The accompanying engraving is a good interior view of the workshop of the Compressed Air Machinery Co., 11–13 First St., San Francisco, Cal., a concern that manufactures various devices used in the mining and mechanical world. The company has for years been making a specialty of the manufacture of the Giant rock drills and Giant air compressors, having opportunity to see the practical operation of their machinery in the mines on the Pacific coast, and make such improvements from time to time as suggested by their observations by practical miners. Their shop presents a busy scene, and steady demand exists for their machinery. They are filling orders for their machinery for mines on this coast, and have a demand for foreign trade, shipping to Mexico, British Columbia, Alaska, Australia and to some Eastern points. The Giant baby drill, which has attracted so much attention, is manufactured by The Compressed Air Machinery Co. They are the owners of patents pertaining to this class of machinery, and furnish information and estimates to those desirous of purchasing.

Paris Fair Awards.

Following is a partial list of awards to the State of California and California exhibitors. The grand prize is for products of mines and metallurgy:

GRAND PRIZE.

G.	C.	Name.	Address.	Exhibit.
11	63	State of California	Sacramento	Mines and mining
		GOLD MEDALS.		
11	63	New Almaden Q. M. Co.	New Almaden	Quicksilver
11	63	Cal. State Mining Bureau	San Francisco	Gold
		SILVER MEDALS.		
11	63	Pac. C. Borax Co.	San Francisco	Borax
11	63	D. Fricot	San Francisco	Gold specimen
11	63	F. Beaudry	San Francisco	Gold nuggets
11	63	Calaveras M. Co.	Calaveras Co.	Gold ore

Electricity in Various Things.

During a recent discussion at a meeting of engineers where boiler explosions were under discussion, the point was brought out that electrolytic action played some part in boiler explosions. One of those present gave his experience as follows:

"I had a novel experience in the gas plant of the San Jose Light & Power Co., which is not near the electric light works, and there are no lines which could bring in any electricity. Holding my hand near a leather belt a flame would come out near the knuckle. Go under a belt and you can feel your hair raised by frictional electricity. If you go on top of a boiler and put your knuckles near the drum you will see a blue flame. Your hand could not actually come into contact with the boiler because it was hot."

Another added: "There is no question but that static electricity may exist in anything under certain circumstances." While another said: "I have noticed practically the same thing under different circumstances. You cannot touch any of the wires of a transmission line in a great rain. In repairing you have to work with rubber gloves even when no machines are running."

"It is a well known fact," said a listener, "and probably familiar to all of you, that in those meteorological tests where experiments are made by flying kites in order to get observations in the upper air, they have to ground the piano wire which they send up. Otherwise they would get a current of electricity strong enough to knock a man down. The same thing occurs in building large steel vessels. They have to run a rod to the ground to carry off the electricity."—American Manufacturer.

MINING SUMMARY.

ALASKA.

The U. S. army transport Lawton goes on a relief expedition to Nome. About 600 extra berths are installed. She may make two trips conveying the sick and destitute people who are stranded at Nome.

Juneau Record-Miner: H. Hile, manager Last Chance G. M. Co., says the actual work in the basin is 815 feet of tunnel, 6x7 feet. The upraise will reach the gravel of the basin. In addition 2700 feet of flume, 4 feet 8 inches square, have been built, and an overflow flume 2180 feet long. Total length of main flume from dam to bulkhead 4160 feet. Wing dams will change the course of Gold creek from the south to the north bank of the basin. From these wing dams a new channel will be dug 1600 feet and from the end of this 300 feet of flume, 12x4 feet, will pick Gold creek bodily up and discharge it again into the old channel just below the bridge. This flume will be built on a 4% grade.

The steamer Humboldt reports a rich placer strike on the Chistochina river, one of the northern tributaries and formative branches of the Copper river. The diggings are 200 miles from Valdez and 240 miles from Eagle. This ought to give the transportation companies a few more to be carried north, and later carried back at government expense, though it comes somewhat late in the season.

ARIZONA.

COCHISE COUNTY.

The Dos Cabezas Con. M. Co. has an ore body 6 feet wide, assaying 25% copper, $350 silver and $25 gold per ton. The company will erect reduction works.

COCONINO COUNTY.

In the Buckskin mountains the new Nebeker fifty-ton stack smelter is running; the heavy machinery was hauled 200 miles from Belknap. The smelter is turning out bullion copper.

The sale is reported of the Central Arizona M. Co.'s property to Eastern men for $100,000. The property is in the Grand Canyon district, 40 miles north of Williams.

GILA COUNTY.

Development work has been resumed on the copper mines at Troy. T. Kavanaugh, foreman.

MOJAVE COUNTY.

Mineral Wealth: C. Gracey will erect a 100-ton stamp mill to treat the ores of El Dorado canyon, Nev.——The work of retimbering the main shaft on the Tennessee has commenced. The fire destroyed the timbers to a depth of 150 feet.

PIMA COUNTY.

On the Panama mine, in Old Hat district, J. D. Burgess has sunk a double-compartment shaft; the ore assays 213 ounces silver, $11.40 gold, 8 ounces copper, 39 ounces lead.

The Bradford mine, at Bloxton's, on the N. M. & A. Railway, is shipping to smelter copper and silver ore; F. W. Meade is Supt.

Breen & Peck will put a locomobile line between Nogales & Tucson; also, between Nogales, Washington and Duquesne camps.

PINAL COUNTY.

Supt. Blair of the Mammoth-Collins mines and mill, near Florence, finds increase of the water inflow in the lower levels, which necessitates an increase in the capacity of the pumping plant.

SANTA CRUZ COUNTY.

Wieland & Jund are shipping ore from the Lead Queen mine, near Harshaw.

YAVAPAI COUNTY.

Jerome News: The Brookshire group has a 34 H. P. gasoline engine at work. Supt. Treadwell is taking interest in road building.——The cyanide plant at the Copper Chief property, on Equator hill, is nearly completed. The ore will be roasted: capacity of plant, forty tons per day.——Men are developing the Iron King under the superintendency of W. E. Edwards.——Col. Bosworth, Pres. of the Verde Queen C. Co., has gone to New York; development is being pushed. Dr. King is in charge.——Gradually the copper miner is encroaching on the gold district of Cherry creek.

YUMA COUNTY.

The Crosby-Ehrich syndicate of Colorado Springs, which recently purchased 2000 acres, is building a dredger, with a capacity of 4000 yards per day, that will cost $50,000, to be towed to Pot Holes. The company is also prospecting its ground with a drilling machine.

The Colorado River G. D. Co. is making an examination of 10,000 acres at the junction of Yuma Wash and the Colorado river.

Arkansas men have a bond on 500 acres of dredgable placer land in the Laguna district, owned by the Y. C. R. G. D. Co. The prospective purchasers have thirty days to examine and prospect the ground: the bond calls for the payment of $20,000 in various installments. Prospecting has begun.

F. M. Barnes of Poncha Springs and other Colorado men are examining a tract of 40,000 acres above The Needles.

The Advance Gold Co. has launched its barge at Yuma and is putting in machinery. It will be completed in October and will cost $40,000.

The Cuchan G. M., M. & D. Co. is prospecting with steam power drills 640 acres of placer ground, to determine the character of machinery necessary to work the property.

CALIFORNIA.

AMADOR COUNTY.

Dispatch: Near Ball Rock, in Pioneer district, the ledge shows 14 foot wide, mostly quartz; average value $5.40 per ton.——The Defender mine, in Pioneer district, is a monthly gold producer. The Belmont discovery may outrival the Defender.——The Keystone mine at Amador City is operating forty stamps.——The South Spring Hill mine at Amador City is being worked by Supt. J. R. Tregloan. Twenty stamps of the South Spring Hill mill are crushing rock from the Lincoln mine for Supt. Voorhies at Sutter Creek.——At the Bunker Hill mine, near Amador City, C. R. Downs, Supt., unwatering the shaft progresses. A steam pump was used until the 500-foot level was reached, since which time, the pump being unequal to the work, water skips have been used. During last thirty-five days were hoisted 21,000 skips of water, the skips holding 250 gallons each. The biggest day's work was 909 skips. The shaft had to be retimbered. Timbers used are 14x14 inches for the first 200 feet of Oregon pine; now using the heart of red spruce from east of Amador. The shaft has two compartments and a manway, has an incline of 62°.——The new hoisting machinery for the South Eureka mine is being put in place. Supt. Parks is clearing for more powerful hoisting machinery at the east shaft on the Kennedy mine.

BUTTE COUNTY.

Judge Gray, at Oroville, has decided six suits brought by various holders of property along Feather river against Biggs, Bates & Freeland. In each case the judgment is in favor of the plaintiff. Biggs and associates located claims in the river bed near Oroville for dredging purposes; actions were brought for the recovery of the property. Judge Gray considers that his decision is in accord with other decisions, that the boundary line in such cases extends to center of the channel, where not otherwise expressly stated in patent or deed of conveyance.

Schuyler, Starr & Myers are inspecting the Spring Valley mine at Cherokee. A flume is to be laid in the main tunnel 5 feet wide, 3000 feet long.

The J. Wagner mine, Morris ravine, will be reopened and the shaft retimbered.

CALAVERAS COUNTY.

The Mokelumne M. Co. of Lancha Plana will work the bed of the Mokelumne river, using a big steam shovel, built in Toledo, Ohio, at a cost of $10,000.

J. Mora at El Dorado is examining the Live Oak mine.

The Tuttletown and Angels Aerial Tramway Co. will build from a point on the railroad of the Sierra Railway of California near Tuttletown to Angels Camp; capital $100,000; subscribed $25,000; A. Poniatowski, S. D. Freshman, W. Angus, W. Gregg, E. P. O'Brien.

At the Oriole mine the ore assays $20 per ton. At the bottom of the shaft, 429 feet, is found milling ore. It is the intention to sink 200 feet deeper. Stations have been cut at 100, 200 and 300 feet; fifteen men are employed.

EL DORADO COUNTY.

Georgetown Gazette: Men are at work on the Horseshoe Bar gravel mine, near Josephine.

The Little Gem mine, near Josephine, has suspended operations.

INYO COUNTY.

Albright & Skelton are developing a mine 5 miles southeast of Pine City, near Mammoth.

The Ballarat Co. has let two contracts for work in the mine. F. H. Verencamp is Supt.

R. F. Harrison, who bonded the Ratcliffe mine, will put on more men. A new engine and new air compressor will be put in place.

The Ballarat temperature has recently ranged from 115° to 127° daily.

Antimony ore from Wild Rose canyon is being shipped to New York.

Near Ballarat the Mineral Hill mill is closed down on account of insufficient water. Ten men are working in the mine. D. H. Chaplin is resident manager. The Mineral Hill and Ballarat companies are investigating Panamint canyon water supply, with intention to put in an electric power plant.

KERN COUNTY.

At Bakersfield the Standard Oil Co. is credited with intention to erect tanks and control the oil output of the Kern river oil district.

Near Kramer, V. O. Lyon, in six weeks' trip with a dry washer, saved $900 in coarse gold.

The pumping plant of the Yellow Aster Co. at Goler is completed. The system cost $50,000. In August 3894 tons of ore were mined and milled; average number of men, 62; average, 4½ tons to the stamp; cost of mining and milling, $2.36 per ton.

J. E. Miller of Amalie district has a mine 3 miles west of the Amalie, which assays 2094 ounces of silver to the ton, gold 117 ounces.

The Greenback Copper Co. has incorporated at Bakersfield; capital stock $5,000,000. J. Weringer, $2,500,000; J. M. Keith, $1,249,000; J. J. Mack, $1,249,000; R. S. Elwood, $1000; S. L. Mack, $1000.

Arguments in the case of the Cosmos Exploration Co. vs. the Gray Eagle Oil Co. was made in the Circuit Court at Los Angeles this week before Judge Ross. The case at bar involves the issues existing between the mineral locators and the scrippers. Both sides are confident; the Judge's decision will be regarded as a precedent. The present suit is an action for the appointment of a receiver, and it is supposed will be followed by others, whenever any scrip selections have been made in the Kern district.

Echo: Oil shipments from the Kern River district have reached about twenty carloads a day. Last Sunday a train of twenty-eight cars was pulled out of the field. This would show a daily production of over 3000 barrels. The prediction is now being made that within five months a daily production of at least 10,000 barrels will be reached in the Kern river fields alone. Twenty carloads of oil were purchased last Saturday by the Southern Pacific. The sale was made by the Kern River Oil Co., operating in the McKittrick field.

MARIPOSA COUNTY.

(Special Correspondence).—Capt. A. H. Ward has at last made satisfactory arrangements regarding the Hite mine. The old mine has yielded over $2,750,000 in gold, and, by the payment of $46,000 to Hite, the Hite Cove G. M. Co. takes possession. The 1100 shaft will be sunk 200 feet deeper, the ore chute will be drifted on and new appliances put in. The Miners' Loan & Investment Co. of Boston, Mass., is in the deal, and Capt. H. H. Todd of Alameda will probably have his headquarters, as manager, at the mine here, while the San Francisco office of the company will be at Capt. A. H. Ward's business office, 71 Stevenson St. All the parties mentioned have interests in the new organization, and work will now begin on a new lease of profitable life for one of California's oldest gold-producing properties.

Hite's Cove, Sept. 5.

It is reported in Mariposa that the ore from the Mariposa mine averages about $20 per ton. The management is credited with intention to erect a 10-stamp mill this fall.

L. E. Aubury is operating the Sierra Rica and Roma mines. The lower tunnel of the Roma is in on the ledge 900 feet.

Independent: Capt. A. H. Ward of San Francisco is preparing to resume work on his Pino Blanco properties.——Kenney & Gilbert have bonded four claims on Turnback creek, 9 miles from Sonora.——The owners of the Benvenuta, formerly the Virginia, have issued a prospectus of the property for a stock proposition. W. C. Randolph of Quartz Mountain has transferred his $150,000 bond on the mine to San Francisco parties.

NEVADA COUNTY.

The California G. & C. Co. is organized at Spenceville; A. W. Winberg, F. B. Yerby, P. Ehmann, C. C. Bitner, M. H. Jackson, J. H. Austin; capital stock, $40,000; subscribed, $2000.

ORANGE COUNTY.

The Olinda ranch, 440 acres, Fullerton field, has been sold to Los Angeles men; the Olinda Crude Oil Co. has been formed, capital $2,000,000. Four hundred acres is under lease to and being developed by the Columbia Oil Producing Co. and the Fullerton Con. Oil Co.; the royalties paid aggregate about $30,000 annually.

PLACER COUNTY.

The Sacramento folio of the U. S. Geological Atlas says: During the Neocene period the auriferous gravels accumulated on the slope of the Sierra Nevada, and at the same time there was deposited in the gulf then occupying the great valley a sedimentary series consisting of clays and sands to which the name "Ione formation" has been given. Beds of this age, which probably underlie the larger part of the Pleistocene or surface formations in the valley, are exposed only to a limited extent. At Lincoln there is a succession of white sand and clay beds containing a few seams of lignite. North of Rocklin the same series 50 to 100 feet thick is exposed in places below andesitic beds. The strata form characteristic flat-topped hills and consist of light colored clays and white or yellowish-brown sandstones. On top of the Ione formation there is usually a layer of reddish Pleistocene gravel a few feet thick. The highest point at which the beds are found is about 450 feet above sea level.

SACRAMENTO COUNTY.

The dredger on Sailor Bar is at work under the supervision of W. Stanton. The boat is 105 feet long, 40 feet broad, 7 feet deep. The various parts of the machinery are driven by separate electric motors so that each can work; actual working power of the dredger, 3000 cubic yards per twenty-four hours. All gears and working parts are made of steel; the back of each bucket is a steel casting. Five men on a shift run the machine, shifts changed every eight hours. The power for dredger and big centrifugal pump to keep the pond filled aggregates nearly 500 H. P., supplied from the electric plant of the Sacramento Electric, Gas & Railway Co. The Ashburton M. Co. is owner of the bar and dredger.

SAN DIEGO COUNTY.

The usual result of careless use of an iron bar in tamping is reported from the Queen mine at Hedges, by which D. Bean and W. Ames lost their lives. The men were on the morning shift and were tamping the powder preparatory to their first blast. In tamping they used an iron bar and the powder was ignited. The bodies of the men were badly mangled.

SANTA BARBARA COUNTY.

A lithographic stone is reported discovered in Loma Blanca range 20 miles northeast of the city of Santa Barbara, 5 miles long, 60 feet wide, in layers of 4 inches. A Los Angeles company to quarry the stone is organized, E. M. Ross president.

SHASTA COUNTY.

A 30-inch gauge railroad will be built from the bridge over Pit river to the Bully Hill mine.

A fifty-year franchise to conduct an electrical power plant, to furnish power and lights to mines and unincorporated towns of the county, has been sold by the supervisors to A. H. Davidson of San Mateo county.

The Bully Hill smelter will be in operation by Jan. 1, 1901.

SISKIYOU COUNTY.

At the Black Bear mine J. Daggett has developed ore in a new territory from the old workings of the mine. There are 10 miles of tunnel, shafts and stopes. The 10-stamp mill is steadily operating.

At Etna Supt. Foley is driving a tunnel at the Know Nothing mine.

J. E. Childers, foreman Pumpkin Roller quartz mine, says the ore assays $6.93 in gold, 8.6 ounces in silver.

TUOLUMNE COUNTY.

At the Mohican M. Co.'s property Lillian tunnel No. 2 is in 160 feet on the vein. The ledge shows 3 feet quartz on the hanging wall, 2 feet on the foot wall.

At Stent on the 3d in the double-handed drilling contest—first prize $125, second $50—there were four entries, two teams being from Amador county. L. Page and H. Wainwright won first money, drilling 33 inches in Rocklin granite in fifteen minutes; second money was won by R. Hurley and J. Burbank.

The Santa Ysabel assessment has been paid on every share of the 130,000. Stockholders representing about 129,000 others have assented to the plan of reorgani tion.

Sonora Democrat: The two-compartment shaft at the Confidence mine is down 200 feet.——The mill on the Dead Horse has closed on account of shortage of water.——Grading is under way at the App to make room for forty additional stamps.——At the Norwegian mine a 7-foot ledge that assays $23 per ton has been struck in the shaft on the 700 level.——The Old Tuolumne M. Co. has incorporated; capital $1,000,000; E. C. Dozier, D. Levy, W. J. F. Geary, W. O. Powers, E. A. Roberts.——Twenty miners are employed at the Shawmut mine. Two miles east of the mine a storage reservoir will be built. Supt Terry states that the 235-foot crosscut tunnel, when finished, will connect three other tunnels, opening up bodies of ore. A building for the 50-ton cyanide plant is nearly completed.

Independent: On the 4th the Green Con. G. M. Co. bought the Mount Vernon quartz mine for $38,000. The Mount Vernon is in the Sugar Pine mining district. The new company has its principal place of business in Phœnix, Arizona.——The Mount Jefferson is arranging to put in a new boiler plant. Ten stamps will also be added to the ten in use.——The Gem, near the Mount Vernon mine in the Sugar Pine district, is being vigorously developed by Sedge & Bottini, the owners.——Brown & Rodgers have bonded their two mines to J. G. Couch, formerly manager Merced G. M. Co. The property is an extension of the McAlpine on the south. Ore is being taken out for a mill test.

YUBA COUNTY.

The Marysville & Nevada Power & Water Co. proposes to build a ditch and flume from the Feather. Chief Engineer Engelbright's report gives figures for the construction from a point at the dam to a point 19 miles below: Ditch proper, 8 feet on bottom, 13 feet top and 5 feet deep, grade 7 feet to the mile, 15 miles, estimated cost $20 per rod; 4 miles flume, 8 feet wide, 5 feet deep. At upper or receiving end flume 9 feet wide, grade 9 feet to the mile, estimated cost $35 per rod. At a point 19 miles below the dam it is proposed to discharge 2000 inches of water under a pressure of 400 feet, to furnish 1800 H. P. From the above point it is proposed to construct a ditch and flume 6 miles that will carry 8000 inches of water: required dimensions of ditch: Bottom width 7 feet, top width 12 feet, depth 5 feet, grade 8 feet per mile; flume 7 feet wide, 5 feet deep, grade 10 feet to the mile; 3 miles of ditch, estimated cost $18 per rod; 3 miles of flume, cost $28 per rod. It is considered practicable to discharge 4000 inches of water into the Yuba river at this point under a pressure of 1200 feet, furnishing 1200 H. P. From this point the water must be carried through the divide separating North Yuba from Dry creek by a tunnel.

Levy, Canavan and Hilton are in Smartsville this week consulting with H. C. Stillwell, manager Blue Point Gravel M. Co. regarding drifting on the channel and working the gravel by a new process.

COLORADO.

BOULDER COUNTY.

The Boston mill at Ward is sold to the B. & M. Co.

CLEAR CREEK COUNTY.

Idaho Springs Gazette: Bids are being received by the Stanley management for the erection of a 100-ton concentrating mill in two sections, which it is proposed to build near the power station below the shaft building.——The Allan mill has been completely rebuilt for concentration of ores by jigs and tables.——The Little Richard shaft is down 622 feet, with stations at 300, 400, 500 and 600 feet, leaving a 22-foot sump. Drifts are being run from the 600-foot level each way; 17 inches solid mineral shows in the east drift and 5½ inches of a better grade in the west drift. In the 300-foot level west the streak is not so large, but the same character of ore, running $59.12 per ton.——The Big Chief shaft is down 374 feet. The streak varies from 6½ to 29 inches in width. The present contract will finish the shaft to a depth of 500 feet, and no drifting will be done till the 500-foot mark is reached. Stations will be at 200 feet and 500 feet. The mineral will average $14 per ton, although assays have ranged as high as $165 per ton.

FREMONT COUNTY.

The Rocky Mountain smelter at Florence will be ready for operation Nov. 1. It is an independent concern, is backed principally by Iowa people, and when completed will have a capacity of 550 tons of ore a day. It is to be a semi-pyritic smelter, drawing largely upon Cripple Creek district for silicious ores.

GILPIN COUNTY.

Register-Call: At the Running lode, near Black Hawk, drifting is carried on in the seventh or bottom level at a depth of 530 feet on both sides of the shaft. The west level shows a streak of rosin zinc and lead ore about 12 inches wide, which carries values of $109 per ton. Stoping is being carried on in the sixth level, where milling ore is being taken out, found in crosscutting by Supt. Dunstone. Two shifts are at work, twenty-four men; seventeen are day's pay men, the rest leasers. Enough ore is being shipped to keep three batteries going at the local stamp mills. It is being operated by the Gowers Mines Syndicate.

A shipment of smelting ore made at Black Hawk from the Freedom mine on Winnebago hill gave returns of 3.36 ounces gold and 4.40 ounces silver per ton for a lot of 11,840 pounds, and for another lot of 3400 pounds returns of 2.52 ounces gold and 2.50 ounces silver per ton were obtained.

GUNNISON COUNTY.

The Dale M. Co. at Midway has its 10-stamp mill completed. Twenty men are employed.

HINSDALE COUNTY.

Near Lake City, J. B. Brooks, manager San Cristobal G. M. & M. Co., at the Hiwasse mine, has thirteen men employed. A mill is to be run at Granite falls; capacity, 65 tons. A tramway from the mine to the mill would cover 3 miles.

LAKE COUNTY.

Two new furnaces for the enlargement of the Loder pyritic smelter at Leadville are being manufactured at the Denver Engineering Works, each capable of treating 200 tons daily.

Manager McMillan of the Sierra Blanca M. & R. Co., operating on the eastern slope of Sierra Blanca, has three tunnels started. He says his company contemplates the erection of a mill at the foot of the mountain and connected by a 1500-foot tramway with the mouth of the tunnel.

The work of broad-gauging the entire system of the Colorado & Southern Railway to Leadville has begun. When completed, all of the mines of the silver-lead belt will be reached by a broad-gauge line, which will do away with the necessity of hauling any ore after one loading. Under the present system it was necessary to reload the ore from the mineral belt narrow-gauge line to the broad-gauge cars.

Miner: At Leadville the Home M. Co. is sinking the Penrose shaft. The siliceous ores of the Penrose carry about 50 ounces in silver and 14% lead. The iron ores carry 12% to 18% in lead and paying values in gold and silver.

OURAY COUNTY.

The Ouray Herald says the Camp Bird property has not been sold. "The management does not seem cognizant of any unusual transaction and great preparations are being made for fall and winter work. The output will be doubled and 500 men will be working by Nov. 1."

SAGUACHE COUNTY.

Near Crestone the San Luis Valley L. & M. Co. have the machinery for their 100-stamp mill on the ground. The company has a 5-inch streak of hematite, carrying twenty-eight ounces gold and five ounces silver.

Four miles north of Crestone the San Isabel M. & M. Co. have a fifty-ton concentrator completed. Manager Granville expects to have it in operation by the 10th inst. He is building a tramway three-fourths of a mile in length to convey the ore from the mine to the mill and putting in a six-drill air compressor.

Bonanza reports the sale of the Eagle mine to Creede men for $60,000; cash, $15,000. New machinery will be erected.

Supt. Ashley of the Cliff mine is building a wagon road leading from Copper gulch to the mine.

Twenty-five men are employed on the Hanover mine breaking low-grade ore.

SAN MIGUEL COUNTY.

(Special Correspondence).—The Tom Boy mill in Savage basin is treating 180 to 200 tons of ore per twenty-four hours. This is quite distinctively a free milling proposition, as doubtless 85% of the saving is made on the amalgamating plates upon which the material, thirty mesh, discharges from the seven Huntington mills. The other 15% saving is made in the concentrates from Frue vanners, the product of the latter being unusually clean, perhaps carrying only from 5% to 7% of silica. The entire mill has been operated by electric power during the past year, same being transmitted from the plant of the Telluride Power & Transmission Co. at Ames. The seven mills are run by two motors of 50 H. P. each; the crushers and rolls by a motor of 50 H. P.; a 100 H. P. motor operates the six-drill compressor; at a point in the main tunnel, about 3000 feet from the entrance, a 100 H P. motor operates a hoister at the three-compartment shaft which extends from the 600-foot to the 800-foot level. Adjoining the motor room at the mill is a transforming station, by which the 10,000 volts from the main power house are transformed down to 110 volts for motor use. Rawhide pinions are to be brought into use on the gearing of the electric hoist to partially do away with the deafening noise produced by the metal gearing. The main tunnel and the principal drifts on the different levels are well lighted by electricity.

The Tom Boy Co. has a bond and lease on the Argentine property, which covers a well-defined lode almost parallel to that of the Tom Boy and extending through the range from Savage to Ingram basin. The outcropping of the Argentine is very conspicuous and the lessees, in driving a drift on the ledge from a point just below the Tom Boy mill, have run into ore of good values, and which thus far appears to be a sulphide of lead and iron. Further developments on the Argentine are likely to be important.

The Columbia lode lies farther southward and runs nearly parallel to that of the Argentine. The former was a producer a few years ago, but has been closed down during the past two years. Recently a reorganization was effected and the mine and mill were started up a few weeks ago under the name of the Menona M. & M. Co., with R. W. Davis, Jr., as Supt. The mill is operating ten stamps and five concentrators, from thirty to thirty-five tons of ore being put through daily. No plates are used. The concentrates run well in silver, lead and gold, making a product worth about $65 per ton. Present efforts are directed to cleaning out the drifts and levels and retimbering. The mine is opened through two tunnels—the upper going in 350 feet on the vein and the lower tunnel cutting 1361 feet as a crosscut to the vein. On the level of the lowel tunnel about 1500 feet of drifting has been done, which, it is claimed, shows the vein to range from 4 to 15 feet between the walls. The ownership of the Columbia, now the Menona, is in the hands of Eastern people.

The Japan concentrating mill is running very successfully and has some interesting features. The material, after passing through crushers and coarse rolls, is carried to a three-mesh screen, the oversize from the latter being returned to the rolls; but that which passes this screen goes to a four-mesh screen, the oversize from the latter passing to the coarse jigs. What passes the four-mesh is carried to an eighteen-mesh screen, the oversize from the latter going to the second jig. The material that goes through the last named screen is carried to a hydraulic separator, the heavy product therefrom passing to the fine jigs. The overflow from the hydraulic separator is converged to the slime jig. The tailings from all the jigs pass through a 5-foot mill, having one-millimeter screens. Then the product of the mill is carried to hydraulic sizers, the coarse from the latter going over a Wilfley table set to run 245 revolutions per minute. The heaviest material from the hydraulic sizer is drawn off to a second Wilfley table which runs 265 revolutions per minute. The overflow from the second hydraulic sizer passes to a Triumph vanner. The systematic, careful work in the Japan mill is due largely to the efforts of Supt. M. B. Pickel, who has had extensive milling experience in Montana, as well as in Colorado.

The Liberty Bell mill is steadily operating with batteries of forty rapid-drop stamps, crushing 120 to 160 tons of ore per day. To increase the amalgamating surface double-decked plates are in use. The material from the plates is carried by hydraulic distributors to double-decked Wilfley concentrators. The tailings from the tables are subjected to cyanide treatment and this constitutes one of the most interesting features of the mill, being a demonstration of the South African direct method. By means of Butters distributors the tailings pass from the tables to 300-ton circular vats, each 30 feet diameter and 8 feet deep, built of California redwood. The Butters distributor, one to each vat, is made to revolve by the force of the discharge, thus distributing the material to every part of the vat, the heavier particles constantly settling and the slimes, held in suspension in the water, overflowing at the six slime gates on the sides of the vat. By this means the flour-fine clays which would retard percolation are to a large degree drawn off, the distributors keeping the slime-laden water in a state of agitation during the process of filling the vats from the concentrator tailings. When the vats are filled with these settlings the moisture contained therein is drawn off by vacuum pumps. Then a weak solution of cyanide is applied and after a short-time treatment the entire mass from each vat is discharged through bottom gates into a vat of same dimensions immediately under it, where a stronger cyanide solution is applied; and after the leaching is complete the solution is drawn off into the zinc precipitating boxes in the usual way. After precipitating the solution is drawn into a sump tank where its cyanide strength is tested, thence it is taken to the regular solution tanks, where sufficient cyanide is added to bring the whole up to the requisite strength. About nine days are required from the time the material is distributed into upper vats till the refuse is drawn off from the lower vats. The management is now starting to treat 4000 tons of tailings collected last season. Forty additional stamps have been ordered and likewise additional vats and tanks. There are now three upper and three lower vats in use. When the mill capacity shall be doubled there will be five upper and five lower vats in use. The work of the mill is automatic and it is claimed the tailings have about equal value in gold and silver, and that the cost of treating them falls below 75 cents per ton. The main values, of course, are saved on the plates, though the close saving in concentrates and the tailings therefrom constitute a most interesting feature. The cyanide feature was designed by F. L. Bosqui, formerly at the Standard mine and mill at Bodie, Cal. J. W. Mercer is manager of the Liberty Bell mine and mill.

The new Smuggler-Union mill has been running since about the first of the present year. A quite complete description of its construction appeared in this paper in November, 1899, and an illustrated account of its workings was published in the MINING AND SCIENTIFIC PRESS in the early part of this year. It is now observed that practically no changes from the original plans and equipment have been found necessary. The eighty rapid-drop, 1000-pound stamps, twenty-four Gilpin county bump tables below the plates, four Chilian mills and four Wilfley tables set upon intermediate platforms between the amalgamating floor and vanner floor; the thirty-six Triumph vanners on the lower floor constitute the essential features of the equipment, with the exception of the power department. In the result about 40% of the saving is on the plates, 60% in the various concentrate products. The concentrate product runs high in silver; the bullion retorted from the amalgam runs only about $10 per ounce. The bumping tables perform an important part. By them three separations are made. The material in passing from the plates to the bumpers falls upon 18-mesh screens; that which fails to pass the latter is carried to Wilfley tables and Chilian mills. That which does pass the 18-mesh screen to the bumpers is separated into two classes—the first being the heavy concentrate which is saved off the bumpers, the second being the tailings which pass from the bumpers through laterals down to the Triumph vanners. The material in discharging from the Chilian mills comes in contact with amalgam plates before passing to the vanners below. A tank on the intermediate floor is supplied with hot water from the condensing engine for vanner use.

The new mill is operated by steam, but a large electric generator is being put in at the mill to be operated by water power, for which a pipe line is being run to convey water from Bridal Veil basin. The new generator will operate a 30-inch double cylinder air compressor already in place at the mill. This compressor will operate drills in the Smuggler-Union's Pennsylvania tunnel through a 3500-foot pipe line now being put in. Incidentally it may be noted that a connection is being made between this company's Bullion tunnel and Pennsylvania tunnel, a vertical distance of 750 feet. A winze from the former and an upraise from the latter are in progress. The two Smuggler-Union mills are handling between 12,000 and 13,000 tons of ore per month, and the gross output therefrom per month amounts to a little over $80,000, or at the rate of nearly $1,000,000 per year.

Among the properties in Gray's basin, between Ingram and Bridal Veil, is the Mayflower, operated by E. L. Davis and associates. The property has about 1000 feet of development, is working two shifts per twenty-four hours and taking out quite a tonnage of ore, which is carried by pack animals to the Smuggler-Union mill for treatment.

The Keystone placers near Vance Junction are being worked with a Ludlum elevator, by which the bedrock was reached a short time ago at 60 feet depth.

The Special Sessions, on Mt. Wilson, belonging to E. L. Davis and others, is a gold property at about 12,000 feet altitude, and is 9 miles from Rio Grande Southern railway at Wilson. The property is being developed, but is not shipping as yet. An upper tunnel goes in 300 feet on the ledge; a lower, crosscut tunnel cuts the vein 150 feet from entrance, there being drifts on the vein 250 feet each way from crosscut. From this level an upraise goes to the surface. A second crosscut extends from the Sessions to the Oasis vein, a distance of 200 feet. A 45-foot shaft has been sunk from lower level of Sessions, all in ore. It is claimed 6000 tons of ore are in sight, that the vein carries a pay streak about 1 foot wide, carrying values running $35 per ton. Some of the gold herein is free, but in the main it is a concentrating proposition. Mr. Davis thinks a mill may be built.

The Gold Run Extraction Co. of St. Louis, under the management of F. L. Bosqui, is operating a cyanide plant near Pandora, extracting the gold and silver from the placer tailings which have accumulated in banks and bars along Marshall creek during the last twelve or fifteen years. The deposits, in the main, consist of tailings from the Smuggler-Union, Tom Boy, Japan and other mills in Marshall and Savage basins. The plant was built last fall, but since Mr. Bosqui took charge, two months ago, it has been enlarged from 100 to 200 tons capacity per day. It consists of two storage solution tanks, 22x6½ feet; two gold solution tanks, 22x4½ feet; two sump tanks, 22x6½ feet; twelve leaching tanks, 25x5½ feet, of 100 tons capacity each. The leaching tanks are ranged in two rows, with a graded bridge, 18 feet wide, extending over each row of tanks, the bridge surface being of 2x4-inch scantling set on edge, 2 inches apart, permitting the tailings, which are hauled and dumped from wagons, to fall through into the tanks below. Each tank, after the leaching, is sluiced out through a center disk gate at the bottom. The company has a two years' lease on the tailings from the two Smuggler-Union mills. Within ten days the plant, now operating with only six tanks, will be running with the twelve tanks, or full capacity. Mr. Bosqui states that the values obtained will average about $4 per ton of tailings. WASCOTT.

Telluride, Aug. 23.

SUMMIT COUNTY.

A. B. Ogden, manager Excelsior mine and mill at Frisco, is also operating the Moose mine near Alma. A new shaft is being sunk on the Moose to reach an ore body found with a diamond drill several years ago.

At Breckenridge Manager Revett of the North American G. D. Co. will raise the sunken dredger and put it in operation.

It is proposed to drive the Prosperity tunnel 1 mile into the Ten-Mile range from a point on the Ten-Mile river, 4 miles above Frisco, where it would attain a depth of almost a mile, and, when completed, would be the deepest mine in the country.

TELLER COUNTY.

Cripple Creek's production for August was as follows:

Mills.	Tons.	Value.	Totals.
Colo.-Philadelphia	8,500	$40	$ 340,000
El Paso	1,500	25	37,000
Metallic	7,000	20	140,000
National	4,000	30	126,000
Arequa	2,400	20	48,000
Economic	3,222	30	64,440
Gillett	2,000	30	60,000
Smelters	13,000	70	910,000
Miscellaneous	....	..	25,000
Totals	41,822	..	$1,750,440

Victor reports that the Trachyte, south side of Bull hill below Altman, has made a strike of hard, fine-grained quartz of phonolytic character that carries a streak of sylvanite.

Dividends at Cripple Creek for August aggregate $806,000. This does not include the quarterly dividends of the Portland, Mary McKinney, Vindicator, Gold King, Stratton's Independence, Elkton, Isabella and several others whose total amount of distribution amounts to over $1,000,000 each three months.

Victor reports a plan for amalgamation of nearly all the properties on Raven hill, between the New Haven on the north and the Louisiana on the south, embracing the Louisiana, Bonnie Nell, Custer, Fido, Cranks, Mary Ann, New Haven and Joe Dandy, for concentrated development. A shaft 1000 feet in depth is projected in the center of the property.

The Temomj stockholders will dispose of their entire holdings to Stratton's Cripple Creek Development Co. for $250,000.

Over 2000 feet of electric wire has been strung in the Columbine–Victor tunnel and forty-five pound rails laid. The electric engine will be capable of hauling twenty-five loaded cars of ore. The Trail tunnel is to be fitted up the same; the ores mined in the Wild Horse will be hauled underground down to the Economic mill.

The Doctor mine has resumed work by putting on three shifts of miners—a total of 100 men.

The Detroit mill of Independence has also resumed.

M. Robbins, agent Armour-Haviland Co. of Chicago, says that he and associates have closed contracts for properties in Teller and Gilpin counties, calling for the payment of $2,000,000.

IDAHO.

ADA COUNTY.

The new mill on the North Star, the Shaw mountain property of the War Eagle Con. M. Co., at Boise, has started. The Jordan gravitation process is in use. The company employs seventy men.

Boise has news of a strike in Boise Basin on the Mattie property, owned by J. D. Small, operating under lease by Daly & Anderson—a streak 10 inches in width, running above $200 to the ton.

BOISE COUNTY.

A strike has been made in the Golden Star mine, Centerville. The ledge where cut shows 4 feet of ore, carrying gold.

R. Winters, Supt. Boston & Idaho Dredging Co., has a new dredge handling 1500 yards per day. The company is figuring on two more dredgers.

SHOSHONE COUNTY.

Recent rains assure sufficient run for the elevator at Murray for the Cœur d'Alene M. Co.

A copper ledge has been uncovered at Camp Seward, 18 miles northwest of Murray.

WASHINGTON COUNTY.

W. H. Dewey has bought the Caswell Bros. property at Thunder mountain for $100,000.

The first cyanide mill in the county is being erected at Black lake by the Idaho Gold Coin M. & M. Co., east of the Seven Devils copper mines, under the management of E. D. Ford.

The mining suit of Halter & Bullard vs. the American M. Co. and G. Stuart has begun in the District Court at Weiser. This is a suit for partition, and seven-sixteenths of the Peacock, Helena and White Monument mines in the Seven Devils, valued at $400,000, is involved.

MONTANA.

FERGUS COUNTY.

The New Year M. Co., Gilt Edge, says it has made successful application of the cyanide treatment to gold in the ores at Lewiston, which is rusty and very fine. A. S. Wright says the ore is mined, milled and treated with cyanide at an expense not to exceed $1.50 a ton.

G. M. Nelson says of the New Year mine near Lewiston that the last month's clean-up netted about $15,000. The cyanide mill on the New Year has been closed down preparatory to increasing the capacity to 200 tons, put in a new tramway to transport the ore to the mill and install an air drill plant for mining the ore more cheaply.

FLATHEAD COUNTY.

At Libby, Manager Edw. Murphy of the West Fisher M. Co., is credited with making arrangements to add thirty stamps to the 10-stamp mill on the West Fisher.

JEFFERSON COUNTY.

A committee of stockholders of the Basin & Bay State M. Co. are out from Springfield, Mass., to examine the interests and investments of the company at Basin. Receiver Berendes of Boulder, receiver for the company, says the committee will do something with the property, either dispose of it or raise additional funds for completing the mill and smelter and get them in operation.

The power company operating the electric plant at Canyon Ferry on the Missouri river projects transmission of power to Butte to be used in the mines and smelters there.

G. H. Platt and J. H. Longmaid of Helena have transferred to the Elkhorn Silver M. Co. the mining property at Elkhorn which they recently bought from the New Elkhorn Co., Ltd., of London. The transfer includes several quartz claims, mill and other buildings, town lots in Elkhorn with buildings thereon, ditches, water rights, etc. The consideration is $20,000, or in lieu thereof 20,000 shares of the capital stock of the new company, which is capitalized at $100,000, with shares at $1 each. It is thought the new company will begin work.

MADISON COUNTY.

Rouderbush, Gillie, Kane & Booth, representing the Amalgamated Copper M. Co., are credited at Pony with intention to buy the Clipper group, which includes the Boss Tweed mine, for $1,000,000. The Sentinel says the transfer will be made by Oct. 1st, and that they will build a concentrator 800 tons daily capacity on the site chosen years ago by the Pony G. M. Co., a tramway to be built from the mine.

The Parrot smelter at Gaylord is being dismantled and will be taken to Anaconda. This property cost $750,000 to build, but was never completed or a pound of ore crushed.

SILVER BOW COUNTY.

Near Butte work on the Smokehouse lode is resumed. The noise new electric hoist is operated, not to be subdued, as it is operated wholly by gearing, no leather belts being used. The new hoist is of 75 H. P. and has a sinking capacity of 700 feet. There was so little room to work that the company bought the lot on which the hoist stands, paying for it $22,000. The company owns fifty-two acres of ground in the heart of the city. The lot just bought will be used to cut the timbers on. The timber to be used will be 10-inch, as electricity will be used for blasting in the mine, and blasts caused by electricity will shake the smelter timbers out of position. The company intends to sink a shaft of three compartments on the Destroying Angel lode, one of their properties, 1000 feet deep.

The tax statements require the grade of the ore taken from the various mines. According to that the gross value per ton of Butte's ores was $14.61, of Anaconda's $13.18, of the Colusa-Parrot's $8.93.

NEVADA.

ESMERALDA COUNTY.

J. Siegel, general manager Vulcan C. Co., Sodaville, says he has cut another ore body east on the 100-foot level.

EUREKA COUNTY.

The Chloride, Climax and Crown Point copper prospects at Bald mountain are bonded to A. H. Tarbet of Salt Lake City, Utah.

LINCOLN COUNTY.

The Quartette M. Co. has seventy-eight men on the payroll.

Supt. Rose is working a full quota of men on his Searchlight group and is shipping carload lots to Barstow. It takes good ore to pay freight; on teams to Manvel, $8; railroad, $2.50; working charges, $5, and 90% returned; the Quartette mill proposes to buy ore in small lots.

STOREY COUNTY.

It is expected that Rheinold Sadler will press the button that turns on the electric current at the Gould & Curry mill about the 25th inst.

On the 5th Supt. Ryan wired: "No. 2 elevator ran twenty-three hours. It was stopped one hour, saving pressure water. At 6:30 this morning the water was 195 feet 6 inches below the 1950-foot level station."

WASHOE COUNTY.

The new 100-ton smelter of the Reno S. & M. Co., at Reno, is completed.

NEW MEXICO.

BERNALILLO COUNTY.

J. A. Coram, president Cochiti G. M. Co., says "sufficient water supply, including that required for economical emptying of the cyaniding tanks, will be in operation Sept. 1. The ore treated for last seven days averages $10.25."

GRANT COUNTY.

The Texas mine at Central, operated by the Bayard S. & M. Co., has a double-compartment shaft almost completed to the 500-foot level. The company is locally credited with intention to go down 2000 feet before they stop.

SANTA FE COUNTY.

The smelter of the Santa Fe G. & C. Co. at San Pedro is building. The air drills are kept at work night and day. Ten thousand tons of gold-copper ore are now ready for the smelter.

The Cerillos smelter will put in a roaster for refractory ores. Additional trackage room is being provided that the ore may be handled by gravity from the cars to the ore bins.

SOCORRO COUNTY.

The Deep Creek M. Co. (White, Sill & Smith, Denver, Colo.) has incorporated to operate 540 acres of copper lands, Mogollon district; capitalization $1,500,000. The company owns twenty-seven patented claims, twenty acres each, paying $60,000. A tunnel will be driven into the mountain.

TAOS COUNTY.

The rejection by the Supreme Court of the United States of the Cebolla grant makes all that mineral region surrounding Red River public domain. This decision restores 20,000 acres of land.

OREGON.

BAKER COUNTY.

The Golconda Co. is arranging to put in forty more stamps.

The Baby McKee mine, 35 miles from Baker City, has been bought outright by Capt. Regnier, a Cincinnati, Ohio, man.

The Badger mine at Susanville has thirty men; the shaft is sunk 300 feet and will be sunk 200 feet deeper.

Near Sumpter work will start on the Buffalo property near the Magnolia. R. T. Cox will be in charge.

JOSEPHINE COUNTY.

S. J. Fore of Cole's, Cal., has bought a seven-eighths interest in the Hungry Feeder and forty acres adjoining the property for $17,500.

On the Whitney ledge Supt. Mitchell has ten men at work. The ledge is 4 inches wide, the pay chute 40 feet long.

UTAH.

Salt Lake Tribune: Utah mine production keeps up at an unprecedented rate. The months so far this year have shown the following ore and bullion settlements:

January	$ 1,666,014
February	1,830,980
March	2,046,413
April	1,470,593
May	1,695,167
June	1,907,129
July	1,605,829
August	1,507,495
Total	$13,729,620

At this rate the ore and bullion settlements this year in this city will reach well above $20,000,000—a figure never before approached in a single year.

EMERY COUNTY.

Near Provo the controlling interest in the Copper Globe M. Co. has passed to men who intend to develop the property; the price was about 50 cents per share. The property consists of six claims, 25 miles southeast of Ferron; St. V. Le Sieur, president.

JUAB COUNTY.

E. H. Buchanan has a year's lease on the Picnic mine at Silver City, and promises to pay the stockholders a royalty of 25% of the net earnings of the mine.

The Spy mine is bought by the Carissa Co. for $50,000. Supt. Underwood will put it in condition.

The Miner reports a strike in the Yankee tunnel which assays 36 ounces silver, 55% lead, $10 gold.

SALT LAKE COUNTY.

The American Smelting & Refining Co. will blow out its gold-sampling rooms and cease the sampling of auro-cyanides west of the plant at Argentine, Kan., on Oct. 1.

SUMMIT COUNTY.

The control of the Sunbeam has passed into the hands of T. Kearns of the Silver King, who will put in machinery to sink 300 feet deeper.

Tribune: Connection with the main ore chute on the 1200-foot level having been accomplished, the management of the Silver King at Park City is opening up ore which shows, per ton, 35.2% copper, $38 in gold, 610 ounces silver, with lead values correspondingly high.

WASHINGTON.

FERRY COUNTY.

At Republic Supt. J. S. Wyatt is putting in a new set of tanks for treatment of ore at the Mountain Lion mill.

D. F. Hallahan has bought the Commercial and Ajax claims, near Sheridan camp, for $4000.

At Republic the strike on the Tom Thumb is considered important and locally justifies belief that in the next six months the mine will produce 200 tons daily.

At Republic the Republic mill will be in operation Nov. 1st; capacity 200 tons daily. There are sixteen tanks, each 22½ feet square and 6 feet deep, capable of treating 1600 tons of ore at one time.

SNOHOMISH COUNTY.

At Monte Cristo the Monte Cristo M. Co. has sixty men on the payroll. The concentrator is daily handling seventy tons. When there is more air and room, the force will be increased to 200 men.

STEVENS COUNTY.

In the copper belt west of Valley the King G. & C. M. Co. has incorporated to work the Anderson mine; J. B. Tuttle is Supt.

WYOMING.

CARBON COUNTY.

(Special Correspondence).—Recent forest fires have delayed progress as most of the companies have been compelled to use their men to fight fires, which have done considerable damage. After the State officials withdrew their men and when the fire was only 1 mile from here we fought the fire and whipped it out. We had a fire line 4 miles long, and after three nights and four days succeeded. At first the people shouted it would be useless, as it would take more men to whip the fire than to whip China. Had this fire got in it would have been death to this camp, as all the timber for miles around is destroyed. The Ferris-Haggerty lost 1000 cords of wood alone, beside other damage, and the fire is still burning around Battle lake. The Ferris-Haggerty is about 6 miles from there. Mr. Ferris' death has put a stop to the Manhattan deal which was pending. Sweet & Cling have located several iron claims within 6 miles of this mine and have found gold float 3 miles from here. The smelter is an assured fact. The contract has been let for the machinery. Before the contract could be let it was necessary for Chas. E. Knapp, manager of the Boston & Wyoming Smelter Co., to raise $100,000 cash. This he has done and the contract for the hauling of 146 tons of machinery from the railroad to Encampment has been let. Dr. Burger, manager Great Lakes mines, has his shaft house completed. The K. C. mine is about 5 miles from Encampment. The Great Lakes mine is taking out good copper ore. The fire near the Great Lakes mine was so fierce that the flames shot 100 feet in the air above the tree tops, but no damage was done to the G. L. M. shaft house.

Encampment, Aug. 31.

FREMONT COUNTY.

At South Pass the Carrisa mine has been incorporated under the name of the Federal G. M. Co. The lower level has been opened up and three ore chutes uncovered that carry ore.

FOREIGN.

AUSTRALIA.

In mining the rapid increase in the production of gold in 1897, 1898 and 1899 has so far this year been checked, and it is probable that the total will not much exceed that for 1899—say about 4,000,000 fine ounces. The expectations formerly held with regard to some of the Western Australian mines have hardly been realized. On the other hand, there is always the possibility of fresh discoveries to be kept in mind. The high prices of the industrial metals have proved of great advantage to the Broken Hill lead mining field, as noted on the editorial page, and the Tasmanian copper field. In several parts of Australia considerable development of copper properties is in progress, and there is no doubt that in time the production will be greatly augmented. There are large amounts of refractory ores in Australia of different kinds that still remain to be made commercially profitable.

BRITISH COLUMBIA.

Near Ymir it is stated that the Keystone has been sold to Spokane, Wash., men for $30,000.

B. C. Riblet of Nelson has finished the new tramway for the Ivanhoe, near Sandon.

The proposed increase of the Provincial duty from 1% to 2% on the output of the larger mines is meeting with considerable opposition from Kootenay mine owners.

A sheriff's sale is announced on the 15th, at Quesnelle, of the plant of the Cariboo Dredging Co.

British Columbia papers note the shipment of 1500 tons of lead ore concentrates from the St. Eugene mine in East Kootenay to Guggenheim & Sons' smelter at Autofagasta, Chile, as an indication that before long other markets than those in the United States and Canada will want the products of British Columbia mines. The deposits in East Kootenay are rich in lead—exactly what are required for fluxing dry ores.

A 20-stamp mill will be installed at the Engineer mine, on Taku Arm, Atlin.

Vancouver reports the transfer of the Brallamer copper mines, on Howe sound, to the Scott syndicate, on the basis of $2,000,000, with a cash payment.

Ainsworth reports that the Highland group is sold to the Highland M. Co., Ltd., for $100,000 cash. A 100-ton concentrator is to be constructed; a wharf will be erected at the mill site, on the lake. The concentrates will be sent by boat to the Hall smelter at Nelson. A 4000-foot aerial tram will connect the mine and concentrator and will be in operation by Nov. 30. A 480-foot head of water, brought by flume from Cedar creek, 1700 feet distant, will furnish power for the concentrating plant. Work on the flume is in progress. The office of the company is at Nelson.

CANADA.

In 1894 Canada produced 5,103,222 pounds of lead; in 1895, 16,461,794 pounds; in 1896, 24,199,977 pounds; in 1897, 39,018,219 pounds; in 1899, 21,862,436 pounds.

MEXICO.

The Mecatona Con. M. Co. has been organized to work properties at Parral, Chihuahua; W. H. Mealy president, D. L. Williams Supt. The mines are 3 miles from the Central station.

The Dos Cabezas gold and silver mine, in eastern Sonora, near Casas Grandes, Chihuahua, the southern terminus of the new Sierra Madre line, is reported bought by Strong, Sturgess & Co. of New York.

A new mining camp has been opened at Agua Caliente, 6 miles north of Chinipas, State of Chihuahua, by R. Gird, an old Arizona miner. The camp is called Guadalupe. The ore carries gold and silver, assaying $15 gold and twelve ounces silver to the ton.

The consolidation of the Avino mines with the Durango Copper Co. is reported ratified in London.

The Lewis Co., ore buyers, City of Mexico, have sold their interests to the National Metal Co., organized in New Jersey with $1,000,000 capital. J. B. Cottle, City of Mexico, is general agent.

At El Oro is organized the Santa Rosa M. Co.; managing owner, J. Corwin, formerly of the Esperanza Co. The property is the most southerly of all the El Oro mines.

THE KLONDIKE.

The N. A. T. Co.'s coal deposits on the Yukon are on Coal and Cliff creeks, on the Canadian side, 70 miles below Dawson. The veins vary from 5 to 25 feet, being very uneven. Very little has as yet been shipped to Dawson, but the boats plying on the lower river all use it, and it finds a ready sale at $30 per ton on the dump. The workings are under the management of J. Watson. About thirty-five men are employed. Wages vary, the regular coal miners getting $5 per day and board; miscellaneous labor is paid for at the rate of $100 per month and board.

Recently Declared Mining Dividends.

Mercur Co., Utah, 20 cents per share, $40,000	Sept. 1
Swansea M. Co., Utah, 5 cents per share, $5000	Sept. 10
Union G. M. Co., Colorado, $312,500	Sept. 5
Elkton Con. M. & M. Co., Colorado, $75,000	Sept. 10
Bunker Hill & Sullivan M. & C. Co., Idaho, $21,000	Sept. 4
Empire State Idaho M. & D. Co., 3%	Sept. 15
Wolverine C. M. Co., Michigan, $2 per share	Oct. 1

Personal.

BERTRAM HUNT has returned to San Francisco from British Columbia.

C. W. KEMPTON writes from New York that he has returned from Venezuela.

WM. NIVEN of the City of Mexico is examining mines in the State of Sonora.

GEO. H. KISLINGSBURY is in Chihuahua, Mexico, examining mining properties.

FRED BOECKMAN, Pres. Champion M. Co., Nevada county, Cal., is in San Francisco.

W. H. HILL is now general manager Idaho Little Giant M. Co., Ltd., Warren, Idaho.

AUGUST SAHLBERG is managing director Esperanza & Serio M. Co., El Oro, Mexico.

H. VAN F. FURMAN has returned to Denver, Colo., from a protracted sojourn in Alaska.

W. H. STORMS of the California State Mining Bureau is in San Francisco writing his report.

LEWIS T. WRIGHT, manager Mountain Copper Co., has returned from London to Keswick, Cal.

PHILIP DEIDESHEIMER of San Francisco is operating the Accident mine, Big Oak Flat, Cal.

R. M. DOWIE of the Keystone Driller Co., Beaver Falls, Pa., is visiting northern California.

WM. ORR of Salt Lake City, Utah, is at Deer Lodge, Nev., starting the Horse Shoe Co.'s new mill.

JNO. DERN, Pres. Mercur G. M. & M. Co., of Utah, arrived in New York from London yesterday.

SUPT. RALSTON, Melones Company, has returned from Calaveras county, Cal., to San Francisco.

WALDEMAR LINDGREN of the U. S. Geological Survey is examining the country around Sumpter, Or.

OTTO GRAMM, president of the Laramie Iron Works, Laramie, Wyoming, is visiting San Francisco.

C. C. BURGER, consulting engineer for the Cook–Turner Co., New York City, has returned from a trip abroad.

EMMET BOYLE of Nevada county, Cal., goes this week to the employ of the Esperanza G. M. Co., El Oro, Mexico.

P. P. BUSH, general Western agent Canton Steel Co., Canton, Ohio, is in Salt Lake City, Utah, from Denver, Colo.

F. G. FARISH, formerly assayer Grand Central M. Co., La Colorada, is now manager for the Japan Con. M. Co., Telluride, Colo.

R. C. MASON is succeeded as superintendent construction at the new stamp mill of Mass mine at Ogima, Mich., by Henry Key.

C. S. CURTIS, late assayer for the Guggenheims, Parral, Mexico, takes a similar position with the Mexico G. M. & S. R. Co., City of Mexico.

PROF. O. H. PACKER, a mining engineer of San Francisco, has returned from a trip to Michigan, where he examined some iron ore deposits.

S. F. EMMONS of the U. S. Geological Survey is spending his vacation at Greenwood, B. C., and giving expert evidence in the Center Star–Iron Mask case at Rossland.

DAVID CRAELIUS has returned from his European trip and has resumed his old position as general manager of C. A. Luckhardt Co.'s Metallurgical Works, 71–73 Stevenson St., San Francisco.

C. W. WHITELY, manager of the East Helena, Mont., smelter, is in Salt Lake City, Utah, in consultation about the new smelting plant to be erected by the American Smelting & Refining Co. at that point.

J. H. HAMMOND sailed for Boston from Liverpool on the 5th inst. London wires that as the representative of a syndicate composed of Werrnher, Beit & Co. and J. B. Robinson, the South African magnates, and J. Pierpont Morgan and other capitalists, he comes to examine a group of mines in Colorado, and that if he reports favorably it is asserted the syndicate has agreed to purchase the mines for $7,000,000.

JOHN W. GATES, formerly chairman American Steel & Wire Co., arrived last Saturday from Europe. The company's half yearly statement at a meeting last Tuesday showed net earnings for the six months ended July 1 of $6,300,000. Of this total it is stated $800,000 net were earned in the month of May, immediately following the cut in wire products and Mr. Gates' sensational revelations as to overproduction."

GARDNER F. WILLIAMS, the general manager of the De Beers Con. mines, is expected to arrive in London by the incoming mail steamer from South Africa, says the African Review. Mr. Williams was in Kimberley during the siege, and took a prominent part in its defense, and he is now taking, with Mrs. Williams and family, a six months' holiday, which will be spent mostly in America. It is understood that Mr. Williams will secure a number of mining engineers to reinforce his staff before he returns to Kimberley.

GRANT H. BROWN, London representative Flint–Eddy Co. of New York, has returned from St. Petersburg. He says: "Russia is now endeavoring to annex Manchuria and she is depending on American bankers to finance her war loan. Japan is the only power which will possibly object to the Czar's Manchuria programme, and unless the Mikado declares annexation a cause for war the Czar will issue a proclamation annexing Manchuria within sixty days. If Japan calls a halt Russia will immediately go to New York to secure the necessary war funds and place big orders for ordnance there. When everything is ready the Czar will occupy Manchuria and fight Japan. Russia does not anticipate any interference from the other powers in her Manchurian move."

Commercial Paragraphs.

A FORTY H. P. Hercules gasoline engine is being put in at the Mammoth–Collins mine, near Florence, Arizona.

A 16x17 LEYNER COMPRESSOR, manufactured by J. G. Leyner, Denver, Colo., has been bought by the Red River M. Co., Lake City, Colo.

THE Crown Gold Milling Co.'s, 23 Stevenson street, San Francisco, California, new dry process for sizing and concentrating refractory ores is reported to be occasioning interest among practical mining men.

LOUIS FALKENAU has removed his laboratory and school of assaying from 434 California St. to 538 Sacramento St., San Francisco, Cal. His new place occupies two commodious floors and is equipped with suitable apparatus, giving it greatly increased capacity.

AT Houghton, Mich., on Aug. 30th, the Michigan College of Mines graduated a class of twenty-two mining engineers and granted twenty diplomas as bachelors of science. The graduating class includes one member from British Columbia, one from Russia and two from Mexico.

W. F. WAGNER, general manager New York office of Jessop & Sons, Ltd., Sheffield, England, is informed that Jessop's steel has been awarded the grand prix at the Paris Exposition. The firm's exhibit was much the same as that made at the Chicago World's Fair and attracted a great deal of attention.

THE Jeffrey Manufacturing Co. of Columbus, Ohio, was awarded a gold medal at the Paris Exposition covering its line of elevating-conveying and mining machinery. No doubt many of our readers who have enjoyed a visit abroad this summer have had the pleasure of seeing the exhibit of this company.

D. CAMPBELL DAVIES & CO., Durango, Mexico, have established in that city a general agency for mining and smelting machinery and supplies for Mexico, Central and South America, with intent to place orders on a commission basis at the minimum of expense to the manufacturer. They have a system of securing advance information concerning these matters that they consider of value to manufacturers and dealers placing orders through them.

List of U. S. Patents for Pacific Coast Inventors.

REPORTED BY DEWEY, STRONG & CO.,
PIONEER PATENT SOLICITORS
FOR PACIFIC COAST.

FOR THE WEEK ENDING AUG. 28, 1900.

656,801.—RIVETING MACHINE—J. H. Batcher, Sacramento, Cal.
656,767.—BALING PRESS—C. Dodge, Davisville, Cal.
656,815.—RIVETING MACHINE—S. Forman, Sacramento, Cal.
656,776.—GAGED FEEDING JOGGER—R. H. Pratt, Portland, Or.
657,037.—HOSE COUPLING—A. M. Spickelmier, Tualitin, Or.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

MACHINE FOR SPREADING, TRUING AND GAGING DRILLS.—No. 656,415. Aug. 21, 1900. David G. Morgan, Quartz Mountain, Cal., one-half assigned to R. H. McNamara, same place. This invention is designed to spread, true and gage rock drills of that class in which the cutting bits are formed at right angles with each other. It consists of tools or formers, the first of which has separable channeled jaws, means for holding the drill in contact with the jaws and operating them so as to spread the bits, a die follows by which the ends of the bits are squared or straightened after being spread, and finally a gage or sizer into which the bits are successively inserted to bring them to the proper size. The hammers which act to produce these various operations are preferably actuated by fluid pressure. The device is rapid and economical, as it makes it possible to do the whole work at a single heat.

PROCESS OF LEACHING ORES OR TAILINGS.—No. 656,395. Aug. 21, 1900. Edward H. Dickie, Bodie, Cal., one-third assigned to James Kane, same place. This invention relates to improvements in the leaching of ores, tailings and like material containing valuable precious metal in conjunction with a cyanide solution, and is especially designed for use in connection with such ores or tailings as contain base substances which act upon the cyanide in the solution and render it unfit to dissolve the precious metals. This solution prevents the base substances from uniting with the cyanide to destroy its power of dissolving gold and silver. The result is obtained by adding to the cyanide solution a substance which will unite with the base metal forming a salt thereof, and which has little or no affinity for the precious metals, thus allowing the solution to act directly upon the precious metals. The ores are leached in the usual manner.

Catalogues Received.

"ELECTRIC POWER" is an edition de luxe of a volume portraying Westinghouse electric motors applied to stationary service. It is intended for distribution at the Paris Exposition, and is printed in French, English, German and Spanish. It is a handsome specimen of typographical excellence, showing the electric motor operating machinery of every kind all over the world. There is no "talk," or description, merely pictures and an explanatory title to each. The pictures are works of art. The one on page 129 is about as finely executed a half tone as any seen.

Obituary.

NEAR Glendale, Or., on the 3rd inst., E. W. Dana, a mining superintendent, was killed at a shaft on the Copper Stain mine, of which he was in charge. A whim was being worked by a horse, when the harness broke, allowing the bucket to start down at great speed, and Dana, in his effort to stop it, was struck by a harness hame over the heart, killing him instantly.

Latest Market Reports.

SAN FRANCISCO, Sept. 6, 1900.

SILVER—Per oz., Troy: London, 28$\frac{1}{10}$d (standard ounce, 925 fine); New York, bar silver, 62⅝c (1000 fine); San Francisco, 62⅝c; Mexican dollars, 50¼c.

From Jan. 1 to Sept. 1, 1900, silver shipments from San Francisco compare as follows:

	1899.	1900.
Fine silver	$2,645,283	$3,204,442
Mexican	1,550,115	5,424,922
Totals	$4,195,398	$8,629,364

The greater part of the above went to China.

COPPER.—New York: Lake, 1 to 3 casks, 17.00 cash; carload lots, 16.75; Electrolytic, 1 to 3 casks, 16.87½; carload lots, 16.75; Casting, 1 to 3 casks, 16.75; carload lots, 16.50. San Francisco: 18. Mill copper plates, 20c; bars, 22@23c.

Exports of copper during August, according to returns by the N. Y. Metal Exchange, were 13,850 tons. July shipments were about 11,000 tons.

LEAD.—New York, $4.37½; Salt Lake City, $4.20; St. Louis, $4.32½; San Francisco $5.00, carload lots; 5½c 1000 to 4000 lbs.; pipe 6¾, sheet 7½, bar 6c. London, £17 12s 6d=3.80c per ℔.

The New York Report says the recent advance in the price of pig lead by the A. S. & R. Co. is said to be coincident with an agreement entered into by them with the principal Western miners of lead ore. In accordance with this agreement the A. S. & R. Co. are reported to have agreed to pay the lead ore producers a flat rate based upon a price of 4 cents per pound, New York, and to maintain this rate for the balance of the year 1900. Heretofore the price paid by the smelting company has been based on what is known as the brokers' or bullion price which was fixed by the most recent sale of fifty tons of lead delivered New York. The bullion price was usually from $2 to $5 per ton under the actual selling price of the metal, a special sale of 50 tons of lead being made at the close of each day in order to keep the bullion price at such a discount. The lead market to-day is more active, consumers apparently making freer sales of their manufactured products and not being willing to do so without covering them with purchases of A. S. & R. Co.'s quotations of raw material.

The new prices of the A. S. & R. Co., 50-ton lots, are as follows:

Delivered.	Desilverized.	Corroding.
St. Louis	$4 32½	$4 42½
Chicago	4 32½	4 42½
Cincinnati	4 37½	4 47½
Pittsburg	4 47½	4 52½
Philadelphia	4 42½	4 52½
New York	4 37½	4 47½
Boston	4 45	4 55

On carload lots 5c. per 100 lbs. higher.

SPELTER. — New York, $4.10; St. Louis, $4.05; San Francisco, ton lots, 5½c; 100-lb lots, 5¾c.

ANTIMONY.—New York, Cookson's, 10½c; Hallett's, 9½c; San Francisco, 1000-lb lots, 12c; 300 to 500 lbs., 13@14c; 100-lb lots, 15@18c.

IRON.—Pittsburg, Bessemer pig, $16; gray forge, $14.50; San Francisco, bar, per lb., 2.55c in small quantities.

STEEL.—Bessemer billets, Pittsburg, $18.50; sheet bars, $23.50; San Francisco, bar, 7c to 12c per lb.

QUICKSILVER. — New York, $50.00; large lots: London, £9 5s; San Francisco, local, $48.50 ℔ flask of 76½ lbs.; Export, $45.50.

MAGNESIUM.—New York, $3.00 ℔ lb.; San Francisco, $4.00.

ZINC.—San Francisco, 5½c; slab, 6c; bar, 7¾c.

SOLDER. — Half-and-half, 100-lb. lots, 21c; San Francisco, Plumbers', 100-lb. lots, 17¾c.

BABBITT METAL.— San Francisco, No. 1, 10c.

ASSAY LITHARGE.—San Francisco, 10c ℔ lb, small lots.

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 30c to 35c.

NICKEL.—New York, 50@60c ℔ lb.

PHOSPHORUS.—F. o. b. New York or Philadelphia, 45@50c ℔ lb.

POWDER.—F. o. b. San Francisco: No. 1. 70% nitro-glycerine, per lb., in carload lots, 15¼c; less than one ton, 17¼c. No. 1*, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1** 50%, carload lots, 11¾c; less than one ton, 13¾c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9½c; less than one ton, 11½c. No. 2** 30% carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9, in lots not less than 1000.

FUSE.—Triple tape, $3.60 per 1000 feet; double tape, $3.00; single tape, $2.65; Hemp, $2.10; Cement No. 2, $3.00; Cement No. 1, $2.65, in lots of 3000 feet and up.

CANDLES.—Granite 6s, 16 oz., 40s., 12¼c ℔ set; 14 oz., 40s., 11¼c.

◆

San Francisco Stock Board Sales.

SAN FRANCISCO, Sept. 6, 1900.

9:30 A. M. SESSION.

200 Chollar 20c
900 C. C. & V..$1 25
300 G. & C......34c
50..............33c
100 Ophir 46c
500 Overman....10c
150 Savage......08c
100 Sierra Nev..31c
200 ....32c

2:30 P. M. SESSION.

300 Ophir. 47c
300 Mexican 26c
100 G. & C.....33c
1200 B. & B.....26c
800 C. C. & V.$1 25
250 Crown P't...13c
100 Overman....10c
600 Justice......04c
600 Caledonia....47c
100 .... 46c
100 Silver Hill...42c

WANTED.

A Rich Placer proposition, adapted to working by Railroad Steam Shovel, or Dry Land Excavator. Description, with price and terms, to receive attention must be accompanied by reliable reports and references.

Address: EDWARD N. BREITUNG,
MARQUETTE, MICH.

Quicksilver

——FOR SALE BY——
The Eureka Company,
OF SAN FRANCISCO.
ROOM 1, - - 320 SANSOME STREET,
SAN FRANCISCO.

THE CALIFORNIA DEBRIS COMMISSION, HAVING received applications to mine by the hydraulic process from W. W. Treat and John H. Thomas, in the Good Hope Mine, near Eclipse, Plumas Co., to deposit tailings in Onion Valley Creek; from the Bader Gold Mining Co., in the Bader Gold Mine, near Magalia, Butte Co., to deposit tailings in Little Butte Creek; from the Ralston Divide Gold Mining Co., in the Lynchburg Mine, near Virner, Placer Co., to deposit tailings in Long Canyon; and from G. H. Lewis et al., in the Snake Gulch Gravel Mine, near Vallicita, Calaveras Co., to deposit tailings in Snake Gulch, gives notice that a meeting will be held at Room 59, Flood Building, San Francisco, Cal., Sept. 24, 1900, at 1:30 P. M.

INFORMATION WANTED

regarding whereabouts of John R Williams, about 70 years old Last heard of as Supt of a mine in Copper's Hill, Vermont in 1866 Has an adopted son about 32 years old Supposed to be placer mining in the West, possibly California. $25 00 reward at Deseret News Office, Salt Lake City, Utah.

Quicksilver

For Sale in Lots to Suit.

REDINGTON & COMPANY, Wholesale Druggists, 23-25-27 Second Street, San Francisco.

FOR SALE.

FOR SALE.---A "Daniel Best" Gasoline Engine, 14 H. P., in perfect order.

Apply at Room 69, Nevada Block, San Francisco.

FOR SALE --Ten mines, forming a group (gold and silver), with mill site and water power. Acuitapilco Mining District. Ore assaying from 30 ozs. to 100 ozs. to the ton; gold, ⅛ oz. Address to LIC. ELIAS GALINDO, P. O. Box 26, Tepic, Mexico.

FOR SALE.

Lease and Bond, Eighteen Months, Easy Terms, Copper Property, New Mexico.

High grade ore with good gold values. Accessible. Plenty wood and water. Strong vein. Three shafts. Will pay from start. Adjoins large producing mine. H. B. RUNKLE, El Paso, Texas.

FOR SALE.

ENGINES:

8 h. p. N. Y. Safety; 6x10 Rice Horizontal; 10x16 Hendie & Meyer; and others.

THE S. H. SUPPLY CO.
WRITE FOR CATALOGUE OF MINING MACHINERY AND SUPPLIES.
22nd and Larimer Sts., DENVER, COLO.

ASSAY OFFICE FOR SALE.

An old established and completely equipped Assay Office and Chemical Laboratory, doing a good business in Denver, Colo.; power plant with crushing and grinding apparatus in connection. Good business reasons for selling. Bargain if sold at once. Address Q 641, Mining and Scientific Press.

FOR SALE.

Hoisting Outfit.

Webster, Camp & Lane 13½″x15″, double cylinder, double drum Hoist. Drums 66″ diameter, good for 800 feet. Two boilers 60″ diameter by 16′ long, with stack and fixtures complete.

One Cameron Sinking Pump, 4″ suction, 3″ discharge.

One Deane Feed Pump; two injectors, one for each boiler; pipe fittings and connections.

This plant is new, having been in service less than three months. Immediate shipment from Deadwood, S. D.

For price and particulars, address

WILLIS SHAW, Machinery,
Chicago, Ill.

D. Campbell Davies & Co.,

REPRESENTING THE LARGEST
EUROPEAN and AMERICAN
MANUFACTURERS
—— OF ——
Mills, Mine and Smelting Machinery Supplies.

EXPORT TRADE A SPECIALTY.

Apartado No. 83,
DURANGO, - - - MEXICO.

WE BUY very rich Ores, Dental Scraps, Tellurium Ores, Mill Wastes, Jewelers' Sweeps, Gold Retorts, Old Iron Retorts, Base Amalgam, Quicksilver, Amalgamated Plates, Gold and Silver, Old Slags.

A. M. DONALDSON & CO.,
ASSAYERS AND WASTE PRODUCT SMELTERS,
1661 Larimer St., Denver, Colo.
Donaldson's Assayers' Slag Hammer { 1 lb......$1.10 / 1 lb. 3 oz.$1.25

FRED C. MILES,
CISCO, PLACER CO., CAL.
COPPER AND GOLD PROSPECTS.
A GOING GOLD PROPERTY.

WANTED.

WANTED.- A COMPETENT AND RELIABLE man to take charge of a gold quartz mine and stamp mill in Sinaloa Mexico Must understand assaying and have business qualifications References as to ability and honesty required Address C. L. Merry, Pres. H G. M. Co., Kansas City, Mo.

TO MINING EXPERTS.

WANTED.—A proposition containing magnetic pyrites (Fe_7 S_8 to Fe_{11} to S_{12}).

Address THOS. L. NEAL, Attorney, Lankershim Block, Los Angeles, Cal.

WANTED.

Experienced Promoter and Stock Operators to handle the sale of stock for an oil company. State previous experience.

For particulars, address
C. J. TALLON,
308 Market Street,........San Francisco, Cal.

Experienced Coal Miners

can secure steady employment either on contract or by day's work at the TESLA COAL MINES, Tesla, Alameda County, California. Good wages guaranteed, also good board. Good climate, and also good accommodations and houses for families.

For further particulars, please apply to the Superintendent at the Mines, or to the Company at 328 Montgomery St., San Francisco, Cal.

REFRACTORY ORES WANTED.

1000 TONS or more which will assay $75 00 Gold per ton and over, delivered free of charge at San Francisco, Cal. Correspondence solicited.

C. J. TALLON,
308 MARKET STREET, SAN FRANCISCO, CAL.

BENJAMIN T. LLOYD,
STOCKS, BONDS AND MINES.

Have immediate customers for well-developed Gold and Copper Properties.

P. O. Box 608, SALT LAKE CITY, UTAH.

SITUATIONS WANTED.

Position as chief engineer at mines. Go anywhere. Have family. Long experience with mining machinery. R. J. Blackwell, Temescal, Riverside Co., Cal.

WANTED.—SITUATION BY A COMPETENT and experienced millman on concentrators or battery frame. Highest references. Address L. W., 509 Kearny street, room 2, first floor, San Francisco, Cal.

WANTED.—SITUATION AS MANAGER OF producing or developing property. Twelve years' experience in gold mining and milling, copper mining and smelting. Address C. H., care of Mining and Scientific Press.

A Distinct Triumph.

In competition with the best manufacturers of Europe and other American makes, the

Cross Oil Filter

Has been selected for the equipment of the Imperial Steel Works, owned and operated by the Japanese Government. This plant is probably the most perfect of its kind in Japan.

We guarantee these Filters to save 50 per cent of oil bills and back our guarantee with a trial at our expense.

Catalogue 38.

THE BURT MFG. CO.,
Akron, Ohio, U. S. A.
Largest Mfrs. of Oil Filters in the World.

MILL PLANS.

Cyanide, Concentration, Smelting, Sampling

F. D. BAKER, Mech. Eng., DENVER.

WEST COAST OF MEXICO.

WÖHLER, BARTNING Suc's, Mazatlan (Sinaloa), Mex.

Bankers, Importers, Exporters and Commission Merchants.

Representatives and Agents of the principal Mining Companies in the State of Sinaloa and the dependencies of the Pacific coast in the States of Durango, Chihuahua, Sonora, Lower California and Jalisco.

ORE BUYERS AND EXPORTERS. - MINING SUPPLIES.

ERICSSON SWEDISH TELEPHONES

Seem to possess almost human intelligence. They respond to every requirement in a smooth, positive fashion that shows what a perfect telephone can do. Besides this they have unequalled strength and durability. Their reputation as "STANDARD OF THE WORLD" is built on merit. Is the best too good for you?

ERICSSON TELEPHONE CO. 296 BROADWAY NEW YORK.

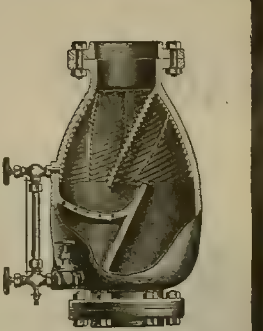
Fuel Economy is An Important Item,

but the waste in steam delivery is a still more serious matter. We not only make a saving for you in fuel, but insure you delivery of steam free from moisture.

The Austin Separator

does this because it's built on a practical and scientific basis. IT FULFILLS ITS MISSION.

Shipped to any point in the United States on 30 days' trial.

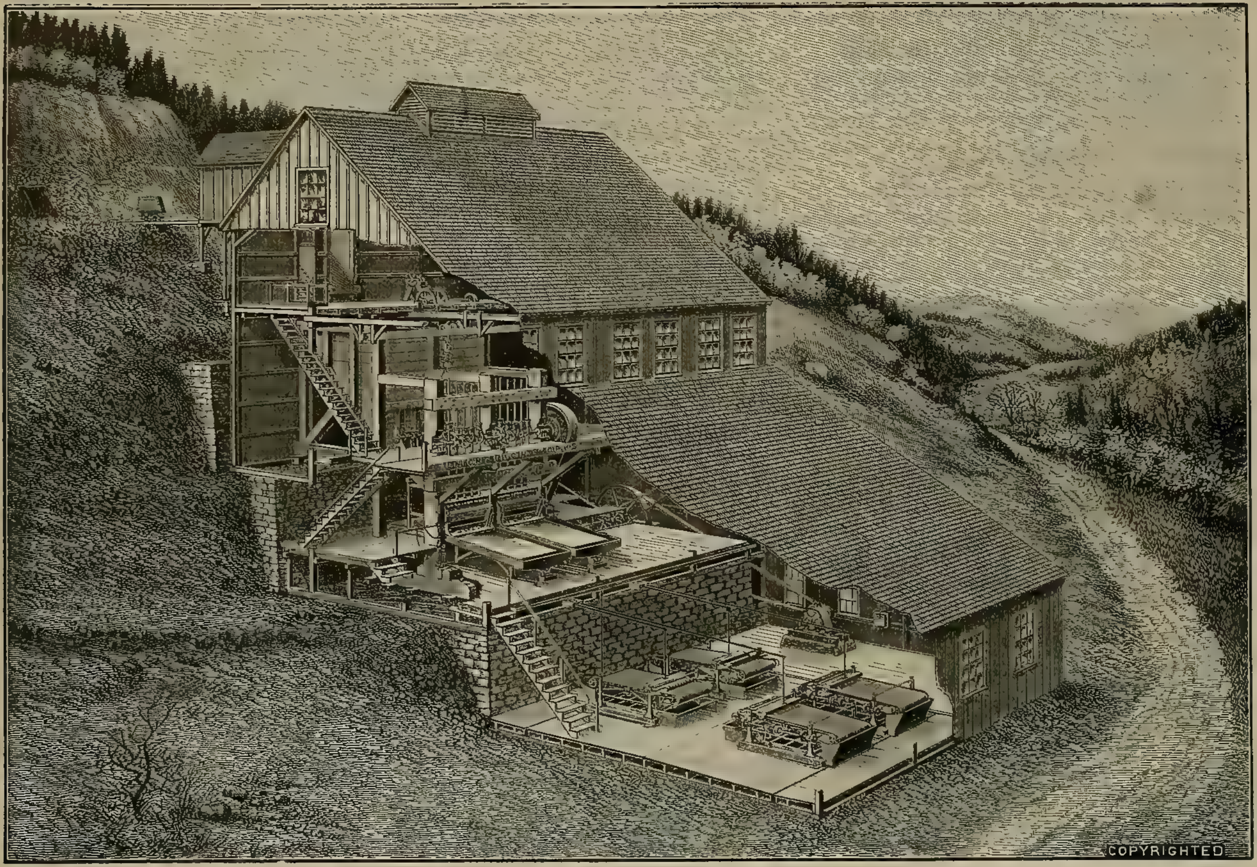


Vertical. Sizes 1½ to 12 in.

AUSTIN SEPARATOR CO.,
27 W. Woodbridge St.,
Detroit, Mich., U. S. A.

UNION IRON WORKS,

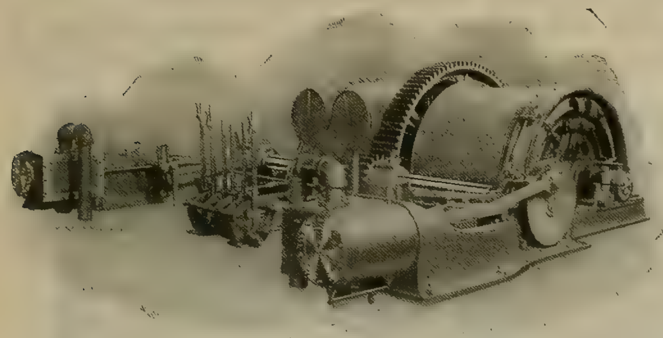
222 Market Street, San Francisco, Cal.



Builders of All Classes of Mining Machinery.

The above is an illustration of a First-Class Modern 10-Stamp Gold Mill.
For particulars, send for Catalogues.

EXTRA HEAVY DOUBLE DRUM SECOND MOTION HOIST.



DO YOU REQUIRE A

HEAVY DUTY GEARED HOISTING ENGINE?

IF SO, WRITE TO US.

We have a large line of patterns for these plants and will build you one to meet your exact requirements and for ROUND OR FLAT ROPE.

Our stock of Boilers, Pumps, Compressors, Drills and General Mine Supplies is unequaled in the United States.

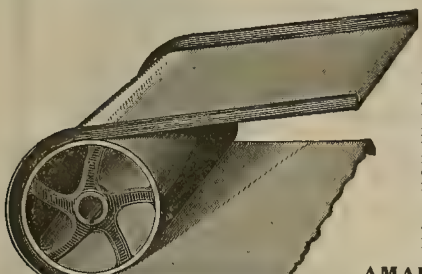
YOUR CORRESPONDENCE IS SOLICITED.

The Hendrie & Bolthoff M'f'g & Supply Co.

No. 34. DENVER, - - - - - - COLORADO.

SPADONE'S CONCENTRATOR BELTS.

PATENTED.



This illustration shows the edge flanging outwardly as it passes over the pulley. This relieves the strain from the top and bottom of the edge by directing the strain automatically to the inside face surface of the edges. Heretofore all belts have been so constructed that when they pass over the pulleys or rolls, a direct strain comes upon the top or at the base of of the edges, causing the edges to break away from the body of the belts in a very short time. *We avoid this Mechanical Defect by our Spadone Curved Edge.* Belts made to fit any machine—4, 5 and 6 feet wide. Prices and samples on application.

AMALGAM PLATE CLEANERS.

Our Amalgam Plate Cleaners are made of Pure Rubber in moulds, thus insuring a plate cleaner which will not scratch the plates and a perfect edge which will clean the Amalgam plates evenly. They are made 6 inches long, 3 inches wide and ½ inch thick, making a convenient size to handle. Price by mail to any address, each 75 cents. Correspondence solicited.

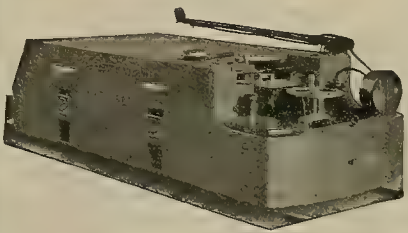
Send us your order for Water, Air Drill, Steam, Suction and Fire HOSE, RUBBER BELTING, RUBBER PACKING and LEATHER BELTING.

THE GUTTA PERCHA RUBBER AND M'F'G CO.,

30 and 32 FREMONT STREET, Telephone Main 1813. SAN FRANCISCO, CAL.

General Electric Company's

ELECTRICAL MINING APPARATUS---



GE Mining Locomotive.

ELECTRIC LOCOMOTIVES, HOISTS, PUMPS, BLOWERS, EXHAUST FANS, and MOTORS FOR GENERAL USE, are Efficient, Economical and Durable.

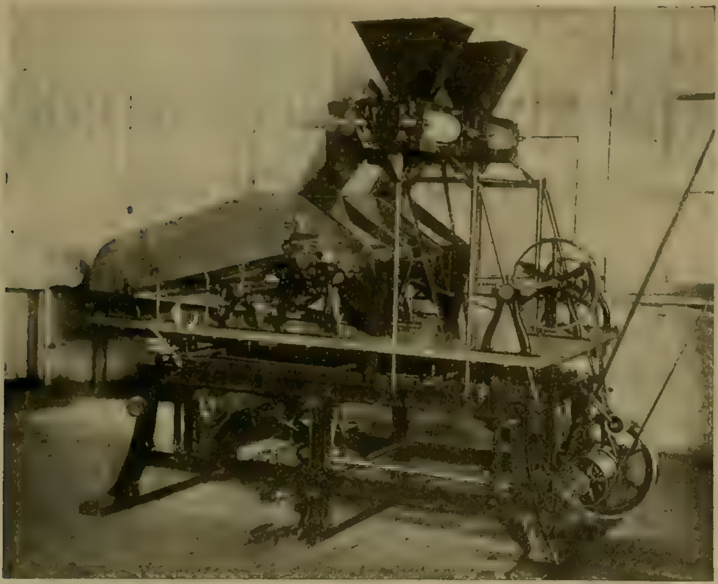
General Office: Schenectady, N. Y.

San Francisco Office: Claus Spreckels Bldg. Denver Office: Kittredge Building

CROWN GOLD MILLING CO.

Manufacturers of the "CROWN" CONCENTRATOR and CROWN ORE SIZER. A dry process of sizing and concentrating ore, sand or gravel. Designed to accord fully with the laws of specific gravity, and especially adapted to refractory ore or localities where there is no water.

The chief claims for the Crown Concentrator are that it occupies less floor space and has nearly four times the capacity of any wet concentrator; that it will concentrate ores containing base and refractory metals that ordinarily slime and carry off values; that it effects a saving of values far above the ordinary methods of concentration.



We have, now in operation, a complete plant for crushing, sizing and concentrating ores by the

Crown Dry Milling Process.

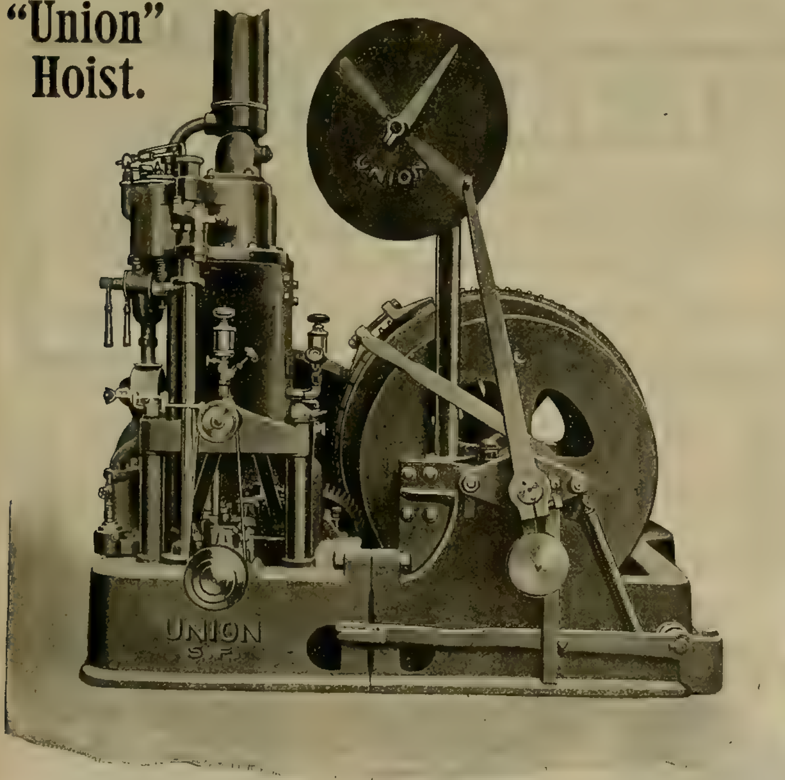
Mine owners desiring tests made can forward us, freight prepaid, not less than 1000 lbs. nor more than 4000 lbs. of sample, for which a charge of $20 will be made. (This amount includes assaying, etc.)

Ores for which this process is adapted and of which consignments are solicited are any concentratable ores, pulps, tailings, or sands, carrying sufficient values, whether they have heretofore been profitably concentrated or not.

⁂

Office,......................**230 Post St.**
Works,.................**23 Stevenson St.**
SAN FRANCISCO, CAL.

"Union" Hoist.



The above illustrates the 25 H. P. double cylinder, single drum "Union" hoist, with all the latest improvements.

THE UNION GAS ENGINE CO.

—BUILD THE—

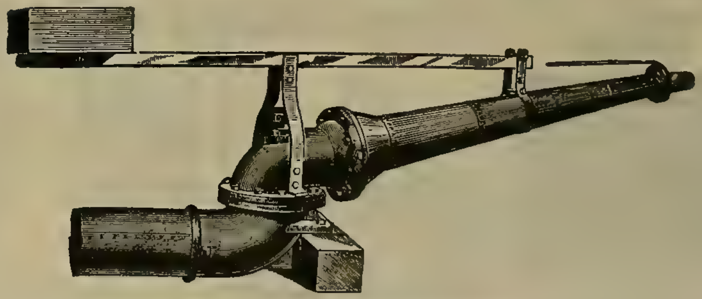
"Union" Gas Engines,

Which use either MANUFACTURED or NATURAL GAS, ORDINARY STOVE GASOLINE (NAPHTHA or BENZINE), DISTILLATE or KEROSENE.

STATIONARY ENGINES for All Kinds of Work in Sizes from 3 to 300 h. p. in actual use.
"UNION" COMBINED HOISTS in Sizes from 2 to 130 h. p. in actual use.
"UNION" COMBINED COMPRESSORS—20, 30, 40 h. p.
HOISTS and COMPRESSORS Can Be Built in Larger Sizes to Order.
"UNION" MARINE ENGINES, 4 to 200 h. p., of Single, Double and Four-Cylinder Types.
FIFTEEN YEARS' EXPERIENCE Building Gas and Oil Engines.
"UNION" ENGINES Are In Use All Over the United States.
"UNION" ENGINES Are Simple, Durable and Economical.

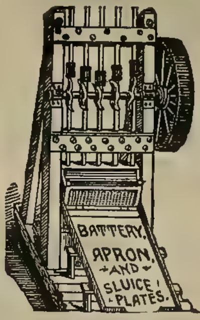
Office, 248 First Street. Works, Corner First and Clementina Streets. SAN FRANCISCO, CAL.

Double-Jointed Ball-Bearing Hydraulic Giants.



The above presents an improved **Double-Jointed Ball-Bearing Hydraulic Giant** which we build. The improvement consists of the introduction of a **Ball Bearing** by which the pressure of the water is reduced to a minimum and the direction of the nozzle changed at will with ease.

Catalogues and prices of our specialties of HYDRAULIC MINING MACHINERY furnished upon application. **JOSHUA HENDY MACHINE WORKS, 38 to 44 Fremont St., San Francisco, Cal.**



To Gold Miners!

Silver Plated Copper Amalgamating Plates

For Saving Gold in Quartz and Placer Mining.

ONLY BEST COPPER AND REFINED SILVER USED. OLD MINING PLATES BOUGHT OR TAKEN IN EXCHANGE FOR NEW PLATES. GOLD EXTRACTED FROM OLD PLATES AT A MODERATE COST. OLD PLATES REPLATED. GOLD, SILVER, NICKEL, COPPER AND BRASS PLATING.

Denniston San Francisco Plating Works,
652 Mission Street, Cor. Annie, San Francisco, Cal.
E. G. DENNISTON, ... Proprietor.

——:Send for Circular.:——

STEEL RAILS, TRACK FIXTURES,

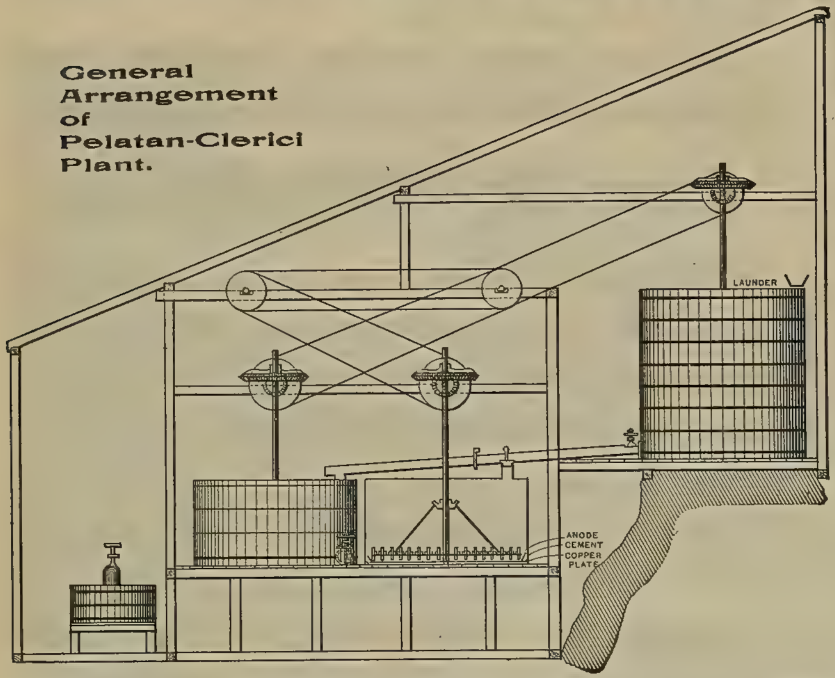
PRODUCT PENNSYLVANIA STEEL COMPANY.

BAR, SHEET AND BOILER STEEL,

STRUCTURAL MATERIAL,

Cold Rolled Shafting.

GEORGE W. GIBBS COMPANY,
33-39 Fremont Street, 38-40 Beale Street,
CORRESPONDENCE SOLICITED. SAN FRANCISCO, CAL.



THE "PELATAN-CLERICI" PROCESS

OF TREATING REFRACTORY ORES

General Arrangement of Pelatan-Clerici Plant.

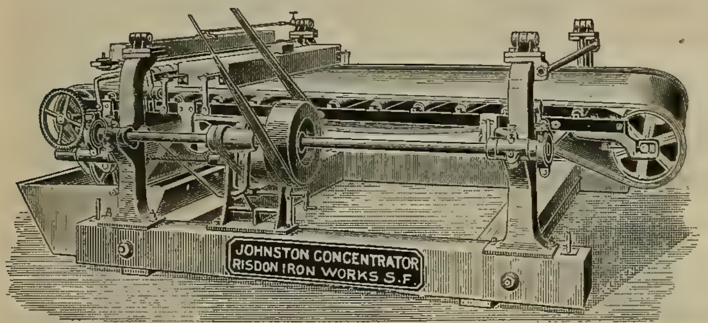
Saves the precious metals by the simplest, most economical and most efficient process known. No roasting or previous treatment, except ordinary crushing. Extraction complete in from 6 to 12 hours. Extracts equally well both fine refractory gold and coarse gold in the form of amalgam. Makes a greater saving of gold than any other process from raw material at less cost. The electric current and dissolving agent promptly dissolve the precious metals, both gold and silver. Samples of ore tested free of charge. Several mills saving over 90 per cent of values by bullion returns. Simplicity. Economy. Efficiency.

FOR PARTICULARS, WRITE TO

THE RISDON IRON WORKS,

SAN FRANCISCO, CAL.

AGENTS.



The JOHNSTON CONCENTRATOR.

DURABILITY, CAPACITY AND SIMPLICITY : : ARE ITS ESSENTIAL POINTS. : :

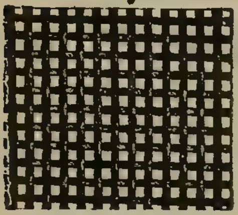
SAVES MORE VERY FINE SULPHURETS THAN ANY OTHER CONCENTRATOR MADE.

The Johnston Concentrator is slung with arms from above on an angle, giving it the oscillating motion that makes it a perfect machine. This undulating motion immediately settles the sulphurets, retaining all amalgam, leaving sulphurets very clean, one 6-ft. Johnston doing the work of two 4-ft. belt machines.

Send for Catalog No. 14.

Risdon Iron Works,

HOWARD AND BEALE STS., SAN FRANCISCO, CAL., U. S. A.



"The Perfect"

DOUBLE CRIMPED STEEL MINING CLOTH

THE LUDLOW-SAYLOR WIRE CO.,

ST. LOUIS, MO.

USE "THE PERFECT" Double Crimped Cloth.

MINERS' STEEL CANDLESTICKS.

SCREENING

MACHINERY FOR ALL PURPOSES.

VIBRATORY, SHAKING, REVOLVING, STATIONARY AND MECHANICAL HAND SCREENS FOR ALL MATERIALS.

SCREENS SPECIALLY ADAPTED FOR ……… MINING PURPOSES.

COMPLETE PLANTS ERECTED.

SEND FOR DESCRIPTIVE MATTER.

WESTERN MACHINERY & SUPPLY CO., Engineers and General Machinists,
161 La Salle Street, CHICAGO.

Trommel Screens
THE ROBERT AITCHISON PERFORATED METAL CO.
305 TO 305 DEARBORN ST. CHICAGO, ILL.

CARY SPRING WORKS,

240 & 242 WEST 29th STREET, NEW YORK, U. S. A.

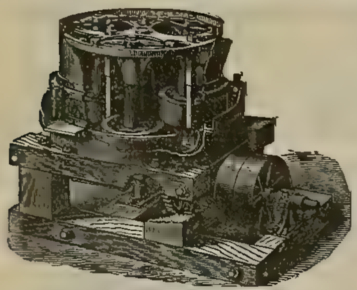
Telephone, 3346—38th St.

WIRE SPRINGS OF EVERY DESCRIPTION.

MANUFACTURERS OF All kinds of ROUND AND FLAT WIRE, TEMPERED AND UNTEMPERED.

SPRINGS For Machinery, Rolling Shutters, Motors Etc.

MUSIC BOX AND FINE SPRINGS OUR SPECIALTY.



Centrifugal Roller Quartz Mill.

F. A. HUNTINGTON,

—Manufacturer of—

CENTRIFUGAL Roller Quartz Mills.

CONCENTRATORS and ORE CRUSHERS.

Mining Machinery of Every Description

Steam Engines, Shingle Machines.

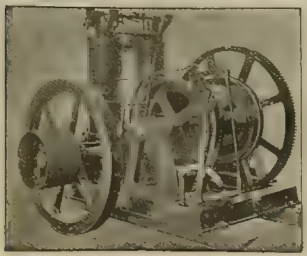
Room 1, 3d Floor, Mills Building
SAN FRANCISCO. CAL.

MINING HOISTS.

Engines, Boilers,
Saw Mills, Hoe Saws,
Mill Supplies.

TATUM & BOWEN,

34-36 Fremont Street, San Francisco, Cal.
29-35 First Street, Portland, Or.



Mining Hoist.

THE GOLDEN GATE GAS ENGINE
Will raise more ore than any other AT LESS COST.

MANY IN USE, Giving Satisfaction.

Built for any Capacity and for any Purpose.
Pumping Water, Propelling Boats, Hoisting Ore, Machine Shop Power, Etc.

Send for Particulars and Catalogue.

ADAM SCHILLING & SONS,
213 & 215 Main St., San Francisco, Cal.

GENERAL PHOTO-ENGRAVING CO.

[SUCCESSORS TO DEWEY ENGRAVING CO.]

FINE ZINCOGRAPHS, HALF-TONES, AND DESIGNING.

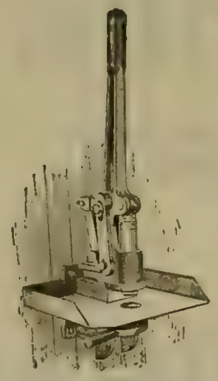
ENGRAVINGS OF MACHINERY OUR SPECIALTY.

SEND FOR SAMPLES AND PRICES.
TELEPHONE BLACK 1466.

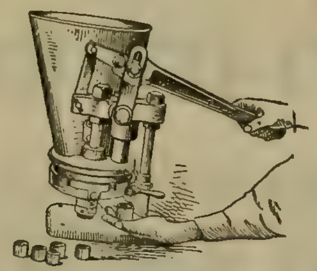
NO. 536 CLAY STREET,
SAN FRANCISCO, CAL

ONE OF OUR MANY SPECIALTIES FOR ASSAYERS.

The Calkins Cupel Machine.



WALL PATTERN.
In position for filling mold.



THE AUTOMATIC.
Showing finished cupel being expelled.

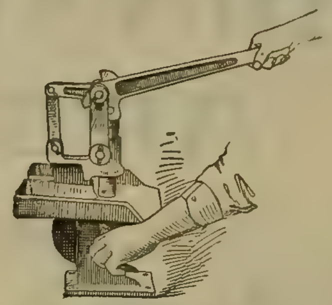


TABLE PATTERN.
Showing position of lever when greatest compression is obtained.

To Assayers:

With these machines perfect cupels can be made by anyone with great ease and rapidity. They are the greatest labor-saving machine of the Assayer that can be had. Compact, easily operated, can't get out of order, everlasting.

WRITE FOR OUR NEW, DESCRIPTIVE PAMPHLET IN WHICH ALL OUR SPECIALTIES ARE FULLY DESCRIBED.

F. W. BRAUN & CO.,
Manufacturers of Modern Appliances for Assayers,
LOS ANGELES, CAL.

L. C. MARSHUTZ. T. G. CANTRELL.

NATIONAL IRON WORKS,

N. W. Cor. Main & Howard Sts., San Francisco.

MANUFACTURERS OF
STATIONARY AND COMPOUND
ENGINES,
FLOUR, SUGAR, AND QUARTZ MILL
MACHINERY.

AMALGAMATING MACHINES.

CASTINGS AND FORGINGS
OF EVERY DESCRIPTION.
All work tested and guaranteed.

IMPROVED PORTABLE HOISTING ENGINES

Sole Manufacturers of

Kendall's Patent Quartz Mills.

Having renewed our contract on more advantageous terms with Mr. S. Kendall for the manufacture of his Patent Quartz Mill, we are enabled to offer these mills at **Greatly Reduced Prices.** Having made and sold these mills for the past 16 years, we know their merits, and know that they have given perfect satisfaction to purchasers, as numbers of commendatory testimonials prove. We feel confident, therefore, that at the prices we are now prepared to offer them, there is placed within the reach of all a light, cheap and durable mill that will do all that is claimed for it and give entire satisfaction.

MARSHUTZ & CANTRELL

Send for Circulars and Price List.

THE CAL. ANTI-CALORIC COMPANY,

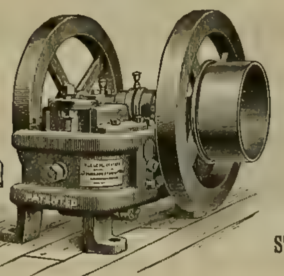
Tel. Main 5752. Office, 217-219 Mission St., San Francisco, Cal.

Sole Manufacturers of CAL. ANTI-CALORIC SECTIONAL COVERINGS AND BLOCKS FOR BOILERS. PLASTIC (dry) for Steam Domes, Etc. Sole Agents for the Boston Asbestos Paper Co. Asbestos Goods of All Kinds. Send for Information. Factory, Potrero.

The ONLY

FINE CRUSHER

OF HARD ROCK.



Roll Jaw Crusher.

Reduces to Gravel and Sand.

Does as fine work as Breaker and two sets of rolls.

SEND FOR CIRCULAR.

STURTEVANT MILL CO.
113 CLAYTON ST.
BOSTON, MASS.

McFARLANE & CO.,

1734 FIFTEENTH ST., DENVER, COLO.

Mining and Milling Machinery.

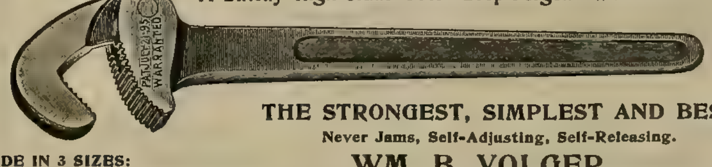
STAMP AND CONCENTRATING MILLS BUILT AND ERECTED.

STEAM AND ELECTRIC HOISTS, CRUSHERS, ROLLS, REVOLVING SCREENS, JIGS. ORE CARS, CYANIDE TANKS, CORNISH PUMPS, CORLISS ENGINES.

OUR 24-INCH WRENCH IS ESPECIALLY ADAPTED FOR MINE WORK.

The Johnston Patented Pipe Wrench.

A Strictly High-Grade Tool---Drop-Forged---Warranted.



THE STRONGEST, SIMPLEST AND BEST.

Never Jams, Self-Adjusting, Self-Releasing.

MADE IN 3 SIZES:

	10 in.	16 in.	24 in.
Pipe	⅛ to 1 in.	¼ to 1½ in.	½ to 2½ in.
List	$2 25	$3.00	$6.00

WM. B. VOLGER,
SOLE MANUFACTURER,
88 Chambers St., NEW YORK.

Agencies: THE MINE & SMELTER SUPPLY CO., Denver and Salt Lake City.

"GIANT" Rock Drills, "GIANT" Air Compressors, "GIANT" Baby Drills, ARE THE BEST

AND ARE MANUFACTURED BY

The Compressed Air Machinery Co.,

11-13 First Street, - - - San Francisco, Cal.

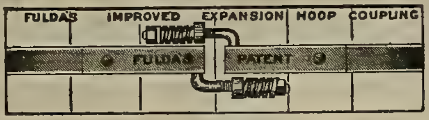
WE SOLICIT FULLEST AND FREEST INQUIRY.

Fulda's Planing Mills and Tank Manufactory,

30 to 40 SPEAR ST., SAN FRANCISCO, CAL.

—MANUFACTURERS OF—

All Kinds of TANKS and VATS.



Our Patent Self-Tightening Hoop Coupling is the Only Practical Method of Keeping a Tank Tight at All Times Without Any Care or Trouble.

—WRITE FOR PRICE-LIST.—

California Vigorit Powder Co.

—Manufacturers of—

Dynamite High Explosives and "Vigorit Low" Blasting Powder.

OFFICE: 208 CALIFORNIA STREET,
SAN FRANCISCO, CAL.

WORKS: POINT ISABEL,
CONTRA COSTA CO., CAL.

PIPE BARGAINS.

Suitable for Water Mains, Mining, Irrigation, Air, Oil, etc, etc. New Spiral Welded Asphalted Steel Pipe with any style coupling desired.

460 ft. 6-in. 3,480 ft. 10-in. 1,828 ft. 14-in. 1,077 ft. 18-in.
50,000 " 8 " 2,428 " 12 " 520 " 16 " 1,623 " 24 "

All Sizes Wrought Pipe, Well Casing and Straight Riveted Pipe in Stock. Equipment of All Kinds for Mine, Railroad and Contractors' Outfits. Write for Prices and Particulars.

BOWES & CO., 23 Lake St., Chicago, Ill.

SULPHURIC ACID

MANUFACTURED BY
THE WESTERN CHEMICAL CO
DENVER, COLO.

For Chlorination, Refining and other processes. Also Muriatic and Nitric Acids, Blue Vitriol, Copperas Commercial and C. P. Our chemically pure Acids and Ammonia are guaranteed perfect.

ANY BOOK

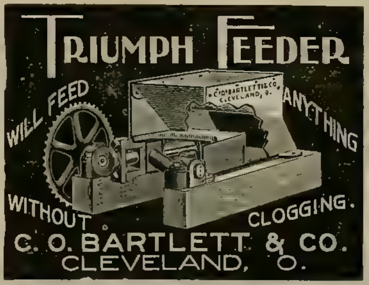
ON ANY SUBJECT Connected with Mining, Metallurgical, Mechanical or Industrial Interests,

WILL BE SENT ANYWHERE, POSTPAID,

AT PUBLISHER'S PRICES.

SEND FOR CATALOGUE OF LINE DESIRED.

ADDRESS BOOK DEPT. MINING AND SCIENTIFIC PRESS,
NO. 330 MARKET STREET, SAN FRANCISCO, CAL.


TRIUMPH FEEDER
WILL FEED ANYTHING
WITHOUT CLOGGING.
C. O. BARTLETT & CO.
CLEVELAND, O.

PRICE, $50.00.

HEALD'S

BUSINESS COLLEGE.

24 Post Street, - - - San Francisco.

MINING AND CIVIL ENGINEERING DEPARTMENT: Mathematics, Draughting, Strength of Material, Chemistry, Assaying, Blow-Pipe Analysis, Geology, Mineralogy, Surveying, etc., under the direction of Prof. O. H. Packer, an engineer of national reputation.

ELECTRICAL DEPARTMENT: Theory and Practice; Construction.

BUSINESS: Bookkeeping, Shorthand, Typing, Modern Languages, etc.

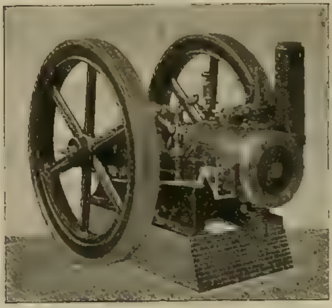
Twenty teachers; individual instruction; can enter at any time; Catalogue and Journal free.

THE WM. HAMILTON MANUFACTURING CO.,
LIMITED,

MINING MACHINERY,

PETERBOROUGH, ONTARIO,

CANADA.



WE CAN SHOW YOU A

HERCULES Gasoline Engine

Running on less than ⅛-gallon of fuel per H. P. hour, with a speed regulation of 2½%.

JOHN WIGMORE & SONS CO.,

117-123 S. LOS ANGELES ST.,
LOS ANGELES, CAL.

SMOOTH-ON TRADE MARK **CASTINGS.**

An iron cement for repairing leaks or fractures in steam or hydraulic work. When hard it will withstand a red heat, steam, water or oil, and expands and contracts with heat and cold the same as iron, insuring a tight joint at all temperatures. Difficult flange connections can easily be made with Smooth-On, as it adapts itself to the flanged faces whether parallel or not. Connections are easily taken apart. Unequaled for boiler patching, and repairing blemishes in iron castings. Write for catalogue and prices. Sole proprietors and manufacturers: Smooth-On Mfg. Co., Jersey City, N. J., U. S. A.

MESSRS. MADISON, BRUCE & SELLERS,

34-36 STEUART ST., SAN FRANCISCO, CAL.......................AGENTS FOR PACIFIC COAST.

MINE BELL SIGNALS. Adopted, Used and in Force in Accordance with Law.

We print in legal size, 12x36 inches, the Mine Bell Signals and Rules provided for in the Voorhies Act passed by the California Legislature. The law is entitled "An Act to Establish a Uniform System of Bell Signals to Be Used in All Mines Operated in the State of California, for the Protection of Miners." We furnish these Signals and Rules, printed on cloth so as to withstand dampness. **50 Cents a Copy.**

MINING AND SCIENTIFIC PRESS, 330 Market St., San Francisco, Cal.

THE FULTON Variable Motion Continuous Flow PUMPS

are made in four sizes with capacities up to 30,000 gallons per hour. THE FULTON DOUBLE PLUNGER CYLINDERS to work in connection with them, in 20 different sizes and lengths.

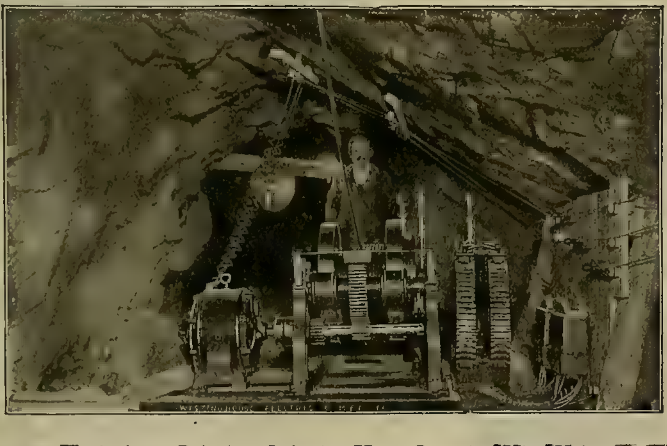
THE FULTON SINGLE ACTING PUMPS are made in 25 different sizes and lengths. The Valves and working parts of both Single and Double Acting Fulton Pumps can be removed, repaired and replaced without disturbing either the Column Pipe or Cylinder.

Manufactured by A. T. AMES, Galt, Cal.

GATES FINE CRUSHER.

The result of ten years' solid work. Success at last. What we wanted, and the public demanded, was a Gates Gyratory Rock and Ore Breaker (always adjustable and indestructible) so modified in design as to make one-half-inch product from three-inch sizes, rapidly and cheaply. The H. Fine Crusher will do this work. It takes the place of expensive big rolls and often prepares ore, without further crushing, fine enough for coarse concentration or cyaniding. In any event, it is the greatest and best intermediate machine between the coarse breaker and the pulverizer.

Ask for No. 1 Catalogue. :: GATES IRON WORKS, Dept. UU, 650 Elston Ave., CHICAGO.



Westinghouse Polyphase Induction Motor Operating Mine Hoist.

Polyphase Induction Motors

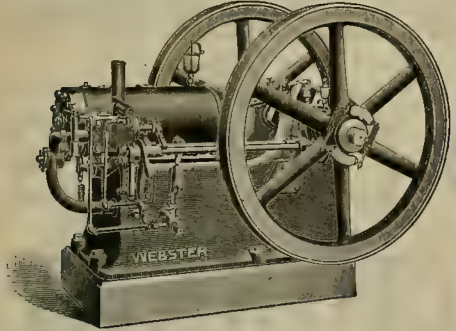
OPERATE

Mine Hoists, Pumps, Locomotives, Air Compressors, etc., in the best equipped mines.

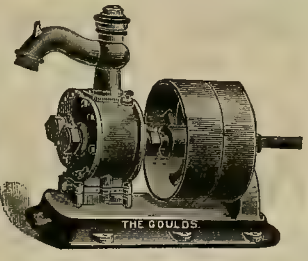
Westinghouse Electric
& Manufacturing Co.

All Principal Cities
in U. S. and Canada.

Pittsburg, Pa.



WEBSTER GASOLINE ENGINES.



ROTARY PUMPS.

Send for Our Large Catalogue, Mailed Free.

We carry a full line of Gasoline Engines.

Pumps for all depths of wells—for Hand, Wind Mill use, Power Pumps, Electric Pumps. Irrigating Pumps of all capacities. Mining Pumps. Tanks. Iron Pipes. Pipe Fittings. Brass Goods. Tools, Etc. Send for Catalogue, sent free.

WOODIN & LITTLE,
312-314 MARKET STREET,……………………SAN FRANCISCO, CAL.

AARON'S ASSAYING, PART I.

FOURTH EDITION.

Revised, Rewritten, New, Improved.

This practical treatise on assaying has long been the favorite among practical men. The new edition, just out, is up to date. Price $1, postpaid anywhere.

Book Dept., Mining and Scientific Press,
330 MARKET ST., SAN FRANCISCO, CAL.

RAND ROCK DRILLS and Drill Mountings.

HIGHEST DEGREE OF PERFECTION ATTAINED. ∴ INDISPENSABLE IN MINING, TUNNELING & EXCAVATING.

AIR —AND— Gas COMPRESSORS.

STANDARD TYPES! SPECIAL PATTERNS! ALL SIZES!

RAND DRILL CO., 100 BROADWAY, New York, U. S. A.

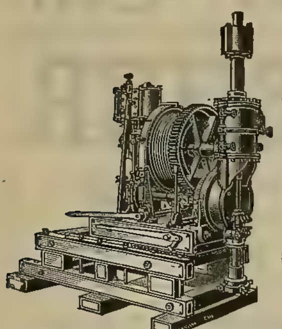
San Francisco Office: 223 First St.
1328 Monadnock Blk., CHICAGO, ILL.

SULLIVAN

Diamond Core Drills
FOR PROSPECTING. Catalogue 29.
The most extensive line of sizes and styles ever offered.
CONTRACTORS FOR PROSPECTING WITH DIAMOND DRILL.

ROCK DRILLS
FOR MINING. Catalogue 30.
Superior valve and ratchet motions. The highest possible grade.
Send for Our New Catalogues.

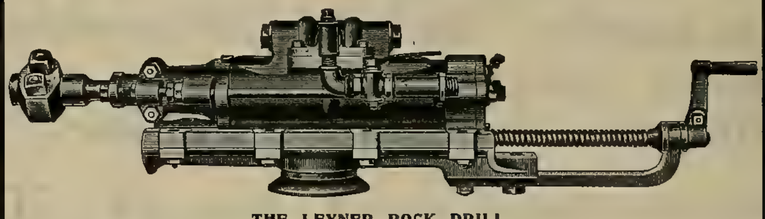
Sullivan Machinery Co.,
New York. Pittsburg. Claremont, N. H.
Main Office, CHICAGO....................54 to 60 N. CLINTON ST.
Western Office, DENVER.................332 SEVENTEENTH ST.
Pacific Agency, SAN FRANCISCO, HENSHAW, BULKLEY & CO.



"N" Drill, capacity 2000 ft.
Cable Address, Diamond, Chicago.
Codes:
- A. B. C., 4th Edition.
- Postal Directory.
- Western Union.
- Liebers.

THE NEW
Leyner Air Drill.

THE MOST ECONOMICAL
DRILL on the MARKET.
EASY to HANDLE.



THE LEYNER ROCK DRILL.

Amalgamation and Cyanide Plants.

HOISTING ENGINES.

FOR FURTHER INFORMATION ADDRESS

THE EDWARD P. ALLIS COMPANY,
MILWAUKEE, WIS.

CANTON STEEL COMPANY,
Manufacturers of

CANTON DRILL STEEL.

UNEQUALED FOR TOUGHNESS AND ROCK-CUTTING QUALITIES. WRITE FOR 1900 STEEL LIST, CONTAINING ENDORSEMENTS AND USEFUL INFORMATION.
Works: CANTON, OHIO. Branch Warehouse: DENVER, COLO.

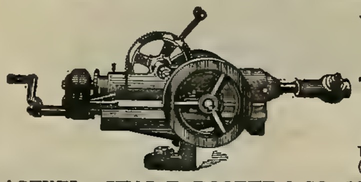
FIRTH'S DRILL STEEL.
USE THE BEST.
Has no equal in Hard Rock Drilling.
ABNER DOBLE COMPANY, GEN. AGTS.,
FREMONT AND HOWARD STS, SAN FRANCISCO.
Sold by Seattle Hardware Co., Seattle, Wash.

TO SECURE GOOD RESULTS BUY JESSOP'S STEEL
FOR TOOLS, MINING DRILLS, ETC.
Chief American Office, 91 John St., New York, N. Y.
Wm. Jessop & Sons, Ltd. Manufactory, Sheffield, England.
I. WILLARD BEAM, Agent, 29 MAIN STREET, SAN FRANCISCO, CAL.

Established 1837.
I. C. Yawger,
Successor to VICTOR BISHOP & CO.
IMPORTER OF CARBONS FOR DIAMOND DRILLS.
21 Maiden Lane, - NEW YORK

DIAMOND DRILLS
FOR PROSPECTING.
AMERICAN DIAMOND ROCK DRILL CO.
120 LIBERTY ST N.Y.

THE JACKSON HAND POWER ROCK DRILL.
Works in Any Rock, in Any Position.
Write for Circulars and References.



THE JACKSON DRILL & M'F'G CO.,
1756 Larimer Street, DENVER, COLO.
Sole Licensees for all Foreign Countries and Eastern United States: THORNTON N. MOTLEY COMPANY (INC.), 43 John St., New York.
AGENTS: CHAS. B. BOOTHE & CO., 126 SO. LOS ANGELES ST., LOS ANGELES, CAL.

THEODOR LEXOW, 14 JOHN STREET, N. Y.
......Importer of......
CARBONS
(BLACK DIAMONDS)
For DIAMOND DRILLS and all Mechanical Purposes.
HENRY DEMMERT.

Dewey, Strong & Co., Patent Agents.
330 Market St., San Francisco, Cal.

BULLOCK DIAMOND DRILLS
If you are interested in prospecting send for our new Diamond Drill Catalogue (No. 33).
BULLOCK MINING MACHINERY
PORTABLE HOISTS—Send for our new Catalogue (No. 40). CHAMPION MINE VENTILATORS—Send for our new Catalogue (No. 35).
HOISTING AND HAULAGE PLANTS, ORE CARS, SKIPS, CAGES, ETC., ETC.

PARKE & LACY CO., Agent,
21 & 23 Fremont St., San Francisco, Cal.

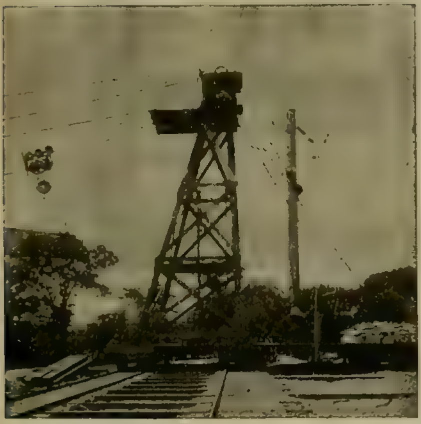
M. C. BULLOCK MFG. CO.,
1172 West Lake St., Chicago, Ill., U. S. A.

WHO BUILD THE BEST STAMP MILL?

FRASER & CHALMERS,

CHICAGO, ILL., U. S. A.
AND LONDON, ENGLAND.

CABLE HOIST CONVEYORS.


Cable Hoist Conveyor at St. Paul, Minn.

Laurent=Cherry Patent System,

requiring no Fall Rope Carriers;

and others.

MANUFACTURED BY

THE TRENTON IRON CO.,

TRENTON, N. J.

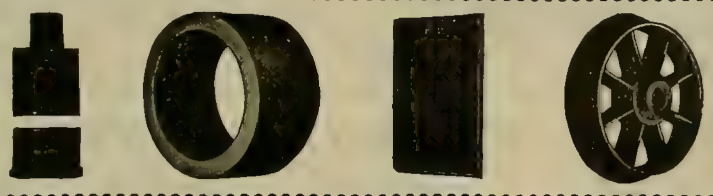
Engineers and Contractors and Sole Licensees in North America for the Bleichert System of Wire Rope Tramways. Also, Wire Rope Equipments for Surface and Underground Haulage, etc.

NEW YORK OFFICE—Cooper, Hewitt & Co., 17 Burling Slip.
CHICAGO OFFICE—1114 Monadnock Building.

For Particulars, Address **NEWTON M. BELL, Agent, 308 Market St., San Francisco.**

A full stock of the Trenton Iron Co.'s Wire Ropes, made from "SPECIAL" Crucible and Plough Steel, carried in San Francisco.

HARD ☘



TOUGH

TAYLOR IRON AND STEEL COMPANY,

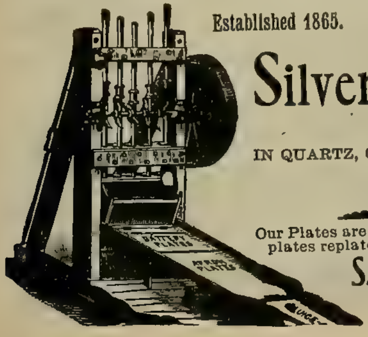
HIGH BRIDGE, NEW JERSEY, U. S. A.

Sole Licensees in America under the HADFIELD System and Patents for **MANGANESE STEEL,**

Best Metal Known for Roll Shells, Stamp Shoes and Dies, Crusher Plates and Side Liners, Toggles and Toggle Bearings, Gyratory Cones and Concaves, or Liners, Mine Car Wheels, Coal Crushing Rolls, Etc.

PACIFIC COAST PARTIES INTERESTED PLEASE ADDRESS PARKE & LACY CO., SAN FRANCISCO, CAL.

WRITE FOR INFORMATION AND PRICES.



Established 1865. **NOTICE TO GOLD MINERS.** Incorporated 1890.

Silver-Plated Copper Amalgamated Plates

FOR SAVING GOLD

IN QUARTZ, GRAVEL OR BEACH MINING. MADE OF BEST SOFT LAKE SUPERIOR COPPER.

AT REDUCED PRICES.

Our Plates are guaranteed, and by actual experience are proved, the best in weight of Silver and durability. Old Mining plates replated, bought, or gold separated. THOUSANDS OF ORDERS FILLED.

SAN FRANCISCO NOVELTY AND PLATING WORKS,

☞SEND FOR CIRCULARS. Telephone Main 976. 68, 70, 72, 74 and 76 FIRST STREET, COR. MISSION, SAN FRANCISCO, CAL.

QUARTZ SCREENS

A specialty. Round, slot or burred slot holes. Genuine Russia Iron. Homogeneous Steel, Cast Steel or American planished Iron, Zinc, Copper or Brass Screens for all purposes. CALIFORNIA PERFORATING SCREEN CO., 145 and 147 Beale St., S. F

Mining Screens

A SPECIALTY.

Diagonal Slot,
Straight "
Burred "
Round Holes.

In American planished or Russian iron or steel for all purposes GEO WIMMER, 312 Iowa Street, San Francisco. Telephone Mint 1332.

—EASTERN PRICES BEATEN.—

SAN FRANCISCO Pioneer Screen Works,

JOHN W. QUICK, Prop.

Improved Facilities! Finest Work! Lowest Prices!

Perforated Sheet Metals, Steel, Russia Iron, American Planish, Zinc, Copper and Brass Screens for All Uses.

MINING SCREENS A SPECIALTY.

221 and 223 First Street, San Francisco, Cal.

For Best Satisfaction and Lowest Prices

— IN —

PERFORATED METALS

— AND —

MINING SCREENS

PLACE YOUR ORDERS WITH

Fraser & Chalmers,

CHICAGO, ILL., U. S. A.

SEND FOR SAMPLES, MENTIONING THIS PAPER.

A BORE HOLE

is the cheapest, quickest, most direct, and most effective way to test lands for minerals, oil, gas, salt, sulphur, borax, water, etc.

THE STAR DRILLING MACHINES

excel for these uses. They will drill a hole through anything to any depth from 250 to 2500 feet The only machines made that are absolutely without annoying springs. They are simple, powerful and efficient. Easy to handle at work or on the road. Used in every State and Territory and in many foreign countries.

We also make full line of drill tool-bits, reamers, sand pumps, spuds, etc., etc. Write for illustrated free catalogue.

Star Drilling Machine Co.,

Akron, Ohio.

AMERICAN AND FOREIGN
PATENTS
CAVEATS, TRADE MARKS.
DEWEY, STRONG & CO.
330 MARKET ST. S. F.

The "Stop for Repairs"
to Mining Machinery,

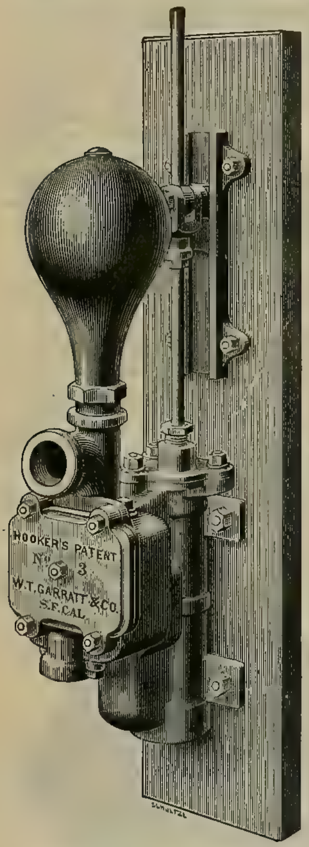
Especially if it is a conveying plant, is a considerable item of expense. Many of these expensive pauses are made to repair or adjust faulty belting. To economize in this respect, use the

LEVIATHAN
CONVEYOR BELT.

It is not only adapted to the heaviest service, but will run under any conditions in underground, drippings, extreme heat or cold.

IT WILL OUTLIVE ANY OTHER BELTING.

MAIN BELTING COMPANY,
1225-41 Carpenter Street, Philadelphia.
55-57 Market St., Chicago. 120 Pearl St., Boston.
SEND FOR PRICE LISTS AND SAMPLE.

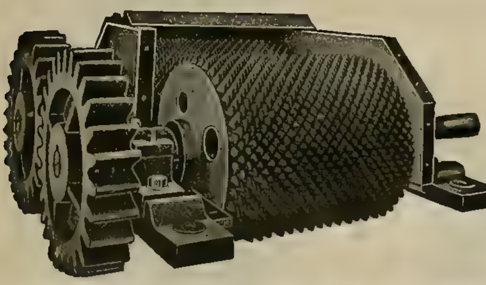

HOOKER'S PATENT
No. 3
W.T. GARRATT & CO.
S.F. CAL.

A GOOD MINING PUMP.

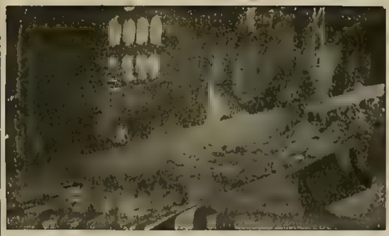
The Hooker Double Acting Pump.
Well Built, Simple, Durable, Efficient.
All Working Parts Easy of Access.
Duplicate Parts in Stock.
We furnish these pumps with suction pipes, hose and strainers complete. Estimates on application.
Can furnish up to number three with double brake for hand power.
Just the pump for a small mine.
Larger sizes, larger capacities.
Send for our catalogue on pumps.

W. T. GARRATT & CO.,
Cor. Fremont and Natoma Sts.,
SAN FRANCISCO, CAL.

LINK-BELT ELEVATORS —AND— CONVEYORS.



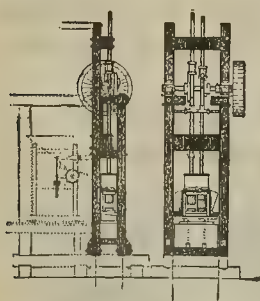
BREAKER ROLLS,
PICKING TABLES,
MALLEABLE IRON BUCKETS
SHAFTING, PULLEYS,
GEARING, CLUTCHES, Etc.
Catalogue Upon Application.
LINK-BELT MACHINERY CO.,
Engineers, Founders, Machinists,
CHICAGO, U. S. A.
DENVER, 1328 17th St ,
A. E. LINDROOTH, Manager.



PICKING BELTS
are now supplanting
SORTING TABLES
of wood and iron.

Fully Described in Our New Catalogue.

ROBINS CONVEYING BELT CO.,
Park Row Building, NEW YORK.



MODERN MINING MACHINERY.
QUARTZ MILLS of any capacity,
IN UNITS OF TWO AND FIVE STAMPS.
Acme Amalgamators for CAPE NOME
and other placer mining. Successfully applied to quartz mills in addition to or displacing plates.
SUCCESSFUL GRAVEL MILL RECENTLY IMPROVED.
Special Gold Dredging Pumps and Machinery. Concentrators, Feeders, Rock Breakers and Power Plants.
Largest manufacturers of Irrigation and Reclamation Pumps in the United States.
Catalogues: No. 20, Pumps; No. 22, Cape Nome; No. 25, Mining.
KROGH MANUFACTURING CO.,
9-17 Stevenson St. and 134-136 Main St., SAN FRANCISCO, CAL.

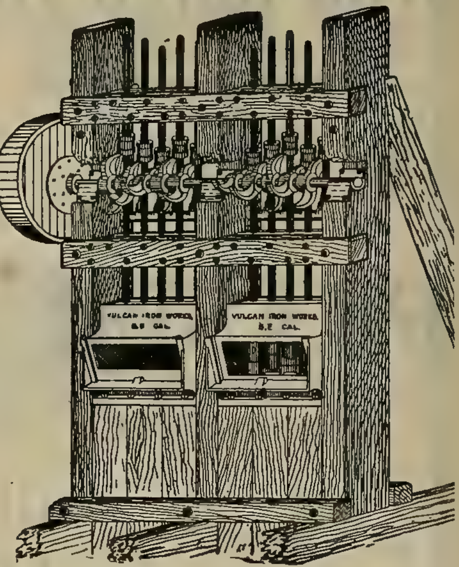
DEWEY, STRONG & CO., Patent Solicitors, 330 Market St., San Francisco, Cal.

Mining Machinery.

Stamp Mills
Of the Latest Improved Design for
Gold Milling.

VULCAN
WIRE ROPEWAYS
For Conveying Ore, Etc.

Vulcan Iron Works,
Office: 505 Mission Street,
San Francisco, Cal.


VULCAN IRON WORKS S.F. CAL.
VULCAN IRON WORKS S.F. CAL.

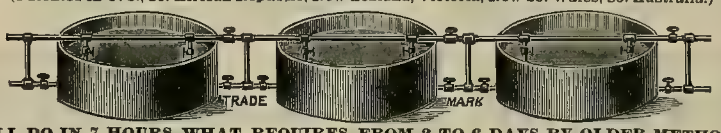
P&B Building Paper

A perfect insulation for cold storage houses and refrigerators.
Unequaled in residence construction.
A protection against heat, cold, dampness, dust, draught and vermin.
Demand it of your dealer — you need it in your buildings.
Paraffine Paint Co—116 Battery, San Francisco

TRADE MARK.
(M'ARTHUR-FORREST PROCESS.)

CYANIDE PROCESS.
The MacArthur-Forrest Cyanide Process is the Best
For the Treatment of Refractory and Low Grade Gold and Silver Ores and Tailings. We are the Originators of the Cyanide Treatment, and have kept up with the times in all Improvements in Cyanide Methods.
Successful Plants in Operation in all Western Mining States.
Samples Assayed and Fully Reported Upon. Properties Examined Designs Furnished. For Terms and Particulars, Address
The Gold and Silver Extraction Co. of America, Ltd.
GEO. A. ANDERSON, General Manager,
Testing Works: 1716 Blake Street, Denver, Colo. 208-210 McPhee Building, Denver, Colo.
ALMARIN B. PAUL, Agent, 27 Crocker Building, San Francisco, Cal.

"PNEUMATIC" CYANIDE PROCESS.
(Patented in U. S., So. African Republic, New Zealand, Victoria, New So. Wales, So. Australia.)



WILL DO IN 7 HOURS WHAT REQUIRES FROM 2 TO 6 DAYS BY OLDER METHODS.
SEND FOR PAMPHLET.
THE PNEUMATIC CYANIDE PROCESS CO., 306 Boston Bldg., Denver, Colo.

Are You Confronted With a Difficult Ore-Separating Problem?
THE WETHERILL MAGNETIC SEPARATING PROCESS
may prove the solution. Apply to Wetherill Separating Company, 52 Broadway, N. Y.

Aaron's Assaying, PARTS II and III.
THIRD EDITION --- REVISED AND REWRITTEN.

The Third Edition of Parts II and III of this great work on assaying is now ready; new type; new illustrations; new matter; better than ever; reduced in price to $1.50 postpaid to any part of America. The practical character of this book has made it the favorite everywhere in the mining world among men who want such a manual on assaying.

Address Book Dept. Mining and Scientific Press,
330 MARKET ST., SAN FRANCISCO, CAL.

THE COPPER FURNACE

Here illustrated has OUR PATENT

WATER VAPORIZING ATTACHMENT.

Experience has proven this to be the best of all methods for applying water for the cooling of jackets. It has the further great advantage of using only about one-eighth the usual amount of water needed for that purpose, and all jackets are kept at the same temperature.

We Manufacture Smelting Furnaces and Equipments

FOR THE TREATMENT OF

GOLD, SILVER, LEAD, COPPER and NICKEL ORES.

of any desired tonnage capacity above forty tons per day, and put them into successful operation under guarantee. Write for catalogue showing different styles of furnaces.

We also design, manufacture and erect Smelter Sulphide Mills for crushing and sampling ores. We are the originators of the Narrow Face, Large Diameter, High Speed Crushing Rolls. A full description of our Crushing Machinery is given in a special catalogue, which will be sent on application.

THE COLORADO IRON WORKS CO.

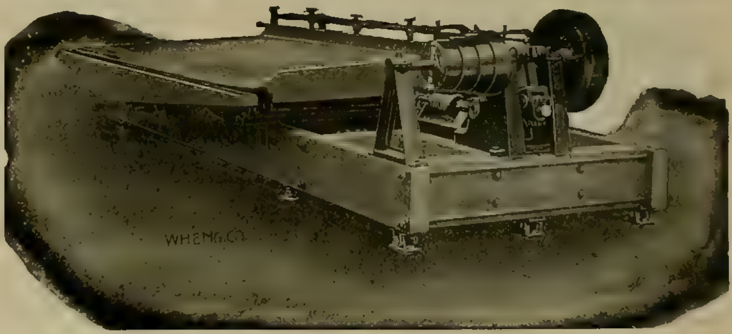
ESTABLISHED 1860.

DENVER, COLO., U. S. A.

THE : CAMMETT : CONCENTRATOR.

Designed with some Regard for the Laws of Concentration.

> From **The Denver Evening Post**, July 15th, 1900.
>
> * * * "Now about concentrating tables. Here's a fellow who says there's nothing equal to the Wilfley, and I am trying to convince him that old man Woodbury over in California makes the finest table in the world." "No, sir," said his comrade, "you're way off. I've tried the CAMMETT too thoroughly to believe there's anything made to equal it."



Manufactured Under U. S. Patent No. 632,892; Dated Sept. 12, 1899.

Denver Engineering Works,---Shepard & Searing,---Sole Manufacturers,

30th and Blake Streets, - - - - DENVER, COLORADO.

GEO. E. DOW PUMPING ENGINE CO.

(Successors to DOW STEAM PUMP WORKS.)

108-120 BEALE ST., - - SAN FRANCISCO, CAL.

——MANUFACTURERS OF——

DOW PUMPS

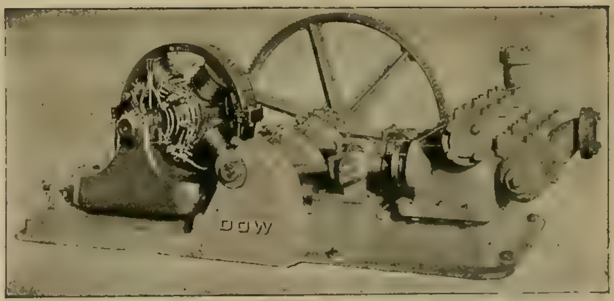
FOR MINING PURPOSES,

Operated by STEAM, AIR, ELECTRIC or WATER POWER.

VERTICAL SINKING PUMPS, BUCKET OR DOUBLE PLUNGER PATTERN.

DEEP MINE STATION PUMPS.

PUMPING MACHINERY FOR EVERY POSSIBLE DUTY.



HOR. TRIPLEX MINE STATION PUMP WITH ELECTRIC MOTOR.

THE HALLIDIE ROPEWAY

For Transporting Ore, Fuel, Earth, Sugar Cane, etc., by Wire Ropes.

SIMPLE, ECONOMICAL, PRACTICAL, DURABLE.

LOADS MECHANICALLY. DUMPS AUTOMATICALLY.

WIRE TRAMWAYS (Single and Double Rope Systems),

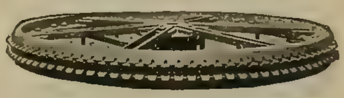
Cableways, Transmission by Wire Ropes,
Incline Planes, Cable Grips,
Logging by Cables, Automatic Loaders,

PLOWING, SCRAPING AND TRANSPORTING by Wire Ropes,

DESIGNED, SUPPLIED AND ERECTED. Estimates Furnished.

Improved GRIP PULLEY.

Patents Nos. 483,442; 610,353.



EFFECTIVE, SIMPLE, AUTOMATIC.

Saves Wear on Wire Rope and Cable.

Send for Illustrated Pamphlet.

Correspondence Solicited.

CALIFORNIA WIRE WORKS, - 9 Fremont St., San Francisco, Cal.

PROFESSIONAL CARDS.

R. H. POSTLETHWAITE, M.I.E.E.
Hydraulic Mining Engineer.
River Dredging for Gold a Specialty.
1315 Leavenworth St........San Francisco, Cal.

THEO. F. VAN WAGENEN, E. M.
Consulting Mining and Hydraulic Engineer.
1508 Fillmore St., DENVER, COLO.

D. B. HUNTLEY,
Mining Engineer and Metallurgist,
De Lamar, Owyhee Co., Idaho.

BERNARD MACDONALD,
Consulting Mining Engineer.
General Manager British America Corporation, Ltd., Rossland, B. C.

DRAPER & McLEOD,
Assayers, Chemists, and Mining Engineers,
1736 CHAMPA STREET,
DENVER.................................COLORADO.

JOHN DWYER, Mining Engineer,
MEXICO.
Address 762–17th Street......East Oakland, Cal.

Established 1879.
CHAS. B. GIBSON,
Chemist, Metallurgist and Mining Engineer,
81 CLARK ST., CHICAGO, ILL.

W. C. WYNKOOP, M. E.
Woodbury (Cochiti District), New Mexico.
Economic Geology and Mine Examinations.

E. H. BENJAMIN, Mining Engineer.
A. M. HUNT, Mechanical & Hydraulic Engineer.
WYNN MEREDITH, Electrical Engineer.
C. L. CORY, Electrical & Mechanical Engineer.
EXPERT EXAMINATIONS. ADVISORY REPORTS.
CONSTRUCTION SUPERVISION.
331 Pine Street,...........San Francisco, Cal.
Telephone Main 1870. Cable Address "Edben."

JOHN W. GRAY,
Mining and Hydraulic Work.

Prospecting Operations and Exploration Work.
Examinations, Surveys, Development, Equipment of Mines, Gold-Bearing Gravels, and Water Supplies.
923 Linden St.,..................Oakland, Cal.
Cable "Espra." Correspondence invited.

ABBOT A. HANKS,
CHEMIST AND ASSAYER.
Successor to Henry G. Hanks, est. 1866. The supervision of sampling of ores shipped to San Francisco a specialty.
—531—
California Street,
San Francisco.

RICHARD A. PEREZ, E. M.
Assayer and Analytical Chemist,
120 North Main St., - Los Angeles, Cal.

S. W. TYLER,
Mining and Metallurgical Engineer,
6 Windsor Hotel Block.
Cable: Retyl, Denver. DENVER, COLORADO.

The SPOKANE BUREAU OF MINING,
N. E. LINSLEY, Manager.
SPOKANE, : : WASHINGTON.
Consulting Mining and Milling Engineer.
Will Examine and Report on Mines.

DANIEL G. JEWETT,
Metallurgist and Assayer.
Specialty: The Mining and Smelting of Copper or Lead Ores.
P. O. BOX 5, GUFFEY, PARK CO., COLO.

CLARENCE HERSEY,
Assayer and Chemist,
(Established 1879.) LEADVILLE, COLO.
Gold, Silver and Lead..................$1.00.
Any two of above 75c; any one of above 50c.
Copper analysis...................................$1.00.
Platinum, Nickel or Tin, each..............$5.00.

Twenty-one years successful experience in the mining metropolis of Colorado.

Write for mailing envelopes and price list.

ALMARIN B. PAUL, M. E.,
ROOM 27, CROCKER BUILDING, SAN FRANCISCO.
Will act as AGENT for the sale of RELIABLE Mining Property. SPECIAL AGENT FOR
MacArthur-Forrest Cyanide Process
for California north of and including Mono, Madera and Merced counties; also for State of Nevada. Will act as agent for Eastern parties owning mining interests in California.

F. H. HARVEY,
GALT, CAL.,
Mining and Metallurgical Work in All Branches.

Assays, Chemical Analysis of Ores and experiments on rebellious ores for treatment by cyanide or other processes. Surveys and reports upon mining properties.

Simonds & Wainwright,
Mining Engineers,
Assayers and Chemists,
159 Front Street,
NEW YORK.

HUDSON H. NICHOLSON,
Consulting Mining Engineer,
Rooms 216 and 217, Boston Building,
DENVER, COLO., U. S. A.
Cable address: Aichen, Denver.

Expert examinations of and advisory reports on mining propositions.

Specialty: The chemical treatment of ores

R. J. WALTER,
1452 Blake St., DENVER, COLO.
Mining Engineer and Metallurgist.
Reports on mining properties.
Assay office and chemical laboratory. Established in Colorado 1879.

SAM'L A. RANK,
MINING ENGINEER,
U. S. DEPUTY MINERAL SURVEYOR.
Mine Examinations and Reports.
514 Cooper Building,
DENVER..........................COLORADO.

EDWARD L. HAFF,
MINING ENGINEER,
U. S. DEPUTY MINERAL SURVEYOR.
Mine Examinations and Reports.
National Annex Block,
P. O. Box 21. CRIPPLE CREEK, COLO.

FRANK C. MANDELL,
MINING ENGINEER,
U. S. Deputy Mineral Surveyor for Idaho and Oregon.
Mine Examinations, Surveys and Reports.
HAILEY, IDAHO.

ERNEST H. SIMONDS,
Late Instructor in Assaying, University of California.
ASSAYS AND ANALYSES.
LABORATORY TESTS OF ORES.
Special Attention Given to the Instruction of Students.
521 Sacramento St., Cor. Leidesdorff. S. F., Cal.

RALPH E. STEVENS,
ATTORNEY AND COUNSELOR,
43–44 Jacobson Building, DENVER, COLO.
Special attention to examination of titles. Corporation, commercial. mining law. Collections receive prompt attention. Notary in office. Refers to Denver representative of Mining and Scientific Press.

T. D. KYLE & CO,
Assayers and Chemists.
Mill Tests of all kinds. Cyanide, Amalgamation and Concentration a specialty. Mail orders given prompt attention.
106 E. Fifth St.. **Leadville, Colo.**

School of Practical Mining, Civil,
Mechanical and Electrical Engineering.
Surveying, Architecture. Drawing, Assaying, Cyanide Process and Metallurgy.
933 Market St., S. F., Cal. OPEN ALL YEAR.
A. VAN DER NAILLEN, President
Assaying of Ores, $25; Bullion and Chlorination Assay, $25; Blowpipe Assay, $10. Full course of Assaying, $50. Established 1864.
☞ Send for Circular.

FRED H. BROWN,
Electrical Mining Expert.
Inventor of the Electro-Geodetic Mineral Locator. Patented March 20, 1900.

Will electrically survey mines and lands for mineral; furnish charts showing run of ore, extensions, pay streaks, and their approximate depth from surface.

References include scientific men, and miners for whom we have located rich mines.

Address, 1025 West 7th St.,
LOS ANGELES, CAL.

A. F. WUENSCH, M. E.
Inspection and Valuation of Mines.
Ref. D. H. Moffat, Pres. 1st Nat'l Bank, Denver.
827 Equitable Bldg..................Denver, Colo.

WM. VAN SLOOTEN,
Consulting Mining Engineer and Metallurgist.
Cable address: "Yadoplata."
35 WALL STREET........... ....NEW YORK, N. Y.

DAVIDGE & DAVIDGE, Attorneys and Counsellors at Law, Corcoran Building, Washington, D. C. Practice in the Supreme Court of the United States, the Court of Claims, the Courts of the District of Columbia, and the General Land Office. Western Union Code.

W. J. ADAMS, E. M.,
Mining Engineer and Metallurgist.
Graduate of Columbia School of Mines.
Author of "Hints on Amalgamation," etc., etc.
ROOM 14, 434 CALIFORNIA STREET,
SAN FRANCISCO, CAL.

HOWARD E. BURTON,
ASSAYER and CHEMIST,
111 E. Fourth St., LEADVILLE, COLO.
Specimen prices: Gold, 50c; Gold and Silver, 75c; Gold, Silver and Lead, $1.00; Silver or Lead, 35c; Copper or Zinc, $1.00.
Mailing envelopes sent to any address.

MINERS' ASSAY OFFICE.
(JNO. HARRIGAN)
10 Stevenson Street, - San Francisco, Cal.
Telephone Clay 972.

Assaying, Analyses, Sampling, Grinding and Pulverizing of all kinds.

Practical Working Tests of Ore by all Processes. Mining Machinery Bought and Sold. Check Assays. Instructions given in Assaying. All Work Guaranteed. **Mines Examined, Sampled and Reported on by M. P. BOAG, M. E. and Cyanide Expert.**

LOUIS FALKENAU,
STATE ASSAY OFFICE,
538 Sacramento St., below Montgomery.

Analysis of Ores, Metals, Soils, Waters, Industrial Products, Foods, Medicines, etc., etc.

Court Experting in all branches of Chemical Technology. Working Tests of Ores and Investigation of Metallurgical and Manufacturing Processes. Consultations on all questions of applied chemistry. Instructions given in assaying and all branches of chemistry.

RELIABLE ASSAYS.

Gold	$ .50	Gold and Silver	$ .75
Lead	.50	Gold, silver, copper	1 50

Samples by mail receive prompt attention.
Rich Ores and Bullion Bought.
OGDEN ASSAY CO.,
1429-16th St., Denver, Colo.

J. W. RICHARDS,
(Late of Aspen, Colo.)
ASSAYER AND CHEMIST. 1754 Champa Street, DENVER, COLO.
Ore Shippers' Agent. Write for Terms.

JAMES ANGUS SNEDAKER,
Mining Engineer,
721–722 Equitable Building, Denver, Colo., U. S. A.

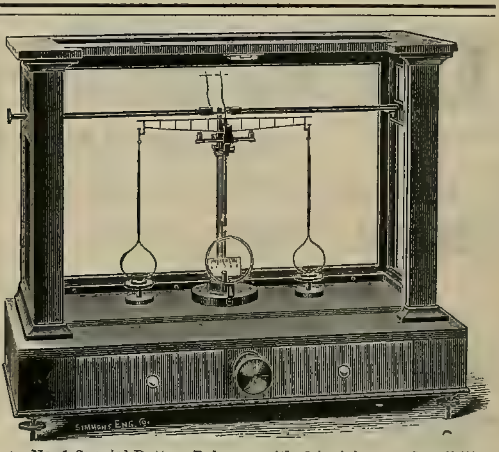
Samples by Mail or Express Will Receive Prompt Attention.
ALBERT I. GOODELL,
ASSAYER AND CHEMIST,
1430 Stout Street......................DENVER, COLO.

CHAS. BUTTERS & CO., Limited.
E. S. LEAVER, Manager.
Ore Testing Works,
Chemical and Metallurgical Laboratory,
Assay Office,
DOOLY BLOCK, - SALT LAKE CITY, UTAH.

Telephone, MAIN 5104.
Cable Address, LUCKWARD.
—ESTABLISHED 1869.—
A. H. WARD.
C. A. LUCKHARDT CO.,
NEVADA METALLURGICAL WORKS,
71 & 73 STEVENSON STREET, - - - - SAN FRANCISCO, CAL.
Assaying, Analyses, Sampling.
PRACTICAL WORKING TESTS OF ORE BY ALL PROCESSES.
STAMP MILL AND CONCENTRATOR IN OPERATION ON PREMISES.

Thomas Price & Son,
Assay Office, Sampling Works
And Chemical Laboratory.
526 Sacramento Street, San Francisco, Cal.

The above illustration shows the method of holding and sighting BRUNTON'S PAT. POCKET MINE TRANSIT, when taking courses or horizontal angles. The construction is such as to permit of simultaneous sighting and reading. No tripod or Jacob's staff is necessary, and an operator, after becoming accustomed to its uses, can take the Transit from his pocket, take a reading and replace the instrument before a sighting compass can be placed. The most accurate and relibale pocket instrument on the market. Send for illustrated Catalogue B to


SIMMONS ENG. Co.

No. 1 Special Button Balance with 8-inch beam. Sensibility 1-200 Milligramme. For very accurate weighings. Among the well-known smelters using this balance are the following: GLOBE SMELTING & REFINING CO., Denver, Colo., U. S. A.; CANADIAN SMELTING WORKS, Trail, B. C.; MT. LYELL MINING & RAILWAY CO.'S Reduction Works, Penghana, Tasmania.

For full description of this and other balances send for Catalogue A to

WM. AINSWORTH & SONS,
(Successors to Wm. Ainsworth.) DENVER, COLO., U. S. A.
For sale by reputable dealers everywhere.

F. W. Braun & Co., Los Angeles, Cal., Agents for balances and the Brunton Patent Pocket Transit.
John Taylor & Co., San Francisco, Cal., Agents for balances and the Brunton Patent Pocket Transit.
H. S. Crocker Co., San Francisco, Cal., Agents for the Brunton Patent Pocket Transit.
Pacific Optical Co., Los Angeles, Cal., Agents for the Brunton Patent Pocket Transit.

Independent Assay Office.
ESTABLISHED 1868.
D. W. Reckhart, E. M., Proprietor.
Agent for Ore Shippers.
Assays and Chemical Analysis.
Mines Examined and Reported Upon.
BULLION WORK A SPECIALTY.
P. O. Box 88 Office and Laboratory:
Cor. SAN FRANCISCO & CHIHUAHUA Sts.
EL PASO, TEXAS.

HERMANN J. VAN DIEREN,
Assayer and Metallurgist,
1407 Seventeenth St., DENVER, COLO.

Stamp Mill and Reduction Works: 19th St. and Platte River.

Buyer of every description of Ores and Precious Stones. Rights for sale for process of treating refractory gold ores; also process for treating low grade copper ores. Write for particulars.

HENRY E. WOOD,
ASSAYER,
1734 Arapahoe St., DENVER, COLO.
Ore Tested in Carload Lots.
Write for Circular.

ALVIN PHILLIPS & CO.,
Chemists, Mining and Metallurgical Engineers,
1761 MARKET STREET,
DENVER, - COLO.

Complete Ore-Testing Works — capacity ten pounds to two tons. Modern Methods of Lixiviation, Cyanide and Chlorination. Concentration on Bartlett Table. Assaying and Bullion Refining. Chemical Analyses of Oils, Coal, Water, and all solutions. WRITE FOR PRICES.

Hoskins' Patent Hydro Carbon Blow-Pipe and Assay Furnaces.

No dust. No ashes. Cheap, effective, economical, portable and automatic.

SEND FOR PRICE LIST TO
W. HOSKINS, 81 South Clark St., Room 55, CHICAGO, ILL.

SMITH & THOMPSON,
Manufacturers of Fine
ASSAY BALANCES.
Write for Catalogue.
2219 Stout St.,
Denver, Colo.

THE ROESSLER & HASSLACHER CHEMICAL CO.,
100 William Street, New York.

CYANIDE

Peroxide of Sodium

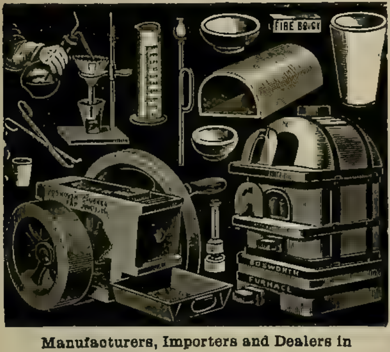
Hyposulphite of Soda

Chloride of Lime

Sulphide of Iron

And Other Chemicals for Mining Purposes.

THE DENVER FIRE CLAY CO.,
1742 to 1746 Champa St., DENVER, COLO.



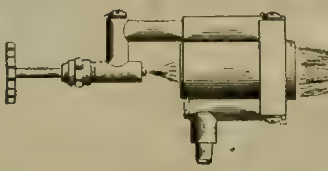
Manufacturers, Importers and Dealers in
Chemicals, Apparatus and Assayers' Supplies, Fire Brick and Tile.
Sole Agents for the "AINSWORTH BALANCES."
WRITE FOR CATALOGUES.

DEWEY, STRONG & CO.,
PATENT AGENTS, 330 Market St., S. F., Cal.

Dearborn Compounds for That Oil Getting Back Into Boilers.

DEARBORN DRUG & CHEMICAL WORKS,
MANUFACTURING AND ANALYTICAL CHEMISTS,
ANALYZERS OF EVERYTHING. OIL CHEMISTS.
MAKERS OF BOILER COMPOUNDS. WATER CHEMISTS.
Offices and Laboratories:
29, 30, 31, 32 and 33 Rialto Bldg. - - - CHICAGO, ILL.

Taylor's Coal Oil and Gasoline Burner
(PATENTED)



A new heating burner for Assayers and Chemists, or for brazing, in which coal oil at 33 deg. to 45 deg., Beaume and 150 deg. fire test, or gasoline at 74 deg. test can be used for fuel. Adapted to crucible, muffle and brazing work. Price $6. For sale by

JOHN TAYLOR & CO.,
63 FIRST STREET,
SAN FRANCISCO, CAL.

MINE AND MILL SUPPLIES.
Importers and Manufacturers of Assayers' Materials, Chemicals and Acids, Etc.
CATALOGUE ON APPLICATION.

IMPROVED BONE ASH.

It is 100% better than Bone Ash now being used; will absorb more lead, will never crack or split in the Muffle, can be dropped before or after using without breaking. Cupels can be made and used at once; no drying required. Excessive heat has no effect on them. Will stand shipping any distance. It takes up none of the precious metals in cupeling. Cupels much quicker. Once used always used. Sold under a positive guarantee or money refunded. Now being used by all smelters and assayers who have tried it.

Price of Improved Bone Ash, $60.00 per ton; $3.50 per 100 lbs.; or manufactured Cupels, $1.50 per hundred.

J. J. CUMMINGS & CO., Sole Mfrs.,
Telephone Clay 972. 10 STEVENSON ST., SAN FRANCISCO, CAL.
For Sale also by Justinian Caire Co., Dealers in Assay Goods and Mining Supplies, 521-523 Market St.

PIONEER REDUCTION CO.
Established 1858. Nevada City, Cal.
Buyers of Gold, Silver and Copper Ores and Concentrates.
HIGHEST PRICES PAID FOR COPPER ORES.
WRITE FOR RATES.

ESTABLISHED 1856.
Controls AND Check Assays
(A SPECIALTY.)
MARINER & HOSKINS,
ASSAYERS AND CHEMISTS,
Mining Engineers and Metallurgists.
81 South Clark Street.
Rooms 51-55,
CHICAGO, ILLINOIS.
SEND SAMPLES BY MAIL OR EXPRESS.
MAILING SACKS ON APPLICATION. : :

ST. LOUIS SAMPLING & TESTING WORKS,
1225 and 1227 Spruce St.,
ST. LOUIS, MO.

The Largest and Most Complete Ore Testing Works in Existence for Making all Kinds of Practical Working Tests of Ore, etc., to Determine the Most Suitable Method of Treatment.

PLANT FOR COAL WASHING, COKING AND STEAMING TESTS OF FUELS. ASSAYS, ANALYSES, CHEMICAL AND PHYSICAL INVESTIGATIONS OF ALL KINDS. MINERAL PROPERTIES, MINES AND METALLURGICAL PROCESSES EXAMINED AND REPORTED UPON. CORRESPONDENCE SOLICITED.

New Process of Copper Extraction.
CHEAP, CLEAN AND EFFECTIVE.
THE GARDINER LEACHING PROCESS
FOR COPPER ORES.
TESTS MADE ON ANY QUANTITY OF ORES AT REASONABLE RATES.
FULL PARTICULARS ON APPLICATION.
THE AMERICAN COPPER MINING & EXTRACTION CO., DENVER, COLO.

Prospecting Machinery.

Multitudes in use for testing for minerals. Sizes and equipments to suit any and all conditions. Unexcelled for Placer Testing, Oil Wells, Water Wells, testing for Lead and Zinc, Iron and Coal; goes through anything; brings up everything. Large sizes drill as much as 1500 feet. In use all over the world. Every purchaser pleased. Used on boats for testing river and lake beds. Water no hindrance. No skilled labor required.

KEYSTONE DRILLER CO., Beaver Falls, Pa., U. S. A.

Ammonia Process.

The practical success of this process is well known and is demonstrated chemically, technically and mechanically in every detail on a large scale. Refractory ores and tailings containing gold, silver, copper and zinc are extracted successful and profitable. Mail average sample and $10 and receive full report about the extraction.

Pocketbook, Ammonia Process, full description, $1.

Instructions in Chemistry and all successful and practical Lixiviation Processes.

Office and Laboratories:
334 KEARNY STREET, SAN FRANCISCO, CAL.
H. HIRSCHING,
Mining Engineer and Chemist.

JEFFREY
Roller, Steel and Special CHAINS
ELEVATORS AND CONVEYORS
COAL MINING MACHINERY.
WIRE CABLE CONVEYORS.
For long and short distance conveying.
THE JEFFREY MFG. CO., Columbus, Ohio.
Send for Catalogue. 41 Dey Street, New York.
Western Branch, Equitable Bldg., Denver, Colo.,
F. R. FIELD, Representative.

DENVER & RIO GRANDE R.R.
SCENIC LINE OF THE WORLD

The ∴ Mining Man's Favorite Route
BETWEEN
Denver, Colorado Springs, Pueblo and Florence, Cripple Creek, Leadville, Glenwood Springs, Aspen, Gunnison, Lake City, Creede, Durango, Silverton, Telluride and Ouray,

Reaching all the Mining, Milling, Cyaniding, Chlorinating and Smelting centers in Colorado and Utah, and all mining points in California, British Columbia and the Pacific Northwest by close connections and a perfect system of through car service.

Pullman Palace and Tourist Sleeping Cars between Denver and San Francisco and Los Angeles, and Pullman Palace and Tourist Sleeping Cars and Free Reclining Chair Cars between Denver and Portland. : : A Perfect Dining Car Service on All Through Trains. : :

For Illustrated Pamphlet, address

W. J. SHOTWELL, G. A. D. & R. G. R. R., 126 California St., San Francisco, Cal.

S. K. HOOPER, G. P. & T. A., Denver, Colo.

THE MINES OF
Eastern Oregon
Which are now attracting so much attention are reached only by the lines of the
OREGON RAILROAD & NAVIGATION CO.
For Descriptive Pamphlets, Through Rates, Etc., Address
E. C. WARD, Gen. Agt.,
630 Market Street, San Francisco.

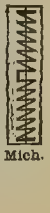
COLORADO'S GOLD
Output for 1899 is unequaled by any State in the Union. Cripple Creek, Leadville, and all the important mining towns are reached by
THE COLORADO & SOUTHERN RY...
For copies of our publications on the Swandyke and Pine Creek Gold Districts, or our pamphlet "Hints to Prospectors," address
T. E. FISHER, GEN. PASS. AGT.
DENVER, COLO.

Notice the Shape of
GLOBE BOX---THE BEST BABBITT.

J. M. HAYDEN & CO.
GLOBE BOX METAL
GRAND RAPIDS MICH.
THE BEST BABBITT.

Send for trial order, Ladle free.

The Globe wire lace makes the smoothest joint, runs the stillest and lasts the longest of any lacing. Sent on approval. Write us for booklet with instructions, etc. J. M. HAYDEN & Co., 58 Pearl St., Grand Rapids, Mich.



SELBY SMELTING AND LEAD CO.,

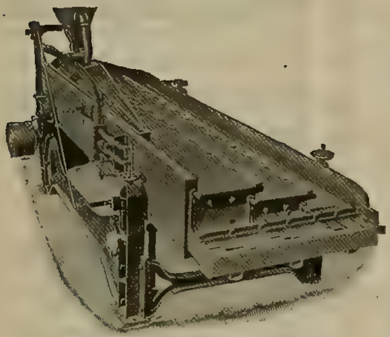
REFINERS OF GOLD AND SILVER BARS, GOLD DUST, ETC.

Buyers of Gold, Silver, Lead and Copper Ores, Gold Concentrates, Lead Bullion, Cyanide Product, Etc.

ORE AND BULLION ASSAYERS.

Works at VALLEJO JUNCTION, CAL. Office, 416 MONTGOMERY ST., SAN FRANCISCO, CAL.

THE IMPROVED BARTLETT CONCENTRATING TABLE.



The BARTLETT CONCENTRATING TABLE has been GREATLY IMPROVED recently by the substitution of iron in place of wood wherever possible. It is now built with SOLID IRON TOP, PLANED TO A TRUE SURFACE AND POLISHED; all parts are made by template and EACH PART BEING INTERCHANGEABLE. As now constructed, the table has no special wearing parts and will last for many years. It has a CAPACITY OF FROM FIFTEEN TO FORTY-FIVE TONS IN TWENTY-FOUR HOURS, according to the class of ore worked. It is the only table in the world which will take the place of jigs and do away with all costly and complicated machinery.

It is Especially Designed for Separating Zinc from Lead.

Send for our illustrated catalogue, containing all the latest information on the concentration of ores.

THE COLORADO IRON WORKS CO.,

Established 1860. DENVER, COLO., U. S. A.

CHAS. C. MOORE & CO.,

—ENGINEERS AND DEALERS IN—

MAGNOLIA ANTI-FRICTION METAL,

HAMILTON CORLISS ENGINES, N. Y. SAFETY AUTOMATIC ENGINES, BABCOCK & WILCOX BOILERS, McINTOSH & SEYMOUR ENGINES, GREEN'S ECONOMIZERS, HOPPES LIVE STEAM PURIFIERS, WHEELER CONDENSERS, BARNARD-WHEELER COOLING TOWERS, EDMISTON FEED WATER FILTERS, BUNDY STEAM TRAPS, SNOW STEAM PUMPS, QUIMBY SCREW PUMPS, GOUBERT FEED WATER HEATERS, STRATTON STEAM SEPARATORS, SPENCER DAMPER REGULATORS, HYATT ROLLER BEARINGS.

Contracts for Installation of Power Plants, Any Capacity.

SEND FOR CATALOGUES AND FULL INFORMATION.

32 FIRST STREET, SAN FRANCISCO, CAL.

SEATTLE BRANCH.............313 FIRST AVE. SOUTH.
LOS ANGELES BRANCH.......103 SOUTH BROADWAY.

THE

Pelton Water Wheel Company

Gives exclusive attention to the development and utilization of water powers by the most modern, economic and improved methods. An experience of more than fifteen years, involving both the theory and practice of hydraulic engineering as relates to power development in its widest range of application, is at the service of its customers.

Nine Thousand Wheels Now Running,

Averaging some 700,000 H. P.

ELECTRIC POWER TRANSMISSION.

Pelton wheels afford the most reliable and efficient power for such service and are running the majority of stations of this character in the United States, as well as most foreign countries. Highest efficiency and absolute regulation guaranteed under the most extreme variations of load.

The Pelton Water Wheel Company,

121 & 123 MAIN STREET, SAN FRANCISCO, CAL.

SHOES and DIES

of SUPERIOR quality and at prices 20 to 30% lower than any other maker.

FURNISHED BY

ARTHUR KOPPEL,

66 Broad St., N. Y. City.

Write for Particulars.

MINING CARS of every description.

PORTABLE RAILWAYS,

Rolling Stock, Railway Outfits for Mines of every description.

Export Work a specialty.

ARTHUR KOPPEL,

66 Broad St., N. Y. City.

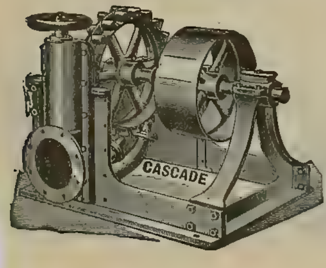
Send for Catalogue and Estimates.

Pacific Coast Agents, BAKER & HAMILTON, SAN FRANCISCO and SACRAMENTO.

TURBINE AND CASCADE WATER WHEEL

Adapted to all Heads from

3 Feet to 2000 Feet.

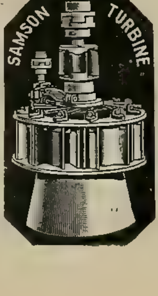


Our experience of 38 YEARS building Water Wheels enables us to suit every requirement of Water Power Plants. We guarantee satisfaction.

State your Head and requirements. Send for pamphlet.

JAMES LEFFEL & CO.

SPRINGFIELD, OHIO, U. S. A.



TANKS!

LUMBER AND HOUSE FINISH.

TANKS FOR WATER, WINE OR OIL.

Jig Frames, Jig Screens, Zinc Boxes,

and Tanks of Every Description for Mining Purposes.

WRITE FOR ESTIMATES ON YOUR WANTS.

THE EXCELSIOR REDWOOD CO.,
FOURTH AND CHANNEL STREETS,
SAN FRANCISCO, CAL.

C. A. HOOPER & CO., Agents,
204 Front Street, San Francisco, Cal.

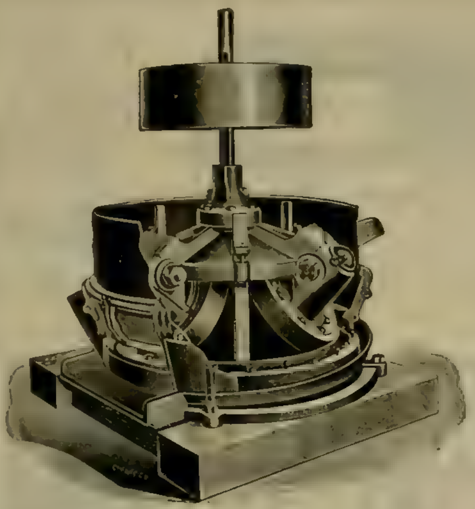
FOWLER'S AIR SPACE

and Asbestos Sectional Covering.

As a Non-Conductor, Unequaled.

Special Rates for Steam Boilers and Drums.

G. C. Fowler, 656-58 Howard St., S. F.

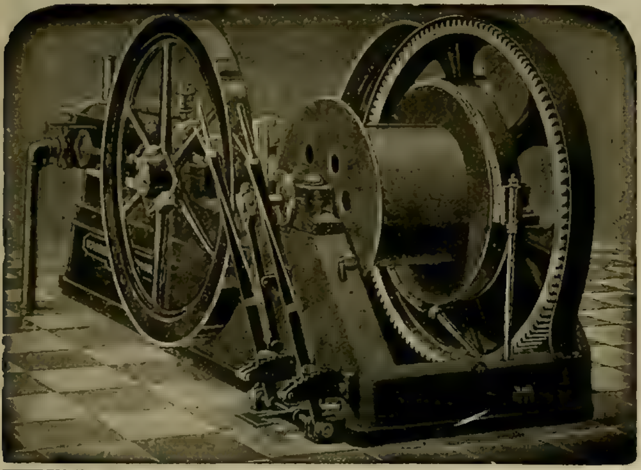


THE GRIFFIN
THREE ROLLER
ORE MILL.

The Griffin Three Roller Ore Mill is a simply constructed Mill, suitable for working all kinds of ores that require uniformly fine crushing by the wet process. This Mill is a modification of the well-known Chilian Mill, but the rollers run upon a crushing ring or die, which is inclined inwardly at an angle of about 30 degrees, the rollers themselves also being inclined to the central shaft of the Mill, thus utilizing the centrifugal force, as well as the weight of the rollers themselves as a crushing agent. The Griffin Three Roller Ore Mill is therefore a Mill of great strength, and has few wearing parts. We construct these Mills with extreme care, using only the best of raw materials, which are most carefully worked by men who are specialists as mill builders. We sell the Griffin Ore Mill on its determined merits, and will gladly supply full information regarding it to any one.

SEND FOR FREE ILLUSTRATED AND DESCRIPTIVE CATALOGUE TO

Bradley Pulverizer Co., Boston, Mass.



FAIRBANKS-MORSE
GASOLINE-DISTILLATE GEARED HOISTER.

An efficient and reliable combination of a Fairbanks-Morse Gasoline-Distillate Engine on the same base with a Friction Hoist. Modern and up to date. We publish a special catalogue describing our Hoister which we gladly mail prospective purchasers.

FAIRBANKS-MORSE GASOLINE-DISTILLATE ENGINES.
ALL SIZES UP TO AND INCLUDING 54 HORSE POWER.
For Pumping, Milling, Lighting, Air Compressors, Etc.

FOR CATALOGUES AND FULL INFORMATION, ADDRESS

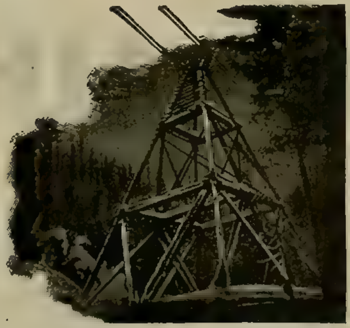
FAIRBANKS, MORSE & CO.,
310 MARKET ST., SAN FRANCISCO, CAL.
201 N. LOS ANGELES ST., LOS ANGELES, CAL.
FIRST AND STARK STS. PORTLAND, OGN.
1600 SEVENTEENTH ST., DENVER, COL.
FRANKLIN AND MONROE STS., CHICAGO, ILL.

THE MINE AND SMELTER SUPPLY CO.,
DENVER, - - COLORADO.
Mining and Milling Machinery and Supplies.

We beg to call your attention to

THE FINLAYSON PATENT
WIRE ROPE TRAMWAY—

the latest and best system of double-rope automatic aerial tramway in the market.
If interested in the most economical system of transporting ores from mine to mill and to shipping stations, send for our special tramway catalogue.



We carry a complete stock of Machinery and Supplies for immediate delivery.

Send for our special catalogues on Mining Machinery, Milling Machinery, Wilfley Concentrators, Tramways, Power Transmission Machinery, Machine Tools, Etc.

THE MINE AND SMELTER SUPPLY CO.,....................Denver, Colorado
THE MINE AND SMELTER SUPPLY CO.,................Salt Lake City, Utah
THE MEXICO MINE AND SMELTER SUPPLY CO.,
No. 16 San Francisco St., City of Mexico.

BOILERS, ENGINES, STEAM HOISTERS, ELECTRIC HOISTERS, ROLLS, CRUSHERS, WILFLEY TABLES, CARS, CAGES, ORE BUCKETS, RAIL, PIPE, FITTINGS, BELTING, ETC., ETC.

ADAMANTINE SHOES AND DIES.
CHROME CAST STEEL.
CANDA Improved Self-Locking CAMS.

TAPPETS, BOSSES, ROLL SHELLS AND CRUSHER PLATES.

These castings are extensively used in all the mining States and Territories of North and South America. Guaranteed to prove better and cheaper than any others. Orders solicited subject to the above conditions. When ordering, send sketch with exact dimensions. Send for Illustrated Circular.

Manufactured by CHROME STEEL WORKS, Brooklyn, N. Y.

H. D. & H. W. MORRIS,
AGENTS,
Room 194 Crocker Building, San Francisco, Cal.

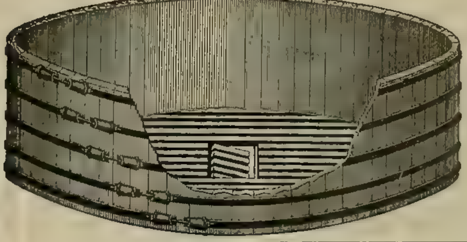
Canda Cam.

MINE BELL SIGNALS. Adopted, Used and in Force in Accordance with Law.

We print in legal size, 12x36 inches, the Mine Bell Signals and Rules provided for in the Voorhies Act passed by the California Legislature. The law is entitled "An Act to Establish a Uniform System of Bell Signals to Be Used in All Mines Operated in the State of California, for the Protection of Miners." We furnish these Signals and Rules, printed on cloth so as to withstand dampness. 50 Cents a Copy.

MINING AND SCIENTIFIC PRESS, 330 Market St., San Francisco, Cal.

FOR CYANIDE PLANTS OR MINING—
TANKS
OF ANY DESCRIPTION.
Write to
PACIFIC TANK CO.,
348 E. 2nd Street, Los Angeles.
35 Beale Street, San Francisco.
Illustrated Catalogue Mailed Free.



THE BUCYRUS COMPANY,
DESIGNERS AND BUILDERS OF
DREDGES, STEAM SHOVELS, EXCAVATING MACHINERY, WRECKING CARS, LOCOMOTIVE CRANES, PILE DRIVERS, CENTRIFUGAL PUMPS, WITH SIMPLE, COMPOUND OR TRIPLE EXPANSION ENGINES,
MACHINERY FOR PLACER MINING.
SOUTH MILWAUKEE, WISCONSIN.

Founded by Mathew Carey, 1785.

HENRY CAREY BAIRD & CO.,
INDUSTRIAL PUBLISHERS, BOOKSELLERS & IMPORTERS,
810 Walnut St., Philadelphia, Pa., U. S. A.

☞ *Our New and Revised Catalogue of Practical and Scientific Books, 92 pages, 8vo; a Catalogue of Books on Steam and the Steam Engine, Machinery, etc.; a Catalogue of Books on Sanitary Science, Gas Fitting, Plumbing, etc., and our other Catalogues and Circulars, the whole covering every branch of Science applied to the Arts, sent free and free of postage to any one in any part of the world who will furnish his address.*

ASSESSMENT NOTICES.

GOULD & CURRY SILVER MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Virginia, Storey County, Nevada.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 6th day of August, 1900, an assessment (No. 91) of fifteen (15) cents per share, was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, room No. 69, Nevada block, No. 309 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 8th day of September, 1900, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 1st day of October, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

ALFRED K. DURBROW, Secretary.

Office—Room No. 69, Nevada block, No. 309 Montgomery street, San Francisco, California.

ALLIANCE EXPLORATION & MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Ophir, Placer County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 3d day of August, 1900, an assessment (No. 3) of five (5) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 236 Sutter street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 11th day of September, 1900, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 2nd day of October, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

S. GOLDSMITH, Secretary.

Office—236 Sutter street, San Francisco, California.

EUREKA CONSOLIDATED DRIFT MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Forest Hill, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 9th day of August, 1900, an assessment (No. 26) of one (1) cent per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 214 Pine street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 8th day of September, 1900, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on SATURDAY, the 29th day of September, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

GEO. W. DIXON, Secretary.

Office—214 Pine street, San Francisco, California.

MARIPOSA COMMERCIAL AND MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Mariposa County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 31st day of August, 1900, an assessment (No. 18) of Ten ($10) Dollars per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 320 Sansome street, room 24, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 10th day of October, 1900, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on THURSDAY, the 8th day of November, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

JOSEPH H. MOOSER, Secretary.

Office—320 Sansome street, room 24, San Francisco, California.

SAVAGE MINING COMPANY. — Location of principal place of business, San Francisco, California; location of works, Virginia, Storey County, Nevada.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 13th day of August, 1900, an assessment (No. 101) of ten cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Rooms 20-22, Nevada block, No. 309 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 18th day of September, 1900, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 8th day of October, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

JOHN W. TWIGGS, Secretary.

Office—Rooms 20-22, Nevada block, No. 309 Montgomery street, San Francisco, California.

AMERICAN OIL AND REFINERY COMPANY.—Location of principal place of business, San Francisco, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 21st day of August, 1900, an assessment of ten (10) cents per share was levied upon all the subscribed capital stock of the said corporation, payable immediately to J. C. Anthony, secretary of said corporation, at its office, at room No. 323 of the Parrott building, Nos. 825 to 855 Market street, in the City and County of San Francisco, State of California.

Any stock upon which this assessment shall remain unpaid on the 26th day of September, 1900, will be delinquent and advertised for sale at public auction; and, unless payment is made before, will be sold on MONDAY, the 29th day of October, 1900, to pay the delinquent assessment, together with costs of advertising and expenses of sale.

By order of the Board of Directors.

J. C. ANTHONY, Secretary.

Office—Room 323 Parrott building, Nos. 825 to 855 Market street, San Francisco, California.

INVENTORS, Take Notice!

L. PETERSON, MODEL MAKER,

544A MISSION STREET, bet. First and Second Sts., SAN FRANCISCO. Experimental machinery and all kinds of models. Tin and brasswork. All communications *strictly confidential.*

DELINQUENT SALE NOTICE.

COLUMBIA ATHLETIC CLUB (INC.)—Location of principal place of business, San Francisco, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 4) levied on the 27th day of June, 1900, and payable Saturday, June 30, 1900, the several amounts set opposite the names of the respective shareholders, as follows:

Name.	No. Cert.	No. Shares.	Amt.
Daniel F. Crowley..............		15	$50 00

And in accordance with law, and an order from the Board of Directors, made on the 27th day of June, 1900, so many shares of each parcel of such stock as may be necessary, will be sold at public auction at the office of the club, 1200 Market street, San Francisco, California, on THURSDAY, the 30th day of August, 1900, at the hour of 12:30 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

JNO. H. EFFINGER, Secretary.

Office—1200 Market street, San Francisco, California.

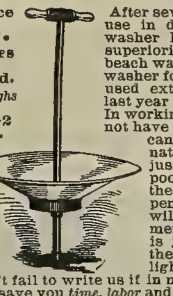
PATENTS

Our U. S. and Foreign Patent Agency presents many and important advantages as a Home Agency over all others, by reason of long establishment, great experience, thorough system, intimate acquaintance with the subjects of inventions in our own community, and our most extensive law and reference library, containing official American reports, with full copies of U. S. Patents since 1872. All worthy inventions patented through DEWEY, STRONG & CO.'s Patent Agency will have the benefit of a description in the *Mining and Scientific Press.* We transact every branch of patent business, and obtain patents in all countries which grant protection to inventors. The large majority of U. S. and foreign patents issued to inventors on the Pacific Coast have been obtained through our agency. We can give the best and *most reliable* advice as to the patentability of new inventions. Our prices are as low as any first-class agencies in the Eastern States, while our advantages for Pacific Coast inventors are far superior. Advice and circulars free.

DEWEY, STRONG & CO.,
PATENT AGENTS,
330 Market Street, San Francisco, Cal.

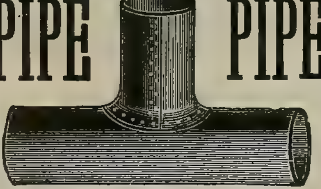
THE LITTLE ALASKA GOLD WASHER.

Price **$6.** Saves the Gold. *Weighs only* 7 1-2 Lbs.



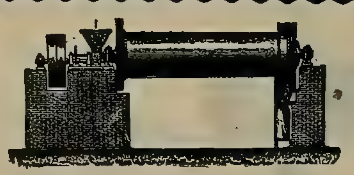
After several years' practical use in different fields, our washer has established its superiority over all placer or beach washers. It is just the washer for Cape Nome; it was used extensively in Alaska last year with every success. In working the operator does not have to wet his hands and can stand in an upright natural position. It is just the washer for the poor man who has not the money to put in expensive machinery. It will do the work of ten men with gold pans. It is just the washer for the prospector, being light and easy to pack. Don't fail to write us if in need of a washer; we can save you *time, labor* and *money.* RUSSELL & KINSEY, 1237 Magnolia Ave., Los Angeles, Cal.

PIPE PIPE



PIPE for Hydraulic Power and Irrigation.
OIL STORAGE TANKS.
GENERAL SHEET IRON WORK.
Lacy Manufacturing Co.,
LOS ANGELES.

THE DAVIDSEN PATENT TUBEMILL.



FOR FINE GRINDING,

Uniformity of Output, Effectiveness, Simplicity, or Economy of Operation and Maintenance, "THE DAVIDSEN" HAS NO EQUAL.

ENORMOUS GRINDING SURFACE. ❧ SLOW SPEED. ❧ ANY DEGREE OF FINENESS.

WRITE FOR CATALOGS.

F·L·SMIDTH & CO
ENGINEERS
66 MAIDEN LANE, NEW YORK
COPENHAGEN, VESTERGADE 29.K. LONDON. 9 BRIDGE ST., S.W.

THE SMIDTH BALLMILL

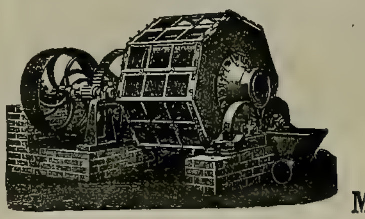
Crushes, Grinds and Sifts in One Operation, Working Continuously.

AMONG ITS SPECIAL FEATURES OF MERIT ARE:

Maximum Output, Slow Speed, Low Horse Power, Absolute Uniformity, Ease of Access, Slight Cost of Repairs.

OUR AUTOMATIC FEEDER INSURES REGULARITY AND EFFECTIVENESS.

THE SMIDTH BALLMILL.

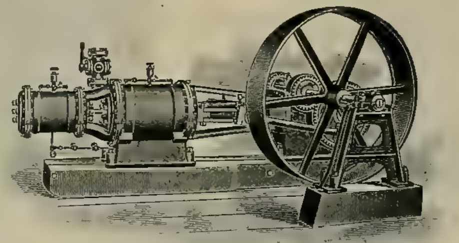


BEST. CHEAPEST. MOST SIMPLE.

WHY NOT have our catalogues, specifications and prices before you purchase

AIR DRILLS OR COMPRESSORS?

Our guarantees are strong; our customers are satisfied. We can satisfy YOU.

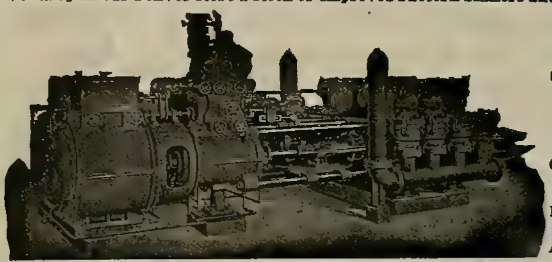


J. Geo. Leyner,
729 Seventeenth St.,
DENVER, COLO.

The Best MINE PUMPS in the World.

COMPOUND CONDENSING AND TRIPLE EXPANSION STATION PUMPS.

We carry in our Denver store a stock of Improved Pattern Sinkers and Duplex Station Pumps, with duplicate parts for repairs.



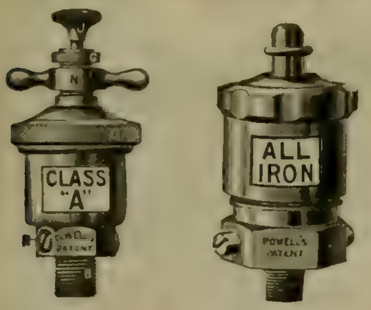
Write for Catalogue and Estimates.

Jeanesville Iron Works Co.,
JEANESVILLE, PA.

Western Office,
Columbia Hotel Building,
1328 17th St.
Denver, Colo.
Telephone 2298 A.
A. MIDDLEBROOK, Manager.

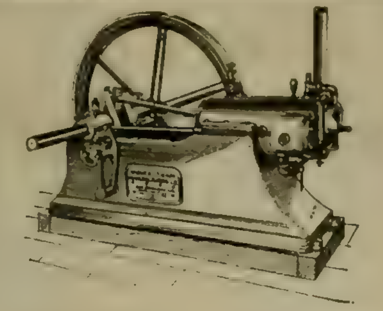
RIVETED SHEET STEEL WATER PIPE
For Placers, Water Powers, Irrigation, Etc.
THE WEIGELE PIPE WORKS
2949-51 Larimer St. DENVER, COLO.

POWELL'S GREASE CUPS.



Large Variety. For Every Requirement.
FEED adjustable the **entire length** of Cup.
CUT-OFF in base regulates the flow.
Any Supply House on the Pacific coast can furnish them.

The Wm. Powell Co., Cincinnati, O.
Manufacturers.



Distillate Engines and Hoists.

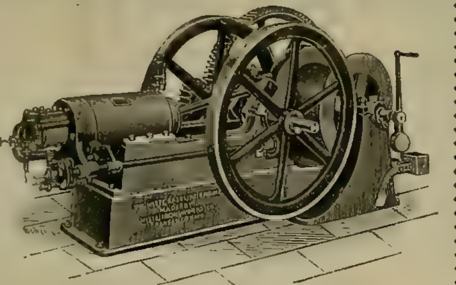
Air Compressors.

HADWEN SWAIN MFG. CO.,
215-217 SPEAR ST., SAN FRANCISCO, CAL.
CATALOGUES MAILED.

WITTE GASOLINE HOISTS

ARE MONEY EARNERS.

Made for use in places far from factory. Are built in parts and in duplicate. Renewals easy and quick to get. Strong, substantial and reliable.



Operate on GAS, GASOLINE or DISTILLATE.

There Are Others, but None as SAFE AND RELIABLE.

Write for Illustrated Catalogue G.

WITTE IRON WORKS CO.,
515 WEST 5th ST.,
KANSAS CITY, MO., U. S. A.

Hendrie & Bolthoff Mfg. & S. Co., Denver, Colo.
C. B. Boothe & Co., Los Angeles, Cal.
Tracy Engineering Co., San Francisco, Cal.

THE MARION STEAM SHOVEL CO.,

Steam Shovels
Dredges and
Traction Dredges

Suitable for all kinds of **Excavating Work,** making a specialty of

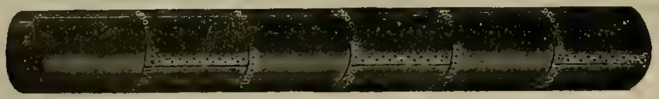
PLACER MINING MACHINES,

separate or self-contained, either as a dry land excavator or **floating dredge.**

The Marion Steam Shovel Co.
MARION, OHIO.

GEO. W. BARNHART, No. 4 Sutter St., San Francisco, Cal.

RIVETED IRON AND STEEL PIPE



FOR HYDRAULIC MINES, IRRIGATION AND POWER PLANTS. Manufactured from the best grades of **IRON** or **STEEL** by **MODERN MACHINERY.**

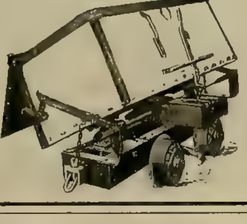
AGENTS FOR THE Celebrated CANTON STEEL.

Schaw, Ingram, Batcher & Co.,
539 Mission St., SAN FRANCISCO.
211 to 219 J St., SACRAMENTO.

OUR CARS HAVE BEEN IN USE FOR NINE YEARS.

TRUAX ORE CARS

CARS ALWAYS IN STOCK TO FILL RUSH ORDERS.



CUT REPRESENTS OUR SIDE DUMP CARS.

SEND FOR PAMPHLET.

CARS MADE FOR ALL KINDS OF WORK.

TRUAX MFG. CO.
69 Stevenson St., S.F.

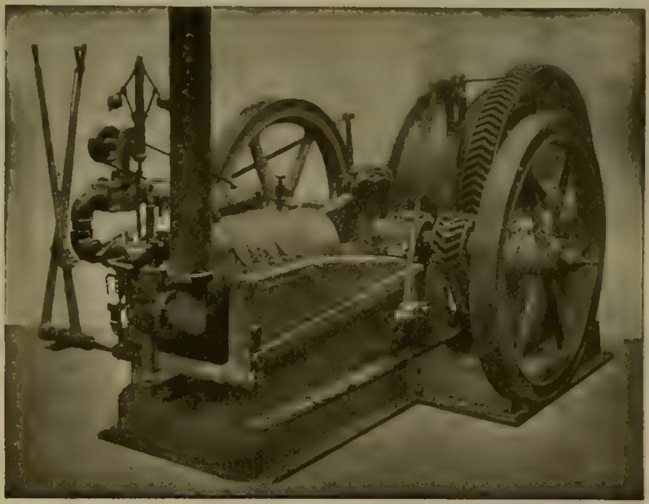
TELEPHONE MAIN 5303

Union Photo-Engraving Co.

DESIGNING
HALF-TONES
ZINC ETCHING

523 MARKET ST.
SAN FRANCISCO. CAL.

HERCULES HOISTS Are Sold the World Over.



Hercules Gasoline Hoist--Speed 385 Ft.; Load 2500 Lbs.

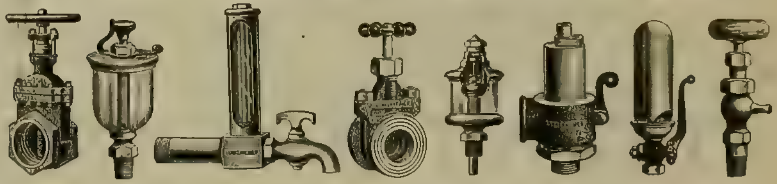
HERCULES GAS ENGINE WORKS,............141-143 FIRST STREET, SAN FRANCISCO, CAL

A MONEY-SAVING "HOIST"

is the Weber Gasoline or Oil Hoist. Made right from right materials, in sizes from 6 to 150 H. P., with Single or Double Drum, for Gasoline, Gas or Distillate. Especially useful in mining, quarry, or ship use—good anywhere. State size wanted and for what purpose.

WEBER GAS & GASOLINE ENGINE CO.,
P. O. Box 1132-I,
Kansas City, Mo.

See our PUMPING PLANTS.



The Lunkenheimer Company

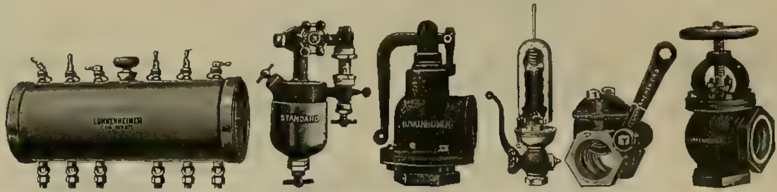
Manufacturers of SUPERIOR BRASS AND IRON SPECIALTIES for Steam, Water, Gas, Air, Oils, etc.

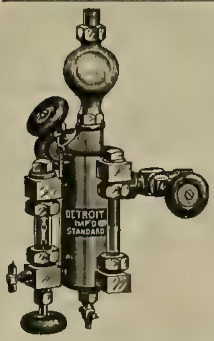
WRITE FOR CATALOGUE.

26 Cortlandt Street, NEW YORK.
35 Great Dover Street, LONDON, S. E.

GENERAL OFFICES AND FACTORIES, Cincinnati, U. S. A.

BRANCHES: NEW YORK, 26 Cortlandt St.; PHILADELPHIA, Bourse Bldg.; LONDON, S. E., 35 Gt. Dover St.; MEXICO CITY, Puente de San Francisco No. 6.





✤✤✤✤ALL ABOUT✤✤✤✤ Sight Feed Lubricators.

Our new catalogue for 1900 is ready for distribution. It explains in detail the principles governing the operation of **Sight Feed Lubricators,** using sectional view to show the internal construction, and containing cuts of the different styles in parts before being assembled into the complete lubricators, thus enabling every one to understand their construction and operation thoroughly.

In addition it shows our full line of **Glass Oilers, Oil Pumps, Oiling Devices, Multiple Oilers, Valves, Etc.** It will be sent to any address on application.

DETROIT LUBRICATOR CO., DETROIT, MICH.

T.P. G.W.P. J.P. E.P.
PENNINGTON
TRADE MARK
SAN FRANCISCO, CAL.

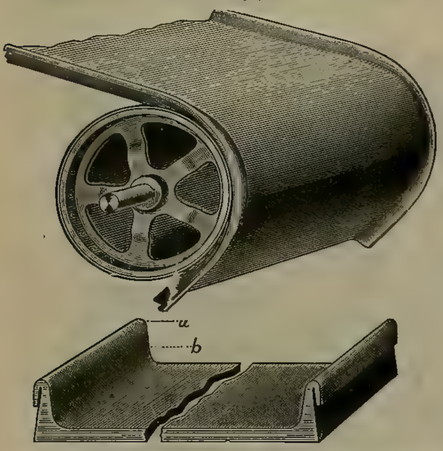
OUR SPECIALTIES ARE:

Hammered Steel Shoes and Dies,
Cam, Crank and Steamboat Shafts,
Rock-Breaker Plates,
Connecting Rods, Well-Boring Tools,
General Blacksmithing.

Correspondence Solicited, and Circulars Mailed Upon Request.

GEO. W. PENNINGTON & SONS,
218 and 220 Folsom St.,............San Francisco, Cal.

THE BROWNELL "PATENT LIP" FLANGE FRUE VANNER BELTS.



It has taken years of ceaseless testing and experimenting to produce the superior belt which we now offer, with elastic flanges and pliable body reinforced with specially woven duck. Every belt is manufactured by experienced workmen, and carefully tested on machines especially built for that purpose; consequently we are to-day manufacturing the best belts that mechanical ingenuity, combined with honesty of construction, can possibly produce.

RAWHIDE GOLD MINING COMPANY,
JAMESTOWN, TUOLUMNE CO., CAL., Feb. 21, 1897.

J. S. BROWNELL, ESQ.—DEAR SIR: Replying to your query of Feb. 15th, will say that I have used your Patent Lip flange belt more than one year, and judging from their appearance after more than one year of hard service, I do not hesitate to say that they are the best belt I have ever used and I take great pleasure in testifying to the fact. Yours truly, W. A. NEVILLS, President.

AMADOR CITY, CAL., Feb. 18, 1897.

MR. J. S. BROWNELL—DEAR SIR: I take pleasure in saying that I have used your Patent Lipped flange belt for several years while connected with this company, and I consider them the best that we have used. The quality of rubber in the flange seems to be the best, and we are not bothered with the flange cracking and thereby destroying the life of the belt. At present we are using 14 concentrators, and have in use several kinds of belts. We consider your Patent Lipped flange the best. Yours very truly, THE CONS. SOUTH SPRING HILL G. M. CO.
By JOHN R. TREGLOAN. Superintendent.

For any information regarding Frue Vanner or Belts, call on or address

JAS. S. BROWNELL, Western Agent FRUE VANNING MACHINE CO.
(Successor to Adams & Carter.) 132 MARKET STREET, ROOM 15, SAN FRANCISCO.

The Copper King, Limited.

Pacific Coast Smelting and Refining Works.

Works:
Seal Bluff Landing,
Cal.

Mines:
Fresno County,
Cal.

Purchasers, Samplers and Smelters

of

Gold, Silver and Copper Ores, and Furnace Products.

Offices:

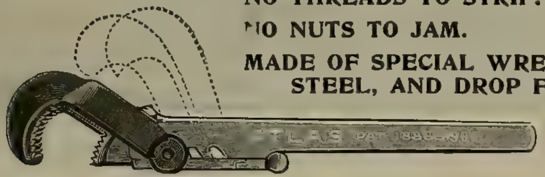
222 Sansome St.,
San Francisco, California.

32 Old Jewry,
London, E. C., England.

ATTENTION! USERS OF PIPE WRENCHES.

THE LATEST, BEST AND CHEAPEST PIPE WRENCH.

NO THREADS TO STRIP.
NO NUTS TO JAM.
MADE OF SPECIAL WRENCH STEEL, AND DROP FORGED.



The good qualities of Chain Pipe Wrench and Screw Pipe Wrench combined, without the faults of either.

Quick, effective and positive in adjustment. Cannot slip, crush or lock on the pipe.

Made in four sizes: 10, 18, 24 and 36 inches. Handling from ⅛ of an inch wire to 4½-inch pipe. Price no higher than other pipe wrenches on the market.

ATLAS PIPE WRENCH CO.,
Flood Building, SAN FRANCISCO.
NEW YORK OFFICE, 121 LIBERTY ST. WORKS, NEW HAVEN, CONN.

MANGANESE STEEL

THE BEST METAL KNOWN FOR

. . . . . .

Stamp Shoes and Dies,
Roll Shells,
Crusher Plates and Side Liners,
Toggles and Toggle Bearings,
Gyratory Cones and Concaves or Liners,
Mine Car Wheels,
Coal Crushing Rolls, Etc.

PARKE & LACY CO., 21 & 23 Fremont St., San Francisco, Cal.

AGENT FOR

KNOWLES PUMPS and PULSOMETER PUMPS,
INGERSOLL-SERGEANT ROCK DRILLS and AIR COMPRESSORS.

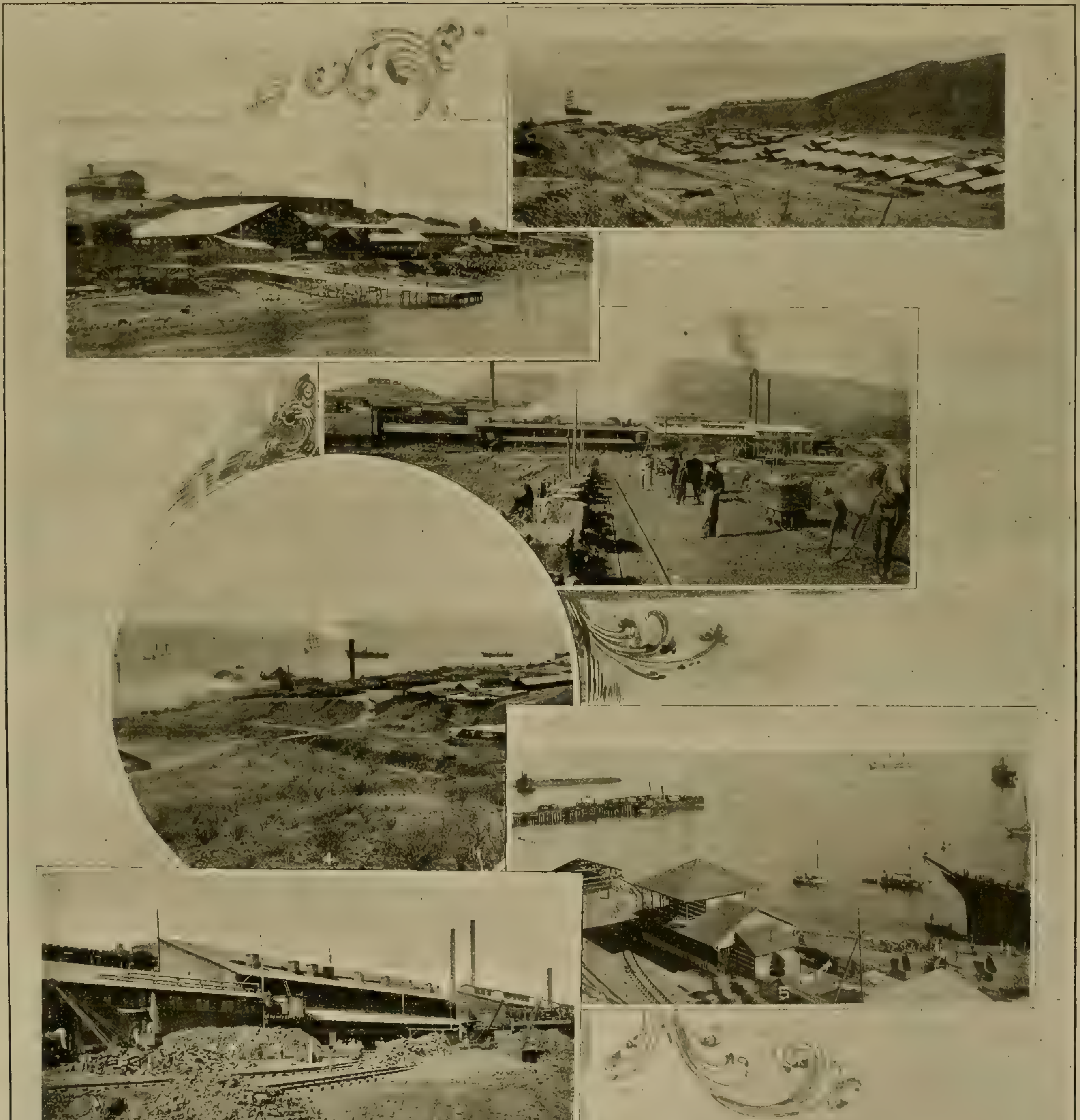
CATALOGUES FREE ON APPLICATION.

This Paper not to be taken from the Library.

CALIFORNIA STATE LIBRARY

MINING AND SCIENTIFIC PRESS.
AND PACIFIC ELECTRICAL REVIEW.

No. 2095.—VOLUME LXXXI. Number 11.
SAN FRANCISCO, SATURDAY, SEPTEMBER 15, 1900.
THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.



VIEWS OF THE WORKS OF THE COMPAGNIE DU BOLEO, SANTA ROSALIA, BAJA CALIFORNIA.

1.—Company's Offices and Warehouses. 2.—Houses of Employes, Santa Rosalia. 3.—Smelter, Electric Power House, and Construction of the Dike. 4.—General View of Plain and Houses of Employes. 5.—Port of Santa Rosalia. 6.—Smelter Deposits of Copper and Matte.

Campagnie du Boleo.

At Santa Rosalia, Lower California, are the headquarters of the Compagnie du Boleo, a large mining and metallurgical concern, that has spent several million dollars, employs thousands of workmen, and produces large quantities of copper matte. It is distinctively a European enterprise, owned and operated by Frenchmen, and nearly all its transactions are carried on with France and England, though, of course, the mining, smelting, and electrical machinery is of American construction. The company was organized in 1885; its operations are carried on in a paternal sort of way, suited to the environments; good wages are paid, the most modern appliances are in use, and the three groups of mines—the Soledad, Providencia and Purgatorio—constitute an unusually large and extensive body of copper ore.

The accompanying illustration graphically portrays the surface conditions. In the smelting works there are twelve furnaces, with a daily capacity of 1000 tons; the railway is 35 kilometers in length, and, alone, employs 100 men. The company has completed a massive breakwater for its extensive fleet.

MINING AND SCIENTIFIC PRESS.

ESTABLISHED 1860.

Published Every Saturday at 330 Market St., San Francisco, Cal.

ANNUAL SUBSCRIPTION:
United States, Mexico and Canada..........$3 00
All Other Countries in the Postal Union..........4 00

Entered at the S. F. Postoffice as second-class mail matter.

J. F. HALLORAN..........Publisher.

Special Representatives:
EASTERN.
E. H. HAVEN..........150 Nassau St., New York City.
MIDDLE WEST.
CHAS. D. SPALDING..........153 La Salle St., Chicago, Ill.
INTER-MOUNTAIN.
W. A. SCOTT..........43 Jacobson Building, Denver, Colo.
SOUTHERN CALIFORNIA.
W. D. CURTIS..........223 W. Second St., Los Angeles, Cal.

San Francisco, September 15, 1900.

TABLE OF CONTENTS.

ILLUSTRATIONS.—Views of the Works of the Compagnie du Boleo, Santa Rosalia, Baja California, 309. Latest Mining and Metallurgical Patents, 315.

EDITORIAL.—Compagnie du Boleo, 309. A Great Danger; Magnetic Separation; Miscellaneous, 310.

MINING SUMMARY.—317-318-319.

LATEST MARKET REPORTS.—319.

MISCELLANEOUS.—Concentrates, 311. California Crude Petroleum as a Fuel; The Estimation of Copper in Ores by the Modified Cyanide Process, 312. Branch Carrying Pipes; California Oil Wells; Location of Mining Claims; Mills and Mill Sites, 313. Boiler Explosions - Cause and Remedy; Assay of Copper Materials for Gold and Silver, 314. Options; Mining and Metallurgical Patents, 315. Mine Bell Signals; Modern Boiler Making; Lithographic Stone; Two Kinds of Brittleness; Cable for Bering Sea, 316. Personal; List of U. S. Patents for Pacific Coast Inventors; Notices of Recent Patents; Books Received; Catalogues Received; Commercial Paragraphs; Recently Declared Mining Dividends, 319.

It is evident that when active mining is renewed on the Rand, South Africa, that the old system of hand drilling by natives will give way to machine drilling, as a measure of economy, doing away with all the list of losses occasioned by the costly and annoying system formerly in vogue.

The progress in metallurgy is one of the greatest achievements of applied science. In Utah silver has been produced at a cost of 23½ cents per ounce; in Montana copper is produced at a cost of 6 cents per pound; in California ore averaging 84 cents per ton in gold has been worked at a profit of 6 cents per ton.

Mention has previously been made herein regarding the hampering effect on mining development of the recent unwise order of the Interior Department concerning the cutting of timber on mining claims. The order bears particularly hard upon that worthy class of claim owners who evince honest effort to develop their claims. In its general wisdom and application it resembles the time-hallowed command not to go near the water till one has learned to swim. The order ties the hands of many miners and is considered simply as one of the usual official mistakes.

This paper is always pleased to publish declaration of mining dividends—receive the name of the company, locality, amount of dividend, and when payable—without charge, and has so done through the years, but can not undertake to announce that any company "will pay" a dividend at any future date. The statement as alleged might be borne out by the fact, but it is deemed better to chronicle the dividend announcement after declaration, and not till then. In this, as in many other things, the character of a paper is largely determined by the statements that do not appear in its columns.

In January, 1898, California celebrated in San Francisco the fiftieth anniversary of the discovery of gold in the State, and during the past week has as enthusiastically celebrated the fiftieth anniversary of the admission of the State into the Union. In the great street paintings and decorations during the week mining scenes and appliances had first rank, and in the procession and display the mining men of the State had equal prominence. About 100,000 "native sons" came to San Francisco to celebrate the event, and about 400,000 more looked on. Men who thought the great celebration of 1898 would not soon be outdone said that the parade that then cost $1000 a minute during its passing was only a fading memory compared with the gorgeous and overshadowing present.

A Grave Danger.

A recent decision of a State Supreme Court in an important mining case overrules the lower court and gives justice by a majority vote of four to three; that is, four of the supreme judges think one way and three think the other way, somewhat after the fashion of a public vote. The three dissenting judges set out at learned length their opinions, arguing diametrically opposite to the other four equally learned judges, and as it happens that four think one way—one more than thinks the other way—the scales of justice incline that way. Probably an easier and less expensive method of securing justice in a court of last resort would be to have a well balanced scales, and pile the briefs, appeals, rejoinders, surrejoinders, arguments and other legal accompaniments for plaintiff and defendant in either side thereof, and award the decision to the party having the weightiest pile.

A verdict of four to three, which would not be allowed in a jury box in a justice's court, is beneath the dignity of a high appellate court and seriously tends to undermine its influence. No State is alone in this degrading practice; nearly every State in the Union has similar experiences, and even the Supreme Court of the United States—the highest tribunal on earth and the most respected—in some instances is itself guilty of what might appear to be trifling with the grave requirements of the nation, as in the case of the decision on the income tax, where the court was divided, one justice changing his mind over night, reversing his opinion of the day before, and thus giving a bare majority to the decision.

We speak of the Supreme Court of the United States as being "the highest tribunal on earth." But there is a still higher one—public opinion—and before that great tribunal all things human are judged and by its standards all things human rise and fall; continue or are overthrown; subsist or are smashed. There never should be a dissenting opinion in the Supreme Court of the State or nation. The decision handed down should be the decision of the court, and not of any judge; any other course is indirectly a blow at its own dignity, at public respect and regard for it, and constitutes a menace to our institutions. People have none too high an opinion of courts now that the courts themselves can trifle with their great positions in reducing regard for what they say to a point even below its present condition. The dissenting opinion of a judge can have but one motive, and that is to give him his little chance of airing his individual views and opinions. No one cares what Brown, J., or Smith, J., thinks about the case in point; the question is, what is the decision of the court, so that men may know what that decision is and govern themselves accordingly. When the curtain is raised and the public is shown the little individual discord and unharmony, it does not tend to enhance public respect for the source of justice which is supposed to flow pure and undefiled.

As it is to the interest of the public that there should be an end to litigation, so also is it to the public interest that when a question is settled by the highest tribunal it should remain settled for all time. The result of the one or two or three dissenting opinions in a Supreme Court decision is simply to open up for future discussion, litigation and bickering, the very question that is supposed to be finally settled by the decision of the tribunal. It must be settled somewhere. In that Supreme Court is the place for settlement; that tribunal was selected as the final arbiter, and for one or two or three of those constituting such final arbiter to publish an opinion favoring the very cause that is decided against by the court of which they are constituted members, is, to say the least, poor policy. When the public reads those dissenting opinions the public naturally gets the idea that justice has not been done by the court; that there is no justice about it; that it simply happens to be four to three, and that if one of the four had happened to have a bad night, or a poor dinner, he might have joined the ranks of the dissenters and then the verdict would have been the other way. This is too slight and tender a pivot upon which to hang the scales of justice, and tends to weaken the court in public esteem, for the common, ordinary lay reader cannot help having the idea, however mistaken, that the court has lent itself to injustice and inflicted a wrong. Some of the dissenting opinions are models of what they should not be in an explanatory and argumentative way. All that is required is a concise, well-written summing-up of the points decided and the reasons therefor, the whole being the opinion of the court unanimously.

There are currents in the streams of time and of national life, which though sometimes broken and temporarily checked, yet turn and double in their course with increasing power and injurious effect. Such currents are flowing noiselessly yet powerfully throughout this nation to-day and threaten to smother in foul depths the fair growth of our institutions. These currents cannot be wholly checked nor smothered, but they need not be augmented. A growing disregard for and disbelief in judicial decisions is among the fountains that feed those currents, and the continuous practice and manifest folly of dissenting judicial opinions and constant weakening regard or belief in the justice of judicial decisions constitutes a grave danger.

Magnetic Separation.

The Wetherill process of magnetic separation is receiving present attention, having a scientific basis of calculation in its theory and practice that entitles it to consideration. O. Bilharz of Berlin goes into its discussion in detail, in connection with the general subject of wet concentration, arguing regarding substances possessing about the same approximate specific gravity, if one of the minerals to be separated is magnetic, that would constitute adequate means of such concentration. In the Wetherill process it is aimed to utilize the smallest amount of magnetism inherent in any ore. In Germany the process is chiefly applied to the separation of spathic iron ore and zinc-blende without any preparatory treatment of the material. The Friedrichssegen Co. estimates a saving of working expenses over former methods of about 35%. At Franklin, N. J., the New Jersey Zinc Co. use the Wetherill process on a large scale, separating Franklinite from red zinc ore and Willemite, treating 400 tons crude ore daily. To mines producing quantities of spathic blende the Wetherill process appears economically applicable. It is maintained that by the use of the Wetherill separator an argentiferous zinc-blende containing 40% zinc can be satisfactorily produced.

The United States Supreme Court, in the case of Black vs. Elkhorn M. Co. (163 U. S., 445), has decided that "the interest in a mining claim, prior to the payment of any money for the granting of a patent to the land, is nothing more than a right to the exclusive possession of the land based upon conditions subsequent, a failure to fulfill which forfeits the locators' interest in the claim. To sum up as to the character of the right which is granted by the United States to a locator, we find: (1) That no written instrument is necessary to create it. Locating upon the land and continuing yearly to do the work provided for by the statute gives to and continues in the locator the right of possession as stated in the statute. (2) This right, conditional in its character, may be forfeited by the failure of the locator to do the necessary amount of work; or if, being one among several locators, he neglects to pay his share for the work which has been done by his co-owners, his right and interest in the claim may be forfeited to such co-owners under the provisions of the statute. (3) His interest in the claim may also be forfeited by his abandonment, with an intention to renounce his right of possession. It cannot be doubted that an actual abandonment of possession by a locator of a mining claim, such as would work an abandonment of any other easement, would terminate all the right of possession which the locator then had."

The leading mining schools and colleges throughout the country report large accession to the number enrolled. The drift of young men toward mining engineering is illustrated in the increase in the number taking the mining course in the University of California, at Berkeley, Cal., which from 5 in 1892 has grown to 190 in 1900.

Concentrates.

COIN SILVER contains 7% copper.

A 10-FOOT head of water would give a pressure of about 4⅓ pounds per square inch.

THE census of 1900 gives Idaho about 160,000 population.

A CISTERN 9½ feet inside diameter and 12 feet deep will hold 200 barrels.

SIXTEEN gravity oil could be sold f. o. b. Los Angeles, Cal., at $1.25 per barrel.

THERE is no California State tax on the issue of certificates of corporation stock.

THE temperature of steam at 125 pounds per square inch gauge pressure is about 352° F.

BETWEEN 60° and 70° F. is by some millmen considered the best temperature for battery water.

A "MACHINE" may be defined as a mechanical device that will transmit and modify motion and force.

LEAD and aluminum do not alloy. Equal parts by weight of silver and aluminum give an alloy as hard as bronze.

TO RUN 2500 miner's inches of water, a sluice box set on a 5% grade should be 5 feet wide, 32 inches deep and 14 feet long.

THERE is an unavoidable loss of gold in all placer mining. Where it is extremely fine, such loss has run as high as 40%.

IN making steam, weight for weight, it is the result of experiment that wood has two-fifths the evaporative power of coal.

A LOSES: $1000 in silver quarters, halves and dimes weighs 803¾ ounces; $1000 in standard silver dollars weighs 859⅜ ounces.

THE American-built Russian cruiser Variag is the fastest vessel afloat of any considerable size. She has a record run of 27.25 miles per hour.

A MINING LOCATION can not be considered other than a prospect until it is proved susceptible of yielding a profit by being worked. Then it may be styled a mine.

THE price of borts for diamond drills has greatly appreciated. Formerly $12, $14 and $16 per carat were the ruling rates. They are now quoted in some cases as high as $50.

WITH the $20 payable on the 28th inst.—the 116th dividend declared by the Calumet & Hecla Co.—the total dividend disbursements of that company will aggregate $70,850,000.

SILICON COPPER is an 85% copper alloy with metallic silicon 15%, and is usually added to molten copper before casting to preclude any blowholes or flaws in the ingots or wire bars.

SUBJECTED to the action of liquid air, lead becomes elastic and can be made to rebound or serve as a spiral spring during the continuance of such extraordinarily low temperature.

THE American Nickel Works, Camden, N. J., reduces cobalt ores. The chief market for it is as cobalt oxide for coloring. The prepared article, 98%, is worth about $8 per kilogram.

WITH an 8-inch drop a stamp will take .22 second to drop. With a cam lift, 7 inches, ninety drops per minute, the time of the lift is .297 second; of the lift and drop together .667 second.

IN Colorado a mining claim must be recorded within ninety days of the date of discovery with the county clerk and recorder of the county in which the claim is located. The matter of record is subject to local laws.

THE economy of a gas engine is exemplified in the fact that the gas consumed in one sixteen-candle power gas jet, if consumed in a gas engine, is capable of producing three sixteen-candle power incandescent electric lights.

AIR at sea level at a temperature of 80° F., half filled with moisture, has 11 grams of water vapor to each kilogram of air. If the temperature be lowered 15° through a change in the pressure, the air will become saturated with water vapor.

A MILLSITE can be legally located on non-mineral land. If, before patent issues, mineral is discovered on a located millsite, a valid mining location could be made thereon, if solely for that purpose, peaceably and in good faith. See page 313, "Mills and Mill Sites."

THERE are two kinds of men: those who go ahead and do the things they are expected to do, or are paid to do, and those who always have the best of excuses for their continued failures. And the man who is good at making excuses is rarely good for anything else.

TO keep machinery from rusting dissolve one ounce camphor in one pound melted lard; remove the scum; mix in as much fine black lead as will give it "an iron color"; clean the machinery, smear with the mixture; after twenty-four hours rub off and polish with soft cloth.

THE dry sheet on a tubular boiler is that part of the first sheet in a boiler that is not covered by water on one side, and is supposed to be protected from the fire on the other side by the brickwork in the furnace, but which is sometimes moved on account of the arch having partially fallen down.

PUNCHED-SLOT STEEL SCREENS are recommended by some millmen for battery service in amalgamating fine gold. Experiment best determines the most economical requirements, "economy" meaning that which gives the most profitable results.

IN the production of phosphorus by means of the electrical furnace a mixture of phosphate of lime and coke is first reduced to powder and then heated. When the mass becomes pasty all the openings of the furnace are sealed except one through which the vapor passes. This vapor is collected and distilled.

ANY good mining machinery firm will gladly furnish a fine catalogue or trade treatise on any specified requirement upon request, and, if the writer means business, will also furnish detailed information as to individual needs, with estimates. Where the contemplated plant is of magnitude a personal visit is more satisfactory.

STEAM at five pounds gauge pressure has a temperature of 228° F.; at sixty pounds gauge pressure, 307°; the difference is 79. As the specific heat of steam is .475, the temperature will be raised as many degrees as .475 is contained in 79, or 165; the temperature of the steam after it passes the reducing valve is thus $228+165=393°$.

ONE of California's "dead rivers" is the "Big Blue Lead," the course of which has been traced about 65 miles, paralleling the main divide of the Sierra Nevadas and about 30 miles west. It trends at right angles to the course of the present streams. It is capped with lava at various depths, and has yielded about $100,000,000.

A GOOD formula for making blue prints of maps is as follows: Take iron and ammonium citrate saturated, 1 ounce; water, 4 ounces. Mix this solution separately; then mix another solution composed of potassium ferrocyanide and water, 4 ounces. When desired for use, mix equal quantities and float the paper therein for two minutes.

ALUMINUM may be silvered or gilded as follows: The article is first covered with a coating of the following liquid: One quart water, 2 ounces glycerine, 1 ounce cyanide of zinc, 1 ounce iodide of zinc. After being in contact for an hour, the article is heated red hot (752° F.). It is then cooled, washed in water with a hard brush, and then put into a silver or gold galvanic bath.

PATENTS have been granted on hardening copper, and the claim has been made that the hardened copper can be tempered. The last patent so granted was No. 587,861, to J. Reuter, Aug. 10, 1897, which, in brief, is to enclose the piece of copper to be hardened in a covering of clay, saturate with vinegar, subject the clay containing the copper to a high degree of heat and finally submerge the whole in water.

AS A SUBSTITUTE for hydrochloric acid in the Etard process of gold recovery, Dr. Black of Otago, N. Z., says that sulphuric acid, together with common salt in combination with permanganate of potash, will extract gold as well as the Etard process, and more quickly. In working gold ores, he claims to have extracted 92% of the gold contents in fifteen hours by percolation and in five hours by agitation, using the solution specified.

THERE is no claim to absolute correctness nor any assumption of infallibility in any statement made at any time on this page. The brief condensations that weekly appear are mainly in answer to numerous questions, and are designed to give in as concentrated form as possible suitable answer to those who evidently want information on questions they send that arise in their daily working life. There are doubtless mistakes and misstatements, but probably the percentage of such incorrectness is as small as in any other effort of the kind. There is no pride of authorship, and "Concentrates" at all times takes it as a favor and a kindness to have indicated where in any item there is a manifest lapse from accuracy or correct statement. The main point is to get things right, and everybody is wiser than anybody.

WITH belts to transmit a given power there must be so many cubic inches of belt pass any given point in a given time. To do this one must either run a large belt slowly or a small belt quickly. The product of area and velocity must be constant. The bending force varies as the breadth and as the square of the thickness and as the amount of bend, a 2-inch belt offers simply twice the resistance of a 1-inch belt; a belt ¼ inch thick offers four times the resistance of one only ⅛ inch thick. Hence a 1-inch belt of a quarter thickness has double the resistance of a belt 2 inches by one-eighth. Yet they are equal in area. In respect of shafts their resistance varies as their speed and diameter, and their power varies as their speed and as the cube of their diameters. Thus, a 2-inch shaft is eight times as powerful as a 1-inch shaft.

THE essential difference between a marble and a compact common limestone is that the first has undergone, through the combined action of heat and pressure, just the right degree of change, or metamorphism, to develop in it crystallization and color. The essential difference between a brick or fire clay, and a cleavable slate used for roofing, is that the first named still retains its plastic condition as it was laid down in the form of fine silt on a sea bottom, while the slate has, by geological agencies, and by actual movements of the earth's crust, become so squeezed and compressed as to have lost all resemblance to its former self, and to become the cleavable article of commerce we now find it. Since these processes of change are dependent very largely upon the actual movements, warpings and foldings, as may be said, of the earth's crust, and the heat and chemical action which is thereby generated, and since these movements only take place with extreme slowness, whole geologic ages being occupied in their conception and completion, it follows, as a matter of course, that metamorphic rocks, like granites, marbles and slates, are found only among the older rocks, and only in those portions of the country where this crust has been wrapped, compressed and folded, as in the process of mountain making. In other words, these rocks are to be expected in their best development only in places bordering along more or less extensive mountain ranges.

A "SIPHON" whose diameter is probably as large as any in the world is located near Boise City, Idaho, and carries the water of Sheep creek across the Boise river. This 48-inch siphon is inverted; is 1700 feet long, maximum depression 350 feet; cost $36,700 and took four months and twenty days to build. Owing to the topography of the country, everything used in its construction had first to be raised 700 feet and then lowered 450 feet. The lightest piece of material handled weighed 3100 pounds. The whole force of water was turned on into the siphon suddenly and at once, not gradually, as is the usual custom. The pipe line of the Spring Valley Hydraulic M. Co. at Cherokee, Cal., has an approximate inner diameter of 30 inches, discharging 52 cubic feet of water a second. At its greatest depression the Cherokee siphon sustains a depression of 887 feet—530 feet greater than at Boise City, where the greatest pressure sustained in its lower portion is 167 pounds to the square inch. In the Boise City line there never has been any tendency to move or any leak, in spite of the pressure. To admit of contraction and expansion without any derangement in position, the engineer invented expansion joints placed between each two elbows, the average movement during the course of construction of the pipe line in all of these expansion joints was ⅞ of an inch between the extremes of temperature of night and day. The pipe being laid on the side of the hill, part of it at an angle of 45°, this movement in the pipe line, if these expansion joints had not been used, would either have deranged the position of the pipe or strained its riveting.

WIRE ROPES are as flexible as new hemp ropes of equal strength and more efficient as standing ropes, being uninfluenced by weather and more durable in hoisting. It is always advisable to use the largest practicable drums, sheaves or pulleys, and to avoid high velocities, as ropes so used will last much longer. A strain of one-seventh of the breaking strain may be taken as a safe working load, though for standing ropes this may be exceeded. The durability of steel wire rope is estimated to be 30% greater than that of ropes made of iron wire. To preserve wire rope from wear or exposure cover it thickly with linseed oil, or with paint formed of equal parts linseed oil and Spanish brown or lampblack. If used under water or under ground a good preservative is made by adding to one barrel of Swedish or Stockholm tar one bushel of fresh slacked lime; boil well, and while hot saturate the rope. Sawdust or oat meal is sometimes added with good effect. Wire rope must not be coiled or uncoiled like hemp rope. It should be unwound as from a reel, to prevent kinking. It is always advisable to line the grooves of the cast-iron pulleys in which the rope runs with wood (set on end), leather or rubber. In the use of wire rope for transmitting power this is imperative, because of the great velocity with which the ropes run. Avoid, if possible, overlapping of wire rope on drums. For shafts and elevators the load lifted should not be more than one-tenth of the strength of the rope. For wire rope to be exposed to intense heat wire core may be substituted for the ordinary hemp center. The grooves on drums and sheaves should be a trifle larger than the rope, perfectly smooth and uniform to the surface of the rope. Wire ropes should run around all sheaves without chafing the sides of the grooves.

WHAT is sometimes called "verdigris," a green or green-gray film forming on copper plates, often showing various colors, is due to the oxidation of copper in the amalgam; or it may be due partly to the effect of sulphates in the ore, in which case it would be partly a basic sulphate of copper. On good electro-silver plated copper plates it is rarely seen. It tends to cause a loss of gold in amalgamation. When it appears the stamps should be hung up and the copper plates cleaned. This may be done with ammonia, a solution of caustic soda or potash, or a dilute solution of cyanide of potassium. After removal, a little more quicksilver should be rubbed in. If it then appears it should be removed as before, all the amalgam scraped off and a good coating of silver amalgam rubbed in. If pure silver can be obtained, this silver amalgam can be easily made by using about three parts of silver to one of quicksilver. It requires about one-fourth ounce of amalgam to each square foot of surface to be amalgamated. If pure silver cannot be obtained, a good way to make it is to use silver dollars. Dissolve them in a porcelain evaporating dish, or any chinaware dish if such be not at hand, in dilute nitric acid, and evaporate it to dryness over hot water, or a water bath. Heat the dry mass gently till it fuses, and all the bluish tinge in it is changed to a grayish black. When this point is reached the copper alloy in the silver coin will be changed to an insoluble oxide. Then dissolve all that will dissolve in a very little water, and filter into a glass jar. To this add the quicksilver required, and drop in a few bright nails or other iron. The silver will be deposited as metallic silver and form amalgam with the quicksilver, and in two or three days it will be complete and ready to use without other care. It is a good idea to always use silver amalgam on the plates, rather than pure quicksilver, as it keeps the surface cleaner and, some mill men say, causes a better saving of the gold.

California Crude Petroleum as a Fuel.

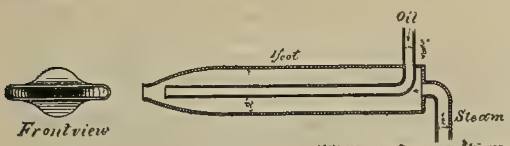
By ERNEST H DENICKE, College of Mining, University of California.

When crude oil was first used as a fuel the flame was shot directly against the flues, which in a short time seriously injured them, and it was thought that oil could not be successfully used. It was also looked upon as a dangerous substance, and these things, together with the usual aversion to adopting entirely new methods, made the adoption of oil as a fuel slow. The pioneers in the use of crude oil as fuel on this coast probably are the California Powder Works; oil has been burned with commercial success at their works, near Pinole, for over thirteen years. At first Peruvian oil was used, but now California oil is used and preferred for several reasons.

The oils of California can be roughly divided into three classes: the thick, heavy oil of the Los Angeles district; the lighter oil of Ventura, and the very light, liquid oil of Coalinga, southwest of Fresno. The first two are carbon oils (because of their high carbon content) with an asphaltum base, unlike the Eastern oil, which has a paraffine base. The California oils have some paraffine, but very little. The Coalinga oil is peculiar, in many respects resembling the Peruvian oil. It is remarkably light and liquid—nearly as liquid as refined coal oil—very volatile, evaporating nearly 10% per day, and does not seem to be a mixture of several hydrocarbons, as most coal oils are. It is a hydrogen oil.

The gravity of the Los Angeles oil is from 12° to 19° Baume, and sometimes as low as 10°; the Ventura oil is 21° to 24°; Coalinga oil about 35°, and the Peruvian oil about 30° Baume. The volatility of the Coalinga oil as compared to the Ventura oil is as 11 to 6. Oils that evaporate to a marked extent are in a measure dangerous, for the vapors are explosive; therefore, it is best to store crude oil in gas and oil-tight tanks of steel.

There is difference of opinion as to which is the best method of burning the oil, and no one method can be called the best, because of the great variety of conditions and boilers. Many patents have been taken out on oil-burner designs, and some of these will work well in one furnace but fail in another. So, in selecting a burner, it is best to experiment, for one will meet existing conditions better than another. Mr. Palmer, the manager of the Union Oil Refinery, who is an authority on fuel oil, claims that the simple pipe burner will give the best "all-around" results. This burner is of simple construction and can be made of a few pieces of ordinary pipe by any good machinist. (See Fig. 1.)

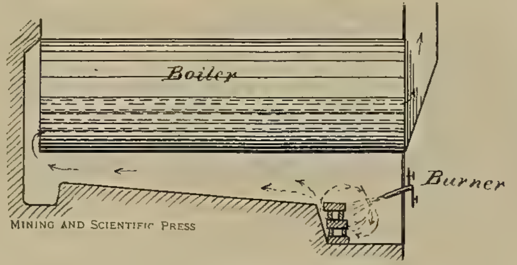


MINING AND SCIENTIFIC PRESS

FIG. 1.

The end of the outer pipe is drawn out and flattened, so as to make a fan-shaped slit, a little larger than the cross-section of a 25-cent piece. Mr. Palmer also claims that the highest efficiency will be gotten out of the Los Angeles and Ventura oils when they are forced into the burner under a head of 20–5 feet and when about 5% of the generated steam is used to blow the oil. These figures will vary, of course, with the kind and quality of the oil. When 5% steam is used with the above oils, a good "white" flame is obtained, and a less amount of steam will give a red, smoky flame, in which little particles of oil can be seen burning. Different oils vary greatly in their heating effect, dependent upon their chemical composition. In rough figures, 130 gallons of Eastern oil — 1 ton of coal; 600 gallons = 11 cords of wood, (maple, which is about the same as California mountain oak). At the California Powder Works it was found that 1 pound of Ventura oil = 1.7 pounds good coal. The calorific intensity of a carbon oil is higher than that of a hydrogen oil. Temperatures obtainable by burning in air with close adjustment are about 2000° carbon and 1750° hydrogen. An excess of air must be used in practice.

At the California Powder Works oil is used as fuel for making steam and in the manufacture of chemicals for dynamite making. The oil is pumped through an underground pipe from the Union Oil Company's Refinery, above Rodeo, and is stored in tanks made of old glycerine tanks. These tanks have one end cut out and are loosely closed by a wooden top, covered with burlap. From here the oil is discharged to the various furnaces at a head of about 22 feet. About 5% of steam is used to blow. Saving is effected in both price of fuel and in the amount of labor needed. When the furnaces are once lit they need practically no attention, except an occasional glance to see that the proper flame is obtained. The boilers are ordinary tubular boilers, four in number. The flame is shot under the boilers into what might be called a brick box against a target, consisting of a grating of firebrick. The accompanying sketch will explain. (See Fig. 2.)



MINING AND SCIENTIFIC PRESS

FIG. 2.

Mr. Palmer recommends this type of construction, but says that the grating of firebrick is not necessary. He says that the burner should point down, as in the accompanying sketch, and should strike against the back of the box as a target. The effect of the deep box is to form a vortex, as indicated by the arrows, and gives plenty of time for complete combustion. Complete combustion is an important factor and deserves more attention than is given to it. To make a test of this, it is necessary to use a pyrometer at various places in the boiler and furnace and to analyze the escaping gases. When this is done many defects of the furnace can be remedied, the loss can be located and a great saving of fuel effected.

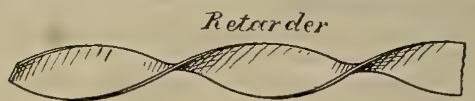
The only objection to the above method of furnace construction is that it necessitates the removal of the grate bars and a partial bricking-up of the firebox. Should the supply of oil be accidentally stopped, the boilers would have to be shut down so as to allow the rebuilding of the firebox to suit coal burning. Where the grating and layer of firebrick are laid directly upon grate bars, it takes half an hour at the utmost to change back to coal burning. Of course, the latter method is not as economical as the first, but, on the whole, it is preferable, and the slight increase in cost may be set down as insurance on the oil supply.

The Western Sugar Refinery of San Francisco probably uses more crude oil than any other establishment on the Pacific coast, for there 700 barrels of Coalinga oil are burned per day, and the consumption will be largely increased within the next few months. The boiler plant consists of thirty-two modified Gallaway boilers; twenty-two of these are 6 feet 6 inches in diameter by 21 feet long, and have 27½ square feet of grate surface. Each boiler has 113 3-inch tubes, giving 688 square feet of heating surface. The ten other boilers are 6 feet 6 inches in diameter by 26 feet long, have the same grate surface and ninety-six 3½-inch tubes, giving a heating surface of 1098 square feet. The plant is rated at 2540 H. P., but 4340 H. P. are obtained. There are also three Green economizers, which heat the feed water—two with 432 pipes and one with 360 pipes.

While coal was being burned, forced draught was supplied by a 4x6-foot Sturtevant blower, driven by two 11½x16 engines. One of these engines was used as an auxiliary. The oil is received in tank cars direct from Coalinga, the cars containing from 6000 to 6500 gallons. The Southern Pacific cars are all uniform, containing 6525 gallons, and the Union Tank Line cars vary as above. Contract price for the oil is $1.30 per barrel, delivered, (42 gallons per barrel, weighing 301.33 pounds).

Seven cars are coupled on to pipes along the track and the oil flows by gravity to a small centrifugal pump, driven by an electrical motor, which pumps the oil into closed steel storage tanks of 10,000 barrels each. These storage tanks are surrounded by a concrete dam wall, the space enclosed containing a little more than the contents of one tank. From these main storage tanks the oil flows by gravity to a small underground tank near the fire-room. Here the oil is pumped into two 3-inch stand pipes by two pumps. The stand pipes overflow at 52 feet, the oil running back to the tank; but the pumps are regulated to 48 feet by Mason regulating valves, which regulate to 6 inches. Larger stand pipes are not allowed by the insurance companies. The boilers are arranged in two rows, facing each other, and the oil pipe, from stand pipe, runs along the front of them. Each stand pipe supplies a separate row, but could supply both rows in case of accident. At a distance of every three boilers these two feed pipes are connected with a cross-arm pipe, so that in case an accident happens to one of the boilers three of them can be instantly cut out without stopping the plant for a moment. This alone is a great advantage over a coal fire, for it takes some time to "pull" a big fire. The stand pipes, pumps and feed pipes are all set up in duplicate, so that an accident can not stop the plant. A network of firebrick set on edge is laid directly upon the grate bars, and against this the oil flame is shot. If anything should happen to the oil supply, this network can be removed and a coal fire started within twenty-five minutes, by actual practical trial. When oil was first used it was blown with 2% or 3% of generated steam, but this gave an imperfect flame and set up a vibration. Now 8% is used and a bunsen flame is obtained with little vibration.

As can be seen by some of the following tables, the fire-room cost of handling the oil is less than a third of that of coal. Besides, there are no ashes, no smoke, absolutely no dirt, and less heat is lost by radiation. The furnace doors are never opened, so no cold air is allowed to strike the boiler, which makes a difference in boiler repair. The flues need practically no cleaning, and the absence of soot gives a better heating power. When coal was used as fuel, twenty-six firemen were employed; now, twelve are needed. Oil fuel allows the use of a peculiar little device which makes a saving in fuel. It is known as a "retarder," and consists simply of a strip of twisted sheet iron, which is placed in the boiler flue. (See Fig. 3.) This not only retards the draught and allows the flame more time, but also revolves and "stirs," if the term may be used, the heated gases. Gases are very poor conductors of heat, and, if they are allowed to go straight through the flues, only a little more than the outer part of the currents is cooled; but the retarders twist the gas currents, bringing more of the heated gas into contact with the flues. They can not be used in a coal fire on account of the soot.



MINING AND SCIENTIFIC PRESS.

FIG. 3.

(TO BE CONTINUED.)

The Estimation of Copper in Ores by the Modified Cyanide Process.

Written for the MINING AND SCIENTIFIC PRESS.

The general activity in copper mining of late years has revived interest in the methods for determining the amount of copper in copper ores. After several years' experience in actual practice, and in the class room as a teacher, I am convinced that the method hereinafter described is the simplest and most accurate method known for determining the amount of copper in an ore. The majority of persons called upon to determine copper are not expert chemists, and it is with reference to this class of workers that I make the above statement.

There are several well-known methods for quantitative copper analysis, the most generally accepted method being the electrolytic method.

ELECTROLYTIC METHOD.—This is generally credited with being a more reliable method than it really is. For years it has been considered the standard method, and it may still be so considered when manipulated by acknowledged reliable chemists. The following list of restrictions and limitations will make the latter statement more convincing:

1. A uniform voltage must be maintained throughout the determination.
2. Do not use too high a voltage—it will deposit spongy copper. Zinc will also be deposited if present above 3%.
3. Do not stop before all the copper is deposited.
4. Do not continue after all the copper is deposited.
5. Do not have the solution too strong with nitric acid—it will keep some copper in solution indefinitely.
6. Do not use too much sulphuric acid—it will deposit spongy copper.
7. Remove bismuth if present, otherwise it will deposit with the copper.
8. Lead is deposited with copper if present.
9. Arsenic must be removed or it will be deposited with the copper.

It is evident that one must know all the mineral constituents of his ore, and also the approximate amount of copper in it, in order to be certain of his result. This is requiring too much of the average chemist or assayer.

THE IODIDE METHOD.—This is an excellent method and very accurate, but it is cumbersome in the hands of some assayers and unskilled chemists.

THE ORDINARY CYANIDE METHOD.—In this method iron, which is usually present in copper ores, is precipitated by ammonia hydrate and filtered out. The precipitate of iron hydrate always contains considerable copper, making the result low. Besides, if an excess of ammonia hydrate be used, it will make the result too high. Arsenic, zinc, antimony, etc., must be removed. Too much nitric or hydrochloric acid lower the result. If the iron precipitate be redissolved and reprecipitated it will produce an excessive amount of ammonium nitrate (or chloride) which, in turn, will react on the cyanide, giving too high a result.

THE MODIFIED POTASSIUM CYANIDE METHOD.—This is sometimes called the "aluminum strip" method.

I have added several precautions and details of my own which I trust will be of service.

This method is dependent upon the following chemical reaction, in which the copper unites with the potassium cyanide, forming the double salt of copper-potassium-cyanide:

$$CuSO_4 + 4KCN = CuK_2(CN)_4 + K_2SO_4$$

The atom of copper in the molecule of copper sulphate reacts with four molecules of potassium cyanide. The one atom of copper weighs 63 microcriths and the four molecules of cyanide of potassium weigh 260.4 microcriths. K = 39.1; C = 12; N = 14. $(39.1 + 12 + 14) \times 4 = 260.4$. As 63 m.c. of Cu requires 260.4 m.c. of KCN, 1 gram of Cu would require 4.1 grams of KCN. 63 m.c. : 264.4 m.c. : : 1 gm. : x gms.

It is evident, therefore, that if a solution of KCN be made to contain 4.1 grains of KCN to each 100 c.c. of solution and 1 gram of ore be taken for analysis, each c.c. of KCN solution required in the titration will represent 1% of copper in the ore.

As chemically pure KCN cannot be obtained, it is necessary for us to use chemically pure copper with which to standardize the KCN solution.

The details of the various operations are as follows:

To Make the Standard Copper Solution.—

1. Wash a little over 1 gram of chemically pure copper in hot, moderately concentrated nitric acid. Wash several times in distilled water and dry slowly, so as not to form a coating of copper oxide on the pieces.

2. Weigh out exactly 1 gram and dissolve in 25 c.c. of C.P. nitric acid. Use a tall beaker and keep it covered with a watch glass to prevent the spray falling outside (a frequent source of loss). Heat may be used.

3. Wash the solution into a litre flask and dilute at once to exactly 1 litre (= 1000 c.c.), using cold (63° Fahr.) distilled water. Mix well.

4. This standard copper solution can be kept indefinitely in a bottle for future use. Do not add any more water to it in any case, as it is your standard.

The Potassium Cyanide Solution.—

1. Dissolve about 42 grams of the best commercial KCN in 1 litre of distilled cold water (63° Fahr.).

2. Decant or filter out any "pus" or sediment, standardize and bottle for future use. Keep it in a dark place.

Though the solution gradually loses strength, owing to the decomposition of the KCN, it will not materially change in one month if distilled water has been used.

Standardizing the KCN Solution.—

1. Take two 100 c.c. burettes. Wash one out with the standard copper solution and the other with the KCN solution. Discard the washings.

2. Fill the Cu burette with standard copper solution and run off to the zero mark. (A graduated cylinder can be used in place of the burette for the copper if desired.)

3. Place at least 15 c.c. of the KCN solution in the KCN burette.

4. Run the 100 c.c. of copper solution into a beaker and add just enough ammonium hydrate to produce a deep blue color—no more—say 5 c.c.

5. Add about 7 c.c. or 8 c.c. of the KCN solution at once, then continue by adding only a drop at a time, carefully stirring the copper solution to insure a thorough admixture, until the blue color disappears and a pink color appears. A white background will assist in determining the end of reaction.

6. Make several confirmatory tests.

7. Multiply the result by 10 to ascertain how much KCN solution would be required for the entire gram of copper. The result will usually be from 95 to 105. This number we will call the "cyanide standard number." For greater accuracy 200 c.c. or 400 c.c. of standard copper solution can be used in standardizing the KCN.

The Ore Sample.—

1. Pulverize a dry sample of copper ore to about 60 or 80 mesh and weigh exactly 1 gram.

2. Place it in a deep evaporating dish on a sand bath and add 10 c.c. to 15 c.c. of strong HNO_3. Cover with a watch glass, but place a glass rod under the glass to permit evaporation.

3. Evaporate nearly or quite to dryness and add 5 c.c. of HC1.

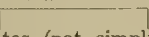
4. Evaporate nearly to dryness.

5. Add 10 c.c. strong H_2SO_4.

6. Evaporate till very copious; choking fumes are given off, indicating that the H_2SO_4 has expelled all the HNO_3 and HC1. Enough H_2SO_4 should be added to produce strong fumes without evaporating to dryness.

7. Cool and add about 50 c.c. or 60 c.c. of water.

8. Filter into a tall beaker and place on a wire gauze over a bunsen flame.

9. Add a strip of metallic aluminum, 2″x1″x⅛″ in size and bent thus: 

10. Boil five minutes (not simply "boiling hot"). This will precipitate all the copper in the metallic state.

11. Add about 25 c.c. of cold water.

12. Decant through a filter, retaining as much of the precipitated copper in the beaker as possible. Wash the copper three times by adding distilled water and decanting through the same filter paper. Throw away the filtrate and washings.

13. Carefully place the aluminum strip on the filter paper and put the beaker containing the copper under the filter. With an ink dropper or a pipette drop strong HNO_3 on all sides of the aluminum strip to dissolve off all adhering copper. Also dissolve all copper off the filter paper, then add just sufficient HNO_3 to dissolve all copper in the beaker below, but do not add an excessive amount.

14. Wash filter paper and aluminum strip with distilled water and dilute the solution to 75 c.c. or 100 c.c., according to the richness of the ore.

15. Cool thoroughly.

16. Add just enough NH_4OH to give a deep blue color—no more.

17. Place the beaker on a sheet of white paper, under the KCN burette, and add KCN till the color just begins to fade.

[If there is a heavy precipitate of aluminum hydrate, quickly filter and wash filter, and then continue titrating to end of reaction. It is better to remove the precipitate after adding nearly a sufficiency of KCN rather than to remove it before beginning to titrate.]

18. Finish the titration to the same shade of pink obtained in standardizing the KCN solution.

19. Multiply the number of c.c. used by 100 and divide by the "cyanide standard number." The quotient will be the per cent of copper in the ore.

Examples.—Suppose, in making up our standard KCN solution and testing the same, 100 c.c. of our standard copper solution required 9.4 c.c. of KCN, then $9.4 \times 10 = 94$, our "cyanide standard number."

Suppose 1 gram of ore be treated and that 31 c.c. of KCN is required in the titration. We then make use of the following proportion:

$$94 \text{ c.c.} : 100\% :: 31 \text{ c.c.} : X\%$$

$$\frac{100 \times 31}{94} = 32.9\%$$

Another Example.—Suppose our "standard cyanide number" is 102, and that a sample of copper ore required 15.3 c.c., 2 grams of ore being taken for a sample (presumably a low-grade ore):

$$102 \text{ c.c.} : 100\% :: 15.3 \text{ c.c.} : X\%$$

$$\frac{15.3 \times 100}{102 \times 2} = 7.1\%$$

Remarks.—In reference to paragraph 6 above, it should be borne in mind that sulphur trioxide fumes must be evolved very copiously to insure the absence of all HNO_3 and HC1, which, if present, will prevent the precipitation of the copper by the aluminum strip. If you evaporate to dryness to get the fumes, some of the copper may assume an insoluble form. If, in filtering under paragraph 8 above, the filter paper is destroyed, it is evidence you did not dilute the retaining H_2SO_4 sufficiently.

San Francisco. O. H. Packer, M. E., C. E.

Branch Carrying Pipes.

The carrying capacity of a pipe is not in proportion to its internal area. A pipe 4 feet in diameter has only four times the area of a pipe 2 feet in diameter, and yet the 4-foot pipe will carry 5.66 times as much fluid as the 2-foot pipe, under the same conditions of length and head. In other words, a 2-foot pipe will carry 17.6%, or nearly 18% as much as will a 4-foot pipe. This proportion of carrying capacity does not hold good for smaller pipes of the same proportionate diameter. A 1-foot pipe has only 16.6% of the carrying capacity of a pipe 2 feet in diameter, and a 1-inch pipe will carry only 14% as much as a 2-inch pipe. A 6-inch pipe can have 15% of its capacity carried by a 3-inch pipe, 23% by a 3½-inch pipe, 34% by a 4-inch pipe, and a 24-inch pipe will carry thirty-eight times as much as the 6-inch pipe.

In taking branches from a main, it is advisable that the sum of the percentages of the carrying capacities of the branches should be 100% or more. Referring again to a 6-inch main, if it be divided into two branches—one 4 inches and the other 5 inches—the carrying capacities of the branches would be respectively 34% and 63% of the 6-inch pipe. Thus provision is made for only 97%, and there would be slight additional friction from the point of diversion of the branches. If the branches be made 4½ and 5 inches, the percentages are respectively 47 and 63, their sum 110, and from the junction the flow would be considerably more free than in the first case.

California Oil Wells.

There were on Sept. 1st 1439 rigs and wells drilling reported in all fields. The greatest increase in new work is noticeable in the central district. The Los Angeles field comes second in number of wells begun. The northern district, including San Mateo, Monterey, Colusa, San Benito, Humboldt and Contra Costa counties, shows a gain in new work. In the central district, which includes Fresno, Kern and Kings counties, on Aug. 1st ninety wells were reported drilling and rigs up. This number was increased during the month to a total of 176, of which 91 are in the Kern river field alone and 29 in the Sunset field. In the coast district, which covers San Luis Obispo, Santa Barbara and Ventura counties, forty-one wells were reported under way Aug. 1st; on the 1st inst. this district showed ninety-two rigs and wells drilling. The southern district, including Los Angeles, Orange, Riverside and San Diego counties, showed 120 rigs and wells drilling Aug. 1st. This number was increased during the month by 32, making a total of 152 under way.

Location of Mining Claims.

Under the Act of Congress (Rev. St., Sec. 2319-2324), a lode claim can not exceed 1500 feet in length by 600 feet in width, and should be in the form of a parallelogram having its side lines equidistant from the center of the lode, with end lines parallel to each other.

A lode is a zone, belt or body of quartz or other rock lodged in the earth's crust, and presenting two essential and inherent characteristics, viz: (1.) It must be held in place within or by the adjoining rock; and (2) it must be impregnated with some of the minerals or valuable deposits mentioned in the statute, and which will authorize the location of a lode claim.

In locating a mining claim all that the statute requires is that the location shall be distinctly marked on the ground so that its boundaries can be readily traced. Whether any markings have been made, and and whether they are such that the boundaries of the location can be readily traced, are questions of fact.

The statute does not require any record of the location, but when one is made it prescribes what it shall contain, viz: that the name of the locator, the date of the location, and such description of the claim by proper references as will identify the claim, the principal object of the record is the identification of the claim; and, if, considering everything it contains, the name of locator, date and description by reference to same natural object or permanent monument, the claim can be identified, the record is sufficient.

No notice of location is required by the statute, but when the same is posted on the ground it must be considered as a marking to aid in tracing the boundaries. When such notice contains a description of the claim and is recorded, it operates as constructive notice that the locator claims the ground described. The description as shown by the record will ordinarily bind the locator as to the locus of the claim; but where the distances and courses set out in the description vary from the monuments or markings made on the ground, the latter prevail and will determine the locus of the claim.

The effect of a valid location is to segregate from the public lands the grounds located, and the prior location gives the prior and better right. A valid location vests in the locator the exclusive right of possession and enjoyment of the ground located, together with all the lodes therein.

The maxim that one may recover on the strength of his own title does not apply in the case of a naked trespasser or intruder, although the party in possession may have a defective location; in such case the latter's possession alone is sufficient to maintain ejectment.

Mills and Mill Sites.

To the Editor:—Will you please answer the following and oblige a subscriber:

A owns a mill on a certain creek but does not own the ground on which the mill stands. B locates a millsite, taking in A's mill, and gives him written notice to remove the mill within thirty days, which A fails to do. B now claims the mill. Is he right?

Cherry Creek, Nev., Sept. 4. Prospector.

The question can not be answered from the standpoint of adjudicated cases except tentatively. The land being non-mineral it might have been appropriated by A, either in connection with a located lode, or under the last clause of Section 2337 of the Revised Statutes, relating to the construction of a quartz mill or reduction works regardless of lode ownership. In the latter case it would seem that the construction of a mill upon the land would segregate it from the public domain, and prevent its relocation by others for millsite purposes. Certainly A is not a trespasser when he goes upon the land and constructs the mill if the land is public and non-mineral; he has rights which the Government would recognize. It is quite likely that the relocator would also have to recognize these rights. The case is quite different from the location of a millsite on mineral lands which are subsequently located by a prospector as a mining claim, in which instance the mill would probably fall to the mining locator.

Questions of this character are extremely close and should be solved by a good lawyer, who should be put into the possession of all the facts. As a matter of first impression we would say that A being the first comer, the land being non-mineral, the erection of the mill secures to A the right to the occupancy of the land as against B, seeking to claim the land for the same purposes. Under such circumstances B could not take A's mill or compel him to remove it,

Boiler Explosions — Cause and Remedy.

The only explosive material about a steam boiler is water. Water, when superheated, will explode upon a sudden removal of pressure with a force equal to that of dynamite.

The boiling point of water varies with pressure. In a vacuum water boils at 70° F. sensible heat. Under atmospheric pressure it boils at 212° F., and cannot be made hotter unless confined under additional pressure, because the escaping steam carries off the heat as fast as fire can impart it. In a steam boiler under 10 pounds pressure it boils at 241°; 50 pounds, 300°; 100 pounds, 340°; 200 pounds, 389°.

Water when heated to the boiling point requires 966° additional heat to change it from the state of water to the state of steam. This change is substantially instantaneous at all pressures. As each molecule of water absorbs the last of the 966° it instantly explodes into steam. As the last degree is absorbed, cohesion is overcome and repulsion becomes the predominant power. The change of steam to water is also instantaneous. Steam remains in its new state only so long as it retains the 966° of latent heat, and the moment it is at full volume, with only 212° of sensible heat, parts with one of these degrees of latent heat it returns to water.

The explosion of water is similar to that of gunpowder in some respects, but different in others. Each grain of gunpowder passing from the solid to the gaseous state explodes when it has absorbed a certain degree of heat; so with water. Each molecule of water, at the instant it has absorbed 966° of heat above the boiling point, explodes and passes from water into steam. The expansive quality of the two is different, powder increasing in bulk 800 times, while water increases 1720 times. The mode of exploding and the general result, large and sudden increase of bulk, are similar. In other respects they differ widely. The explosion of powder is by chemical action; the explosion of water is a physical change only. Water differs widely from powder and all other explosives in another remarkable particular. Only a portion of the water may explode—one molecule, the half, or the whole mass. These various amounts in exploding produce results ranging from violent explosions to mild ruptures and the safe operation of the boiler.

When a grain of powder starts to go from the solid to the gaseous state no power can stop it. It may be confined, but combustion, once begun, goes on to completion. So with a molecule of water. It may be put under such a pressure that it will not fully expand, but, once begun, it changes its state from water to steam.

The true source of the development of the great destructive power in a steam boiler is the sudden concentration of the sensible heat in the water above 212° (or above 70° in case of a vacuum caused by the condensation of steam) into a part of the molecules of water, passing into them the 966° necessary to change them from the state of water to the state of steam. That the stored heat in a boiler concentrates to form steam is shown by familiar experiments: As, for instance, causing water at less than 212° to boil by placing it in a vacuum; or by merely condensing the steam over heated water in a bottle. Again, take a steam boiler under a pressure of 100 pounds and a corresponding temperature of 340°. Remove the fire, and the formation of steam will cease. After a short time raise the safety valve, and the water will begin to boil, and generate and give off steam continuously as the pressure is reduced, until a temperature of 212° is reached, and enough steam will be thus generated and blown off to fill the boiler many times.

These tests show that the boiling point of water is lowered by simply diminishing the pressure; that sensible heat above 70° stored in the water concentrates in a part of the molecules of water, giving to them the 966° necessary to change them into steam. The water ceases to boil, no heat is applied, and by merely reducing the pressure the water again boils. The 966° above the boiling point necessary to cause ebullition are not absorbed from the fire at the instant the water begins to boil the second time. They are already stored up in the water.

Take a boiler containing 10,000 pounds of water at a pressure of 200 pounds and corresponding temperature of 389°. Suddenly reduce the pressure to 50 pounds per square inch, under which pressure water explodes at 300°. There are stored in each of the 10,000 pounds of water 89° of sensible heat above the exploding point—in the aggregate 890,000 thermal units, enough to convert 921 pounds of this superheated water into steam. In an instant these 89° of sensible heat in each pound of water are absorbed by the molecules of water at the surface and for a considerable depth, and suddenly these 921 pounds of superheated water explode into steam.

Thus it will be seen that there is sufficient destructive power stored in the boiler when thus put in action to cause an explosion. If the reduction of pressure caused by the withdrawal of steam be moderate, and such draft be continuous and uniform, there will be no danger; but if the draught is considerable in quantity and instantly checked, the nascent steam thus suddenly formed and thus suddenly checked will give an impact or striking blow upon the shell of the boiler, the aggregate force of which is equal to the weight of the water before it passed into nascent steam multiplied by the square of the velocity with which it strikes.

The instantaneous check to the exploding water acts upon the boiler with the same effect as that produced by quickly closing the valve of a water-main. In the one case it is the weight of the falling water, and in the other it is the force of exploding water, but the striking effect of the blows is the same and is measured by the same rule.

Take a boiler 48 inches in diameter, 19 feet long, and place in it 10,000 pounds of water. Then raise the temperature to 400°, and the corresponding pressure will be about 235 pounds. About $\frac{1}{200}$ part of the water, or 50 pounds, passes into steam, occupying the balance of the space of the boiler, about 86 cubic feet. The temperature is 188° above 212°. The amount of sensible heat, above 212°, stored in the remaining 9950 pounds of water is 1,870,600 thermal units, equivalent in mechanical energy to 1,444,103,200 foot-pounds. Suddenly reduce the pressure from 235 pounds to normal. At 235 pounds it required 400° to evaporate water, at normal pressure only 212°—a difference of 188°. There are stored in the boiler 1,870,600 units of sensible heat above 212°, enough to convert about 1936 pounds of the remaining water into steam, which would occupy, under 235 pounds pressure, about 3000 cubic feet of space. Rating the velocity of the nascent steam at one-half the velocity of full steam discharged into the air (1967÷2), would give a striking force of over 23,000 pounds per square inch upon the shell of the boiler.

Starting with a pressure of 25 pounds, and a corresponding temperature of only 269°, only 57° above 212°, the amount of sensible heat stored above 212° would be 567,150 thermal units. Reduce the pressure to 0, corresponding to 70°, and the 9950 pounds of water would contain 1,980,050 thermal units, sufficient to convert 2049 pounds of water into steam. Rating the weight of the water and the velocity of the nascent steam as in the last case, this would give a striking blow of over 24,000 pounds per square inch.

Take a boiler half full of water, under a pressure of 200 pounds and at 389°, and suddenly inject into the steam space a quantity of cold water. Condensation is instantaneous. Instantly the superheated water at 389° is in a vacuum where it will explode at 70°. Under these circumstances a large portion of the water will explode into steam, and, whether one-quarter, one-half, or the whole, the striking force will be sufficient to tear into shreds any boiler ever made.

If the withdrawal of steam is slight, even if followed by a sudden check, no damage ensues with boilers of the usual tensile strength; but if the withdrawal be considerable and the check instantaneous, an explosion follows. With the varying degrees of draught and sudden check come violent explosion, and mere rupture.

The distinction between rupturing and exploding is sometimes overlooked. When a boiler gives way at a weak point, resulting in damage, it is often called an explosion. When ruptured by mere pressure, the force exerted upon the shell being gradual and uniform, the weak point yields while the balance remains intact. Serious damage may result, but a uniform and unobstructed flow of steam never produces the phenomenon properly called an "explosion."

With an explosion the actual destructive force exerted is not measured by the tensile strength of the boiler nor by the regular pressure of the steam. The force is far in excess of either—five, ten, and often twenty times as great; an immense aggregate concussive and destructive force, that tears asunder the weak and the strong parts at the same instant and demolishes everything within a large radius.

Some writers on steam boiler explosions, in accounting for their violence, make the mistake of commencing the calculation at a point of time after the rupture has commenced. The fact is there is violent internal action at the instant preceding the actual rupture of the boiler, and the rupture is the result of such action. Rupture may be caused by the mere pressure of steam, but it is usually caused by an internal concussive force. It is illogical to say that boilers are ruptured or burst by mere pressure while working with a pressure of only one-fifth their actual tensile strength.

The writer's solution of a steam boiler explosion is this: The water in the boiler, under pressure, is superheated and possesses a highly expansive power. Upon a sudden removal of the pressure, without a corresponding reduction of the temperature, it starts into violent evaporation. This mass of nascent steam is checked by coming in contact with the solid and unyielding shell of the boiler. The result is that the aggregate force of this nascent steam strikes every square inch of the shell of the boiler at the same instant and with the same force, and with a power far in excess of the tensile strength of the boiler; and, moreover, this force is augmented at the instant the shell gives way by an immense reserve power caused by the further evaporation of the water in the boiler.

The writer's remedy is a simple one and consists in the construction of a boiler with a partition plate or diaphragm dividing it into two compartments, the lower containing the water and the upper containing the steam only. The steam passes from the lower to the upper compartment through numerous small perforations and a number of small valves in the diaphragm. The aggregate openings of the valves and perforations should be less than the valve through which the engine is supplied. By this means the pressure upon the surface of the superheated water is kept approximately uniform, and all sudden explosions of any dangerous quantity of water into steam and consequent striking blows are avoided.

The perforations and valves vary with boilers of different size. The aggregate area of all the perforations and valve orifices should be about 10% less than the area of the steam-port. In ordinary sized boilers there should be one perforation of $\frac{1}{4}$-inch in diameter to each horse power, rating 10 square feet of heating surface to the horse power, and such number of valve orifices of about 2 inches in diameter as to make up the balance of the aggregate area.

This lessening of the aggregate area 10% below that of the steam-port will give a very slight diminution of pressure in the engine with steam working at full stroke, but will give practically full pressure at every other point of cut-off. There must be two steam gauges used, one connected with the water space below and one with the steam space above the diaphragm. When the boiler is set and ready for use such small valves should be closed. As the steam is generated and the engine put in operation at its full capacity, any additional steam required is obtained by gradually and partially opening such valves until the required amount is liberated and ascertained, when such valves are set, and need but little further attention. In thus arranging such valves, particular attention should be paid to the steam gauges. The valves should be opened only to that extent at which the pressure upon the superheated water in the lower compartment, as shown by the gauges, remains approximately uniform with that in the upper, with the engine in full operation. Thus arranged, any unusual and sudden withdrawal of steam from the upper chamber is attended with no possible danger.

Boilers thus constructed and arranged are protected against explosions, whether the water wholly or partially fills the water compartment. If wholly filled, a sudden reaction of pressure in the steam compartment can instantly effect only the surface of the water to the extent of the aggregate area of the perforations and valve orifices, and no dangerous quantity of water can be thus exploded. As the pressure upon the water below the diaphragm is thus slightly reduced, small portions of water pass into steam and maintain uniformity of pressure.

Assay of Copper Materials for Gold and Silver.

At the Washington, February, 1900, meeting of the American Institute of Mining Engineers, L. D. Godshall read a paper on "The Assay of Copper Materials for Gold and Silver," which appeared in the issue of this paper of March 24th. In the issues of April 14th and May 12th also appeared technical reference to the same subject. In a discussion of Dr. Godshall's paper, A. R. Ledoux says:

The so-called "combination method" is generally used in assaying bar copper for silver. It has been modified from time to time. Briefly outlined as now practiced, it is as follows: One A. T. of the borings is dissolved in dilute nitric acid. When solution is complete, the liquid is boiled and then filtered to remove gold. The filtrate is treated with sufficient salt solution to precipitate all the silver, but avoiding any unnecessary excess. The liquid is allowed to stand over night and next morning the silver chloride is collected on a fresh filter, which, together with the paper containing the gold and insoluble matter, is scorified and cupelled. Formerly many assayers added sulphuric acid to the nitric acid solution of the copper and silver and then acetate of lead, thus producing a heavy precipitate of sulphate of lead, which was supposed to entangle the silver chloride and prevent it from passing through the filter. As a matter of fact, the use of sulphuric acid and lead salts is entirely unnecessary. Very few assayers now make use of them. If it is not possible to let the silver chloride settle over night, accurate results may be obtained by stirring the liquid vigorously with some form of mechanical stirrer for half an hour. The silver chloride may then be easily filtered without fear of any of it escaping through the filter. The same result may be attained by blowing air through the liquid. It is quite possible to make an accurate assay by this method in three hours. In some cases, noticeably those in which the copper is very free from impurities and the gold contents small, the correct gold assay may be obtained by parting the bead obtained by this process. In many cases, however, the gold assay obtained by the above process is too low, even though the gold be removed from the liquid by filtration before adding the salt solution. It would appear that sometimes the gold is present in the copper in some combination which is soluble in nitric acid or strong nitrate of copper solution. However, it may be, and frequently is, necessary to resort to the "all-fire method" to obtain correct results. This method consists in weighing out a number of 1 to 10 A. T. portions—usually ten—and scorifying them with lead until most of the copper is removed, then cupelling the lead buttons either separately or uniting them five and five, rescorifying and then cupelling. This method is expensive and laborious, involving many scorifications and the use of much test lead. The first scorification must be conducted at a high temperature, and the operations consume a great deal of time and muffle room. But the gold obtained is usually appreciably more than can be extracted by the combination method, though it does not seem to bear any fixed ratio to it even in the same class of copper. In general, in 96% to 98% copper, containing from one to five ounces of gold per ton, the "all-fire" results will be from 0.1 to 0.3 ounce higher than can be obtained by the combination method. Any method that would give correct gold and silver results on all classes of bar copper at one operation, and that would avoid the tedious and expensive operations of the all-fire process, would find ready acceptance among assayers. The method described by Dr. Godshall seemed to offer some possibilities in this direction. To test the practical accuracy of this method, comparative assays were made in my laboratory on three samples of bar copper, using the "combination method" for silver and the "all fire" process for gold, alongside of Dr. Godshall's method. Some preliminary experiments were made by the new method to obtain a knowledge of any peculiarities that might be developed. The process of assay was as follows: One A. T. of borings dissolved in dilute nitric acid (90 c. c. strong to 100 c. c. of water). The solution was then evaporated to expel free nitric acid, a little sulphuric acid (20 c. c.) was added, and the evaporation continued. Finally the copper salts were dissolved in hot water, the solution diluted to 800 c. c. and allowed to cool. Then sulphuretted hydrogen was passed rapidly into the liquid for two minutes. A heavy black precipitate of sulphides was produced, which settled rapidly, leaving a clear blue solution. The liquid containing the precipitate was stirred rapidly and then allowed to settle for about half an hour, and finally the sulphides were filtered off. The filtrates in most cases gave no visible reaction for silver; sometimes, however, silver was not completely precipitated by the sulphuretted hydrogen. No reason was developed why this should be the case, as those solutions which contained silver had apparently been treated exactly like those which did not. The assays noted below did not show any reaction for silver when the filtrate was tested with salt solution. The copper sulphide containing the silver and gold was dried, the papers burned in scorifiers, and the residue scorified with fifty grammes of test lead. The results were as follows:

SILVER—OUNCES PER TON.

	Godshall Method.	Combination Method.
No. 1	67.70	67.20
No. 2	57.20	58.80
No. 3	59.00	59.30

GOLD—OUNCES PER TON.

	Godshall Method.	All Fire Method.
No. 1	2.28	2.42
No. 2	1.89	2.10
No. 3	2.06	2.18

From the foregoing results one would infer that the new method can give good results on silver. But the gold assays are too low, being about the figures which would be obtained by parting the silver beads obtained by the "combination method." The new method does not seem to possess any advantage over the "combination method" in point of speed. When the silver chloride is stirred well or "blown down" with air, it can be filtered off as quickly as the sulphide precipitate. On the other hand, the new method requires the use of sulphuretted hydrogen, which is a noxious and troublesome reagent to handle on a large number of samples at the same time.

Cabell Whitehead, Washington, D. C. (communication to the secretary): Dr. Godshall has placed the metallurgical public under great obligations by reviving the subject of the determination of gold and silver in copper-bearing materials. Several years ago Dr. Ledoux brought this subject before the Institute in a valuable paper, but I have always felt that the subject was not as fully discussed at that time as might have been done with profit. It was clearly shown by the results then reported that the "combined" method yielded lower gold results than the fire assay. This was supposed to be due to a solution of some of the gold, occasioned by the impurities of the nitric acid used; and Dr. Godshall seems to have accepted that view. Since then, I have determined by experiment that when the acid is chemically pure, a partial solution of the gold takes place, probably by reason of the formation of nitrous acid during the process of solution, and that the reaction, though manifested in smaller degree, is closely allied to that which occurs when platinum, in the form of an alloy, is dissolved in nitric acid. This being admitted, it is clear that the "combined" method cannot be relied upon for gold. We were therefore greatly in need of a method such as the one proposed by Dr. Godshall. I have experimented with it, and find that, under certain conditions, excellent results are obtained. The conditions for satisfactory working are given in his paper; but I do not think the danger points are clearly marked. I found that, when the solution was cold, and practically free from nitric acid, the precious metals were perfectly thrown down with a very small amount of H_2S. In such cases, the amount of copper to be removed by scorification and cupellation was small, and gave no trouble; but when the copper solution contained much free nitric acid, or was hot, large amounts of H_2S were required to complete the precipitation; that it had to be followed by a rapid filtration; and that, even then, the solution frequently contained traces of silver. The removal of the nitric acid by evaporation with sulphuric acid is a matter of considerable difficulty, as I believe all who have tried it will admit. This and the careful attention required in making the H_2S precipitations are the chief objections to the method. I have modified it with good results as follows:

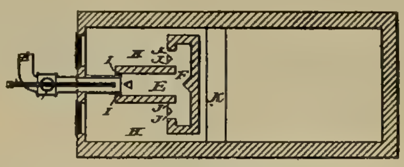
I dissolve in HNO_3; dilute and make faintly alkaline with ammonia; then make acid with acetic acid. I then add a solution of hyposulphite, sufficient to precipitate about 100 milligrammes of copper. After thoroughly mixing the solutions with a stirring rod, the beaker is boiled for five minutes, or until the Cu_2S collects. This precipitate is cupelled in the usual way. With this modification of the proposed method, I believe there remains only one objection, viz., the necessary scorification of a product high in copper. I have been working with some success to overcome this difficulty, and I hope to publish the result of my efforts hereafter.

Mining and Metallurgical Patents.

Patents Issued September 4, 1900.

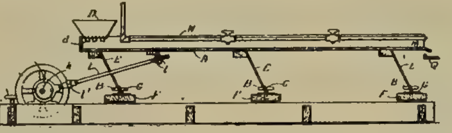
Specially Reported for the MINING AND SCIENTIFIC PRESS.

BURNING PULVERIZED AND LIQUID HYDROCARBONS FOR FUEL AND HEATING.—No. 657,228; S. M. Trapp, Tacoma, Wash.



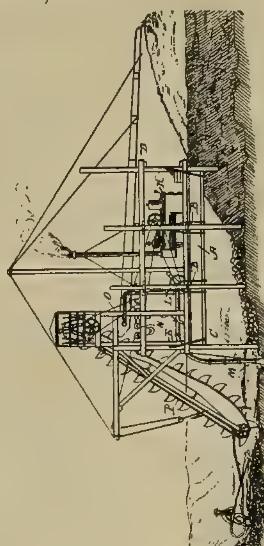
In furnace, combination with fire pit, of fuel flue leading from front toward rear of pit, rear of flue having laterally extending portions formed with ports for directing flame from flue toward front of pit, and means for drawing igniting agent from fire pit into portion of flue in advance of its laterally extending portions.

APPARATUS FOR CONCENTRATING AND SEPARATING ORES, ETC.—No. 657,393; J. Buss, London England.



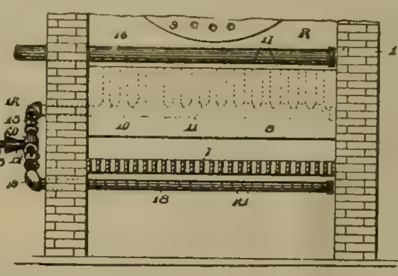
In combination, table A, resilient supports therefor arranged in pairs, independent device carrying each pair of supports vertically adjustable to tilt table transversely, support common to all of devices for vertically adjusting same to tilt table longitudinally, feed hopper at upper front corner of table and perforated pipe above table arranged parallel with and in proximity to upper side edge of table.

DREDGING APPARATUS.—No. 657,247; A. McDougall, Duluth, Minn.



Means for mining comprising, in combination, scow adapted to be used in pit or excavation, excavator thereon, for removing front wall of pit, means for supporting scow above bottom of pit, pump on scow for draining pit, connection from pump adapted to draw from reservoir, sluice adapted to connect excavator with rear wall of pit, flume or chute adapted to connect reservoir and scow, second pump on scow, flexible pipe or pipes connected to second pump by means of which entire bottom of pit may be washed, and pit flooded and drained at will.

SMOKE CONSUMING FURNACE.—No. 657,324; E. Thornton and G. S. Smith, Coitsville, Ohio.



Combination with bridge wall and combustion chamber of furnace, of perforated pipe 18 extending across ash pit beneath grate bars for feeding steam to combustion chamber, pipe 11 extending through bridge wall with series of ejectors connected thereto with outlets at top of bridge wall, pipe 11 and pipe 18 connected to common steam supply, an air supply for pipes 11 and 18, and perforated pipe 16 located above bridge wall for supplying cold air to steam and hot air emitted from injectors in bridge wall.

PROCESS OF MAKING MAGNESIA ALUMINA.—No. 657,452; M. E. Rothberg, Johnstown, Pa.

Process of manufacturing simultaneously, plaster of paris, alumina magnesia, and baryta, which consists in first mixing together solutions of alumina sulphate and lime chloride, and separating resultant lime sulphate; second, treating resultant alumina chloride solution with barium chloride, and separating resultant barium sulphate; third, adding to purified alumina chloride liquor, magnesian lime, and separating resultant magnesia alumina; fourth, recovering lime chloride solution.

PROCESS OF OBTAINING ALUMINA.—No. 657,453; M. E. Rothberg, Johnstown, Pa.

The process of manufacturing alumina, which consists in mixing lime chloride with a solution of alumina sulphate, subsequently adding lime to the alumina chloride solution produced thereby, and finally separating and heading the resultant precipitate, substantially as specified. The process of manufacturing alumina, which consists in mixing lime chloride with solution of alumina sulphate, treating resultant alumina chloride solution with barium chloride, adding lime to alumina chloride solution so treated, separating and heating resultant precipitate.

PROCESS OF REFINING COPPER FROM SOLUTIONS CONTAINING ANTIMONY AS AN IMPURITY.—No. 657,119; F. Klepetko and J. T. Morrow, Great Falls, Mont.

Process of purifying copper from solutions containing copper with some antimony as an impurity, consisting in introducing wood tea into solution, then subjecting solution to electrolysis and depositing copper in purified state.

Options.

An option is a contract by which an owner agrees with another person that he shall have the right to buy his property at a certain price and within a certain period of time.

It is not a contract for sale and grants no interest in the property.

It is binding only on the owner of the property.

The holder of the option is under no obligations to purchase.

Before a sale or a contract of sale can result the holder must avail himself of the privilege of the option, notify the option giver and comply with its conditions.

It must be in writing.

The period of time it shall run does not need to be absolutely stated.

If a consideration is present it will run a reasonable length of time, depending upon the time required to carry out its conditions.

A consideration should be present.

If no consideration is present the option giver can withdraw it at any time.

If the option is under seal a consideration is presumed.

Every extension of an option must have a consideration.

"Until" a certain day means that day included.

No action of the giver of an option is necessary to "expire" it.

Time is the essence of an option, but not as to its performance. Reasonable time will always be given to carry out its provisions.

An option without a consideration is a mere offer, and may be recalled at any time, whether the time stated has expired or not.

Specific performance will be required if the giver of an option refuses to comply with its conditions.

An option is assignable.

Specific performance will not run against third parties who have become purchasers for value in ignorance of the option.—American Investments.

Mine Bell Signals.

TO THE EDITOR:—I note an illustrated article in your issue of the 1st about the Lowell & Arizona C. M. & S. Co.'s plant at Bisbee, Arizona, in which the writer says they are using the Montana code of bell signals in the mine, which gives satisfaction. Hasn't California a code of bell signals? If so, and it is possible, I would like to have them compared. W. W. S.

Nevada City, Cal., Sept. 5.

Following are the two codes in full, as furnished officially: the best answer to the above. The California system was legalized May 1, 1893; the Montana code went into effect June 1, 1895:

CALIFORNIA CODE OF MINE BELL SIGNALS.

1 bell, to hoist. See Rule 2.

1 bell, to stop if in motion.

2 bells, to lower. See Rule 2.

3 bells, man to be hoisted; run slow. See Rule 2.

4 bells, start pump if not running, or stop pump if running.

1—3 bells, start or stop air compressor.

5 bells, send down tools. See Rule 4.

6 bells, send down timbers. See Rule 4.

7 bells, accident; move bucket or cage by verbal orders only.

1—4 bells, foreman wanted.

2—1—1 bells, done hoisting until called.

2—1—2 bells, done hoisting for the day.

2—2—2 bells, change buckets from ore to water, or vice versa.

3—2—1 bells, ready to shoot in the shaft. See Rule 3.

Engineer's signal that he is ready to hoist is to raise the bucket or cage two feet and lower it again. See Rule 3.

Levels shall be designated and inserted in notice hereinafter mentioned. See Rule 5.

For the purpose of enforcing and properly understanding the above code of signals, the following rules are hereby established:

RULE 1. In giving signals make strokes on bell at regular intervals. The bar [—] must take the same time as for one stroke of the bell, and no more. If timber, tools, the foreman, bucket or cage are wanted to stop at any level in the mine, signal, by number of strokes on the bell, the number of the level first before giving the signal for timber, tools, etc. Time between signals to be double bars [— —]. Examples:

6— —5, would mean to stop at sixth level with tools.

4— —1—1—1— —1, would mean stop at fourth level, man on, hoist.

2— —1—4, would mean stop at second level with foreman.

RULE 2. No person must get off or on the bucket or cage while the same is in motion. When men are to be hoisted, give the signal for men. Men MUST then get on the bucket or cage, THEN give the signal to hoist. Bell cord must be in reach of man on the bucket or cage at station.

RULE 3. After signal "Ready to shoot in shaft," engineer must give the signal when he is ready to hoist. Miners must then give the signal of "Men to be hoisted," then "spit fuse," get into the bucket, and give the signal to hoist.

RULE 4. All timber, tools, etc., "longer than the depth of the bucket," to be hoisted or lowered, must be securely lashed at the upper end to the cable. Miners must know they will ride up or down the shaft without catching on rocks or timbers and being thrown out.

RULE 5. The foreman will see that one printed sheet of these signals and rules for each level and one for the engine room are attached to a board not less than 12 inches wide by 36 inches long, and securely fasten the board up where signals can be easily read at the places above stated.

RULE 6. The above signals and rules must be obeyed. Any violation will be sufficient grounds for discharging the party or parties so doing. No person, company, corporation or individuals operating any mine within the State of California shall be responsible for accidents that may happen to men disobeying the above rules and signals. Said notice and rules shall be signed by the person or superintendent having charge of the mine, who shall designate the name of the corporation or owner of the mine.

Section 3 of the law says: "Any person or company failing to carry out any of the provisions of this Act shall be responsible for all damages arising to or incurred by any person working in said mine during the time of such failure."

MONTANA STATE CODE OF MINE SIGNALS.

Signal Bells.

1 bell hoist, 1 bell stop (if in motion).

2 bells lower men, 3 bells hoist men.

4 bells blasting signal, engineer must answer by raising bucket a few feet and letting it back slowly. Then 1 bell hoist men away from blast.

5 bells steam on, 6 bells steam off.

7 bells air on, 8 bells air off. 3—2—2 send down drills. 3—2 3 send down picks.

9 bells danger signal (case of fire or other danger), then ring the number of station where danger exists. No person shall ring any signal bell except the station tender, except in case of danger, or when the main shaft is being sunk. Engineers must slow up when passing stations when men are on the cage.

Station Bells.

Bells.	Pause.	Bells.	No. Station.	Bells.	Pause.	Bells.	No. Station.
2	"	1	1	5	"	1	16
2	"	2	2	5	"	2	17
2	"	3	3	5	"	2	18
2	"	4	4	5	"	4	19
2	"	5	5	5	"	5	20
3	"	1	6	6	"	1	21
3	"	2	7	6	"	2	22
3	"	3	8	6	"	3	23
3	"	4	9	6	"	4	24
3	"	5	10	6	"	5	25
4	"	1	11	7	"	1	26
4	"	2	12	7	"	2	27
4	"	3	13	7	"	3	28
4	"	4	14	7	"	4	29
4	"	5	15	7	"	5	30

Where electric bells are used in connection with other bells:

If cage is wanted ring station signal. Station tender will answer 1 bell.

Reply 1 bell to go up.

Reply 2 bells to go below.

If station is full of ore and station tender is wanted, ring station signal and do not answer back.

2—1—2 bells are rung, engineer or station tender does not understand, repeat signal.

In case of danger or accident, ring station signal, station tender will reply 1 bell, ring 9 bells.

One copy of this code should be posted on the gallows-frame and one before the engineer.

To be in effect from and after June 1, 1895.

This code is subject to change under certain conditions.

The California code is furnished by the MINING AND SCIENTIFIC PRESS, on cloth to withstand dampness, printed in heavy black letters, with blank room for the several levels. The size is 18x43 inches. The Montana code can be had on application to Mine Inspector Shoemaker, Butte, Montana.

Modern Boiler Making.

During the last twenty years the boiler shop has undergone a change, the magnitude of which is paralleled only by that in the machine shop. But while the latter has been mainly brought about by the introduction of new and improved machine tools, the former is due chiefly to the development of a new material—steel. But for this, the old methods which were applicable to wrought iron would probably not have been altered much even at the present time.

There are many points in common between the machine shop of to-day and that of twenty or thirty years ago, but there are scarcely any between the boiler shops of the two periods. Twenty or twenty-five years ago few firms were making steel boilers; to-day the construction of new iron boilers is becoming exceptional. With the new material nearly every machine used, nearly every shop method adopted, nearly every detail of the work has been altered or modified in a greater or less degree. Hand work, too, is practically extinguished in the most modern shops. Formerly there was a good deal of flanging, bending, hammering, chipping, welding, riveting, drifting and tapping done by hand, as there is still in small establishments; but good boiler work is now almost entirely a matter for machine tools, and the importance of these, therefore, has grown to an immense extent. A high-class modern boiler is now machine made almost entirely from beginning to finish. Since the errors of hand work are thus eliminated, two boilers made to the same standard are exactly alike.

Boiler making, to be carried on according to the best modern methods, requires a very large plant, so large that many a good-sized shop cannot afford it all. With only a moderate amount of machinery good work can be done, but it has to be done in a more roundabout way, with considerable increase in cost, which, as in other departments, sorely handicaps such firms in competition with the big shops.

At the present time there are four power agencies in use in boiler shops. Steam and water vastly predominate; nearly all the heavy machinery is driven by these agents. Air is chiefly used for operating small tools, such as drills and calking hammers, while electricity is employed for the same purpose, and, but moderately as yet, for driving heavy machinery tools. Steam, water and air are each suitable for riveting, though the first has been largely displaced by the last. Water power is adopted for heavy flanging, shearing and punching; steam is employed for bending rolls, drills, and most of the machine tools used for cutting purposes. Any large modern boiler shop, therefore, must needs be in possession of at least three power plants—steam, water and air—to which it may be desirable to add the electric motor. The applications of compressed air are growing at a phenomenal rate, being applicable to all the small portable tools used in boiler work. In large shops, in which numerous machines are widely scattered, any agency seems better than shafting and belting, and before long one may anticipate that the extension of the uses of air for small tools will be paralleled by that of electric driving for heavy tools, in place of belts and independent engines.

Lithographic Stone.

TO THE EDITOR:—About 20 miles northeast of here has been discovered a ledge of lithographic stone in 4-inch layers. A company will organize to work it. It is of some interest to note that Solnhofen, Bavaria, now furnishes nearly all the supply of such stone. Litho stones are found in France, near Montpelier, but are not so good as the Solnhofen stone. Lithographic stone is a compact and homogeneous limestone. The Solnhofen stones cover an area of about ten acres. The Santa Barbara deposit is 60 feet wide and has been traced 5 miles. Litho stones must be of excellent quality in order to satisfy the requirements of the art. Many stones found at Solnhofen are laid aside as not coming up to the standard. These are sold to builders and are used for paving floors. A scarcity of superior lithographic stones, if it should ever arise, would have the effect of bringing into the market inferior stones. It is interesting to note that the stones in Solnhofen do not lie deep in the ground; in fact, only the earth and some rock have to be removed, as a rule. The stones lie in layers and have simply to be taken carefully from the earth. The bulk of the ground beneath which the Solnhofen litho stones lie belongs to the public, and each homestead owner has a share in the ground. From time to time the community measures out a new stretch of ground and divides it into lots, and each gets his part. He can either explore the ground himself or sell his claim to one of the large owners. The ground itself, after it has been deprived of its costly treasure, becomes again the property of the community. Blue or gray lithographic stones are the most costly ones, as they are harder and better for use and more copies can be obtained from them. Being harder, they stand the polishing on both sides better than the yellow ones, and therefore are chiefly used for exportation to the United States. In fact, the United States takes only these double-faced stones, which can be worked by the printer from both sides. The Germans, on the other hand, are wont to use single-faced stones. Every stone does not take polish on both sides. A stone may be good on one side, while on the other it is unfit for use—has flaws, splits, etc. Such blemishes are not always apparent on the surface, but may come on when the stone is worked upon by the printer. It requires, therefore, skilled workmen who have been in the trade from their childhood to see that none but good stones leave their hands. J. S. P.

Santa Barbara, Cal., Sept. 5.

Two Kinds of Brittleness.

Two kinds of brittleness ought to be discriminated: 1. "Primary brittleness," as, for instance, that exhibited by gold when alloyed with lead, with arsenic, or with bismuth. In such cases brittleness is characteristic of the alloy from the moment of solidification. 2. "Secondary brittleness," a subsequent and more gradual phenomenon, as, for instance, that exhibited by certain varieties of German silver months or even years after solidification. "Primary brittleness" is an accident of birth; "secondary brittleness" is a disease that develops with age and circumstance. Deteriorated German silver, or platinoid, when examined under the microscope, is seen to contain crevices and fissures; the section has patches of various colors, corresponding, most probably, to separate masses of "liquated" metal. It is further suggested that by the process of "liquation" homogeneity of structure is lost; consequently the tensile strength of the material varies prom point to point of its mass; so also does the electrical conductivity. In passing afterward through the die of the wire maker, the weaker constituents give way; thus incipient crevices are formed, and through these capillary channels moisture subsequently intrudes. If such wires are used for electric currents, maximum heating occurs at the weakened sections; this accounts for the failure of German silver resistance coils on arc lights and other circuits. The separate masses of dissimilar metals constitute local circuits of very small resistance, and within these circuits internal currents act destructively upon the alloys.

Cable for Bering Sea.

On the steamer Orizaba, heading northward, is a submarine cable to connect Unalaklik, St. Michaels and Nome City. It is 187 miles long—the longest submarine cable ever to be laid by an American firm; the largest cable on the Pacific coast. Owing to the danger of the cable being affected by the cold water and ice it has been doubly armored. It is a single conductor Kerite submarine cable, has withstood 3000 volts of electricity and a pressure of 800 megonnes. The cable has a tensile strength of 5000 pounds. The main cable weighs 2800 pounds per mile; the shore ends weigh 9000 pounds to the mile. The main cable is ¾ inch diameter, the shore ends 1½ inches.

The steamer goes to Unalaklik, where the first bit of cable will be laid. The cable will then be extended to St. Michaels, 55 miles; then direct to Nome City, 132 miles. It is expected that by the time the cable is ready for use the overland line to Unalaklik will be completed.

MINING SUMMARY.

ALASKA.

Latest advices from Nome state that T. T. Lane of the Wild Goose M. Co. has made the last payment of $150,000 to Meehan, Baker, Erickson, Castillo & Long for the "Mattie bench claim."

ARIZONA.

GILA COUNTY.

The leading mines in Globe have announced an advance in miners' wages of 50 cents per day.

Silver Belt: The United Globe mine has discontinued the shipments of ore, the contract with the El Paso Smelting Works having expired and the smelting company having raised the charges for treatment $2 per ton.

GRAHAM COUNTY.

Plans for an increase in the copper production are under consideration by the Arizona Copper Co. and the Detroit Copper M. Co. of Clifton and Morenci. The Detroit Copper M. Co. by Jan. 1 will complete a narrow gauge railroad from Guthrie, on the Arizona & New Mexico line, to its mines at Morenci, which will obviate the necessity of transporting its supplies and machinery over the Arizona Copper Co.'s line to Clifton and thence by narrow gauge to Morenci.

MOJAVE COUNTY.

Miner: The Gold Road M. Co. has elected I. W. Hawkins general manager and R. J. Ferguson mining Supt.

PINAL COUNTY.

Blade: The last shipment of ore from the Silver King mine yielded 18% copper and about 800 ounces silver per ton. Pinal county mines seem to be running into copper, but at the same time retaining their other values.

YAVAPAI COUNTY.

Near Jerome the strike in the Brookshire attracts attention. Assays give 28% copper, seven ounces silver and $4 in gold to the ton.

Prospect: Supt. W. A. Clark of the Planet-Saturn, Fool's Gulch, will increase the capacity of the mill from ten to forty stamps.

YUMA COUNTY.

Ore has been struck in the Golden Eagle mine of the Harqua Hala group. C. Pickenbach is Supt.

The S. P. station is moved from Texas Hill to Mohawk Summit.

King of Arizona projects a 1000-ton plant. They now have water.

CALIFORNIA.

AMADOR COUNTY.

The Sargent mine, on the Mokelumne river, 2½ miles south of Jackson, is managed and equipped by San Francisco men.

At the Peerless mine, at Jackson, a depth of 420 feet has been reached; fifteen men are at work.

A strike is reported at the Potter mine, near Plymouth.

The Kirkwood mine, near Jackson, has a new 50 H. P. engine and hoisting works.

The 60-stamp mill of the Oneida mines, near Jackson Gate, is completed.

The Central Eureka has put in a new 200 H. P. hoist.

New hoisting machinery is being put up at the South Eureka mine.

Tangermann & Ehlers, owners of the James mine in the Clinton district, are taking out ore which assays $13.50 per ton.

At the South Spring Hill mill, near Amador City, Supt. Tregloan is operating thirty of the forty stamps.

More powerful hoisting machinery will be put in at the east shaft, Kennedy mine, Jackson.

BUTTE COUNTY.

Eastern men have secured the Campbell property, adjoining the Magalia mine, and a shaft is being sunk.

CALAVERAS COUNTY.

At the Ferry ninety men are engaged on the dam. As soon as the dam is finished mine work will be opened.

Near Milton, Williams Bros. are unwatering the shaft in the Napoleon mine—a slow process—down to the 225-foot level. The old shaft had all fallen in and had to be retimbered. The work is completed to the 300-foot. The owners expect to get at the bottom—500 feet—next month.

Mobley Bros. have suspended work in their deep shaft and are sinking a new one several hundred feet to the north on an extension of the same lead.

E. K. Stevenot has been inspecting the Oriole mine in the interest of the directors.

CONTRA COSTA COUNTY.

The Peyton Chemical Co. expects the buildings and machinery in course of construction at Peyton to be completed by Nov. 1st.

EL DORADO COUNTY.

Mining machinery is being received at Placerville; a pump engine and 500 feet T rails for the Mt. Pleasant mine, 5000 feet T rails for the Mt. Hope, Grizzly Flat, and 3000 feet T rails for the Kimble gravel mine near Placerville.

INYO COUNTY.

A tract of 16,000 acres of land, in which has been found alumina, has been located on the shores of Owens lake as placer ground.

The Owens Lake B. M. & M. Co. is incorporated. A. Baker, W. R. Smith, W. S. Bell, G W. Brown and C. E. Hockett subscribed.

One hundred and seventy-one sacks of ore shipped from the Bunker Hill mine netted $604.

Independent: The Tuba mill is running day and night.——The Ratcliff Con. Co. are working on the Harrison lease. lease.——The first carload of antimony from the Wild Rose will be shipped from Johannesburg on the 20th inst.——The Ratcliffe mine sent down to Ballarat for five men and could get but two, there being no miners in the country.——The Randsburg R. R. Co. are surveying between Johannesburg and Ballarat.——The new placer diggings at Stone Corral are attracting attention. Miners are going in from the Goler and Rademaker districts.

KERN COUNTY.

It is estimated that there are twenty-three strings of tools now operating in Sunset district, twenty-two producing wells and fifty derricks up.

County Recorder Lee has turned into the county treasury $5368.27, the amount involved in the recent litigation concerning fees for recording mining claims; the Supreme Court recently decided the case adversely to Mr. Lee.

MARIPOSA COUNTY.

The Hite's Cove M. Co. has incorporated in Mariposa with 100,000 shares, $1 each. Directors, E. L. Foster, Vallejo; H. G. Perry, Suisun; A. H. Ward, H. H. Todd, H. C. Ward, Alameda.

MONO COUNTY.

In Antelope valley, Carter, Terry, Haslam, Trumble and others have good properties that are being developed. The Almono Co. will place machinery on their property, 2 miles from Little Antelope valley.

NEVADA COUNTY.

R. J. Thomas & J. E. Poingdestre will build two Posthelwaite dredgers on Shady creek and work the banks and bed of that stream.

PLACER COUNTY.

Supt. Felix Chappellet, Jr., at the Eureka drift mine, 12 miles above Forest Hill, has the main tunnel in 3900 feet.

Herald: At the Breece & Wheeler mine at Bath work has begun at stations 5 and 28 for working the top streak over the old blue lead.——Owing to the scarcity of water, a great many claims in the mountains have been forced to suspend operations.——At the Pay Streak in Humbug Canyon a 5-stamp mill is in operation.——The Pioneer mine expects to start up during the present month with the usual force of men.——The Dorer mine is running the usual force.——At the Patrick quartz mine the stamp mill is in operation.——An electric plant for the Turkey Hill mine is being put up in El Dorado canyon.——M. R. Gleeson has ten men working at his mine near Iowa Hill.——Parties with a view of purchasing have been examining the Barton mine.——The quartz ledge in Black Canyon, owned by Snyder, Richards & Co., has been bonded to San Francisco men, who will sink on the ledge. They will use a horse-power whim for the first 100 feet.——Preparations for resuming work at the Tadpole Consolidated mine are being made.——The Canada Hill M. Co. is running its regular force.——At the Sailor Gravel mine a new tunnel is being run.——At the Glen mine a shaft is down 100 feet from the level of the tunnel.——San Francisco men are investigating the Haney Consolidated mine.——The Whitney mine at Deadwood is working steadily with a full crew.

PLUMAS COUNTY.

At 12-Mile Bar gravel mine, east branch Feather river, Supt. Gaberel has new ground opened up 1100 feet in length; twelve men are at work.

SAN BERNARDINO COUNTY.

At the placer mines near Barstow several strikes have been made. The Yucca, Long Range and Duncano mines have been turning out rich dust and the force of employes nearly doubled. E. Corner took eighteen ounces, valued at $330, out of the Yucca mine. D. Smith of Pasadena brought a sack of dust worth $900 into Barstow, which he said he and two other miners had panned out in three weeks. At the Long Range mine, which is 9 miles east of Yucca, Clark, Campbell & Sterens are making from $4 to $10 a day each.

SHASTA COUNTY.

Supt. McDermott of the Afterthought is crosscutting from the lowest level to the vein.

Free Press: The Mountain Copper Co. will not purchase the Stowell group of copper mines; it has thrown up the bond.

SIERRA COUNTY.

The Saddle Back G. M. & M. Co. has incorporated, to work the Butte Saddle mine, near Sierra City; capital stock, $500,000. The directors are P. M. Keefe, Sonora, R. N. Graves, J. Armstrong, J. C. Bunner, G. E. Arrowsmith, San Francisco.

W. Wolf, developing a quartz ledge at the Ruby mine, has reached the ledge, cleaned out and repaired 3400 feet of the old tunnel, put in a new pump and will sink on the ledge.

SONOMA COUNTY.

(Special Correspondence).—The Great Eastern Q. M. Co. has been operating continuously since 1872. Its mine is 3 miles from Guerneville, the nearest railroad town, on a branch of the California Northwestern Railroad. At present ore is being taken from the Mount Jackson, which is an extension of the Great Eastern ledge. The latter company has a lease of the Mount Jackson. The ledge has a width of 80 to 175 feet, and dips at an angle of 60°. The ore contains not more than ¾ of 1% of quicksilver. By reason of economical arrangements in handling and in reduction, as well as for fuel, this is made to pay. The plant consists of a regulation single-drum hoist, an air compressor to propel power drills in the mine, and necessary steam boilers. The furnaces are below the hoisting works. Wood is the fuel used. The shaft is 500 feet in depth (perpendicular), with an 80-foot winze. Thence a drift 400 feet in length taps the ledge. The mine produces 1200 tons of ore per year. This is a close corporation, with Alfred Abbey, one of the three owners, as Supt. The mine gives employment to sixty miners and workmen, besides fifteen woodchoppers.

A ledge of graphite is being developed on the ranch of G. R. Skinner, 4 miles south of Petaluma. The existence of this ledge has been known for several years, but not until now has there been any systematic work to ascertain its extent or value. The Sorrento Coal M. Co., H. G. Williams vice-president, is advancing the capital necessary for present operations. The shaft is down about 100 feet, where a crosscut shows a well defined 7-foot ledge.

Guerneville, Sept. 10.

TUOLUMNE COUNTY.

Assistant Manager C. Ghiglieri of the Golden West mines recently examined the new discoveries made therein, which consist of a new ore shoot about 4 feet wide, which shows free gold and sulphurets. It has been drifted on 25 feet. It dips 65° to the east. It is the superintendent's belief that the shoot is the same one developed in the upper tunnel. He has orders to put on additional men.

The Magnet reports a strike in the Riverside mine, above Columbia, which is under bond to C. H. Knox. The ore goes $65 in free gold.

Attachments aggregating $12,000 have been placed upon the Old Bonanza mine, Sonora.

The Pino Blanco quartz mine was sold at commissioner's sale last week and bought in by the plaintiff, the Union Trust Co. of San Francisco.

VENTURA COUNTY.

At Santa Paula well No. 48 of the Union Oil Co., in Torrey canyon, is down 1600 feet and is in oil sand.

The Union Oil Co.'s well No. 47 is down 700 feet. It is piped with 13½-inch casing.

COLORADO.

BOULDER COUNTY.

The Stephens 40-stamp mill, Ward district, has been sold for $13,000 to W. N. W. Blayney and the B. & M. M. Co. The purchasers will expend $7000 in repairs.

GILPIN COUNTY.

Manager Stephen Hoskin, Carr mine, Lake district, will sink the main shaft an additional 500 feet, which will give a depth of 1000 feet.

HUERFANO COUNTY.

At Ojo, 18 miles west of Walsenburg, O. S. Menlinger has been examining the copper beds and says he picked up pieces of copper glance that asayed 18%.

OURAY COUNTY.

(Special Correspondence).—The Mono & Baltic mine, near Ironton, lies on the western slope of one spur of Red mountain, and has been developed to the producing stage by Chas. Newman of Durango. The property is opened through a main tunnel, which trends eastward 600 feet, cutting through and beneath a large ore body, comprising pyritic and oxidized iron and copper ores, carrying copper, gold, silver and a small amount of lead, the iron and copper constituting a desirable fluxing material for smelters. The ore lies between porphyry and lime, and in the 1700 feet of work on the property the ore is shown to be 100 to 125 feet wide in many places. Most of the development is above the tunnel, where an incline drift follows the contact, considerable stoping having been done. Some twenty-two cars of this ore were shipped to the Durango smelter last July. The Brooklyn, also a part of this group, is well opened up, disclosing a bedding deposit of ore similar to that of the Mono.

The old Saratoga mine and mill, which ran on a large scale ten years ago, is being worked in a small way and may be expected to become a good producer again as conditions become more favorable.

Ironton, Sept. 5.

(Special Correspondence).—The American-Nettie mill is 900 feet lower elevation than the mine, being situated on the Uncompahgre river, a mile below Ouray. Ore is transported from the mine to mill over a wire rope tram line, 2000 feet long, one span from tower to mill terminal being 1800 feet in length, swinging the ore buckets 900 feet above the valley. The mill terminal is 60 feet above the vanner floor. The ore passes through a crusher, thence to the stamps, of which there are twenty, the battery product passing over amalgam plates and then to Wilfley tables. The concentrates are dried on a platform, resting upon coils of steam pipes, which connect with the boiler. The mill crushes about seventy-five tons per day and is at present operating on an old ore dump at the mine. This mill, in its main parts, was moved from Gunnison county.

Ouray, Sept. 6.

(Special Correspondence).—The Treasury tunnel, locally known as the Hammond tunnel, starts at Yankee Girl lake and takes a westerly course, almost parallel to that of the Meldrum. It has been driven about 1800 feet and will be continued till it cuts under a group of claims which the tunnel owners have under bond and lease. A company of Pennsylvania parties are principally interested.

The Bobtail, up the gulch, north of the Treasury, is being further developed. This is an old property, having a 3500-foot tunnel, which was driven in 1892. The ores are a pyritic iron, carrying some gold, and some shipments are being made.

J. H. Ryan has a lease on the National Bell dump, which contains thousands of tons of material. He is sorting out the better grade for shipment.

The Vanderbilt, Yankee Girl, Robinson and Guston are among the big properties which in former years made a great record for Red Mountain, and which are likely to be revived again. In fact, there is more work now in progress on Red mountain than has been seen for several years. With the building of matte, pyritic smelters--one at Silverton the other at Ouray—Red Mountain ought to find ready market for all the low grade iron and copper ore that can be mined. As has been noted, the Silverton smelter is almost completed and one for Ouray seems assured. Upon the success and good management of these smelters depend the revival and rapid development of mining at Red Mountain.

Red Mountain, Sept. 5.

SAN JUAN COUNTY.

(Special Correspondence).—The Gold King Con. M. Co.'s holdings now include the original Gold King group, the Sampson group, the American and Anglo-Saxon, all contiguous, mostly on Bonita mountain, sloping to Cement creek, where the company's mill is located at Gladstone. At the main workings, at an altitude of about 11,000 feet, a tunnel goes in 531 feet to a hoisting station. From this point there is about one mile of drifts and crosscuts on the Gold King and Sampson ore body, besides a great deal of stoping; and from the same station a double-compartment shaft sinks 107 feet to the second level, where there are some 1600 feet of drifting on the Davis vein and on branches therefrom. The veins, as a rule, are not far from vertical, though in some places there are vast ore bodies in nearly horizontal position. The veins, both vertical and flat, range in thickness from 15 to 40 feet, usually between well-defined walls. The small size of the dump and the small amount of waste underground show very little material between walls that is not pay ore, which is composed of an iron, copper and lead sulphide, with a considerable amount of white quartz. The values are largely gold, with some silver and lead.

A tunnel is being driven from the American mine toward the Gold King, which is designed to cut the latter vein at 600 feet below the hoisting station and 2000 feet from the entrance, the work already having proceeded 1300 feet. The present working shaft will be sunk to connect with the American tunnel.

A Bleichert wire rope tramway, 5320 feet long, carries the ore from the mine to the mill, the line carrying forty-seven buckets, each of 800 pounds capacity. One span is 2240 feet between towers, spanning the gulch between Lost and Bonita mountains.

At the Gold King mill a new tunnel has been started toward the Gold King and Sampson group, which is 7x9 feet in the clear, and is now in 600 feet. This will cut the Gold King grounds at 1800 feet below the surface and will be one mile in length. The Gold King mill runs steadily, with forty rapid-drop stamps and nineteen vanners, milling about 120 tons of ore per day. An extension to the mill has been made for forty additional stamps and twenty more tables, thus doubling the present capacity. The machinery for the new work is being put in place. About 10% of the saving is made on the plates, the balance in concentrates, there being a reduction of about five tons of ore to one ton of concentrates. The vanners are graded by speed—those taking the heavy material running at 200 revolutions, those receiving the middle size making 190 and those taking the finest or more slimy portion running at 180 revolutions per minute. Since last year a 250 H. P. Westinghouse compound, upright steam engine has been put in to operate the mill, also a new twelve-drill compressor, which will soon be brought into use in the two tunnels. The steam power is supplied by four boilers and three more are to be added. A new tramway line is being erected to connect the American tunnel workings with the mill. This company owns and operates the Silverton & Gladstone Railroad, comprising a line 9 miles long between the two points named. Besides handling the business of the company's mine and mill, the road has a growing freight and passenger business and is of great benefit to the Cement Creek district, where there is rapid development.

J. C. Purpus and Williams have a bond and lease on the Queen Anne group, on the south slope of Brown mountain, which they are developing. They also have a lease on the Red & Bonita mill, near Gladstone.

Gladstone, Aug. 30.

(Special Correspondence).—The matte smelting plant of the Kendrick & Gelder S. & M. Co. is nearing completion, and it is calculated to be in operation before the first of November. The buildings, including ore bins and assay office, are completed, the machinery is on the ground and is being put in place. There are seventeen ore bins completed for the various assortments of ores. Trackage from the Silverton & Gladstone Railroad is laid beside the ore bins. A flume, 5000 feet long, takes 20 cubic feet of water per second from Cement creek, which is delivered to an impulse water wheel at the mill, under 170 feet pressure, producing 340 H. P. This wheel will supply power to the crushers and rolls in the sampling department, to the blower for the furnace, and an electric generator for light. The furnace size is 42x120 inches, has a capacity of 200 tons per day, and will be run in connection with a Bretherton hot-air furnace, the blast being supplied by a Connellsville blower. From the furnace discharge the slag will pass automatically through the granulating laundry, thence into the waste deposit, without the use of slag cars.

The furnace charge will be so mixed as to run at least 3% copper; to contain about 3% coke and a small percentage of lime, and Supt. E. W. Walter figures on producing a 50% copper matte. The basis of the operation seems to be to oxidize the iron in the pyritic ore, thereby producing heat and producing a concentration of material of about sixteen tons to one ton. The iron, by oxidization, passes out through the slag. The work of the Bretherton hot-air furnace is to take up the waste heat which radiates through a series of pipes in the drum and return it to the furnace.

F. C. Kendrick, general Supt. of mine and smelter, states that the Henrietta mine, in Prospect basin, which belongs to the company, is developed by three tunnels, which run in on the trend of the vein 140 feet, 500 feet and 860 feet, respectively, a 160-foot upraise connecting the lower with the center tunnel, the latter being connected with the upper by an 80-foot upraise. The vein stands nearly vertical and is of good width. The ore is sulphide of copper and iron, running about 8% copper and ten ounces to twenty ounces silver. There is considerable tonnage of ore now ready for the smelter. At a point lower down the hill a tunnel site has been located and a tunnel from this point to cut 600 feet lower than present lowest workings is contemplated. The Henrietta is up Cement creek, is reached by good wagon road 2 miles from the railroad. Plans have been partially made for a 5500-foot tramway from mine to railroad.

Silverton, Aug. 31. WASCOTT.

Special Correspondence). — The Tom Moore, up Animas river and above Eureka, is being developed by tunnel drift, which is cutting under the old workings at considerable depth. It is now in 1000 feet. A 1-mile pipe line is being put in for water power.

The new Sunnyside mill started up a month ago with twenty 1000-pound, rapid-drop stamps, five Bartlett and four Wilfley tables and three canvas tables. This is a well constructed mill, operated by water power, and is situated at Eureka. It is crushing sixty tons per day of very hard quartzite, whose values are chiefly gold, which is saved largely by amalgamation. In the concentrates a product containing some lead and zinc sulphide is obtained. Mr. Terry states that twenty more stamps, with additional tables, may be added to this mill. The old mill, situated a mile or more up Eureka gulch, is operating on about thirty tons of ore per day, having fifteen stamps, with plates, the tailings passing over Bartlett and Wilfley tables. The Sunnyside mine is at the head of Eureka gulch, at 12,500 feet altitude, the ore being transported down to the mills over a Finlayson tramway line 16,000 feet long, operated in two sections—the first, 8800 feet long from the mine to the old mill, and the second 7200 feet, from the latter to the new mill.

The Scotia group, under lease to Moreland & Van Diest, is located up Picayune gulch, at 12,500 feet altitude, about 1 mile east of the Sunnyside. It comprises two lode claims and a placer location. Present development consists of one 300-foot tunnel, from which is a 200-foot drift on the main vein; and a crosscut from that 40 feet to the footwall. Two levels have also been run at higher points. The main vein is said to be 40 feet to 60 feet wide, adjacent to a porphyry footwall; a feeder vein runs at right angles to this. From these veins two grades of ore are found, the first class carrying free gold, which runs from $10 to $40 per pound of ore, the second class running from two ounces to five ounces gold per ton of ore. It is considered a remarkable showing of free gold.

Eureka, Sept. 1.

(Special Correspondence)—The Pride of the West, located up Cunningham gulch and under lease to H. M. Kennedy and others, is shipping about twenty tons per day to the concentrating mill at Howardville, which is also under lease to the same parties.

Howardville, Sept. 4.

TELLER COUNTY.

Judgment by default has been taken in the District Court against the Victor G. M. Co. on demand notes held by D. H. Moffat, aggregating $153,500 in amount. The notes were given March 23, 1900.

Cripple Creek ores won four silver medals at the Paris Exposition. The prizes were awarded for displays and were given to the Woods Investment Co., the Portland G. M. Co., Stratton's Independence Co. and Colorado College of Colorado Springs. The medal given the Woods Co. was for the best comparative display of roasted and unroasted sylvanite ores.

The Bush-Moffat tunnel will resume work.

IDAHO.

BOISE COUNTY.

World: A 6-inch vein in the Faull, Daley & Berry mine at Quartzburg is turning out ore that mills $100 a ton.——J. K. Clark has bought the Kill Buck group, owned by the Kill Buck M. Co., on a basis of $30,000 for the entire property. The group is on Lake gulch, between Wallace and Osburn.——At Wallace, the Columbia-Shamrock M. Co. has incorporated to work the Columbia-Shamrock group at the southern edge of that town.——The Standard M. Co. is putting in a new air compressor and electric plant at the mine.——Williams & Perglase will develop the Wonderful group on Stevens peak, having a working bond from the owners for $40,000.

MONTANA.

DEER LODGE COUNTY.

Inter-Mountain: In all of the Anaconda mines heavy sheet iron doors are being placed in all the connections leading to adjoining mines, so that in the event of fire they can be closed.

FERGUS COUNTY.

In the sapphire mines at Yogo the monthly clean-up averages $10,000. The gems are shipped to London, some of them selling for as high as $75 a carat. Forty men are employed.

LEWIS AND CLARKE COUNTY.

Matt W. Alderson has leased the Fargo mine, in Grizzly gulch, near Helena.

Thos. Cruse of Helena has bonded the Violet Jane mine and other properties at Mud springs, 12 miles northeast of Helena, and will prospect them with diamond drills.

MADISON COUNTY.

The Amalgamated Copper Co. has not yet closed the deal for the Clipper and Boss Tweed mines of Elling & Morris. The company secured an option for a bond that expires to-day. The conditions require that if the intending purchasers desire the mines they must make a payment of $30,000 Sept. 15. Prof. Winchell, C. F. Booth and J. Kane were examining the mine last week. It is a concentrating proposition.

NEVADA.

WHITE PINE COUNTY.

Work has been resumed on the Star mine at Cherry Creek.

ESMERALDA COUNTY.

The copper mines near Sodaville have shut down.

LANDER COUNTY.

The Eastern people who have been trying to get the property of the Nevada M. Co. at Galena have an option on it and will begin sampling the mines, for which they expect to pay $60,000.

LINCOLN COUNTY.

El Dorado Canyon reports that a majority of the stockholders from Philadelphia have appropriated $200,000 to build a new and improved mill of forty stamps, twenty concentrating tables and forty tanks for cyaniding the ore. Charles Gracey is to be general manager.

NYE COUNTY.

Boston men are reported negotiating for the purchase of mining properties near Tybo.

NEW MEXICO.

GRANT COUNTY.

The Fort Bayard M. & M. Co., owning the Texas mine at Central, has a new 100-ton mill. The Texas is a silver property.

The Golden Giant, at Pinos Altos, is pushing development work. W. S. Gage is Supt.

The Santa Rita Co. is putting on new men every day, and now has 100 men busy at development work. B. Thayer is its Supt.

RIO ARRIBA COUNTY.

Supt. J. K. Turner, Copper Hill M. Co., at Rinconado, says several months will be devoted to developing the property, and about $50,000 spent in sinking 500 feet more. Forty men are now employed. Mr. Turner had expected to sever his connection with the company on September 10, but his successor has not yet arrived.

SANTA FE COUNTY.

J. T. McLaughlin, Supt Santa Fe G. & C. Co., says he expects to have the smelter at San Pedro in operation November 1. About the mine and mill 200 men are employed.

OREGON.

BAKER COUNTY.

The Mormon Boy, Cable Cove district, is bonded to Portland men for $20,000.

JACKSON COUNTY.

Applegate reports the discovery of a quicksilver mine in Meadows precinct by Behrman & Kauffman.

JOSEPHINE COUNTY.

H. B. Nye has a small ledge of white quartz with a vein about 6 inches wide, from which about $10,000 has been taken. He has struck another pay chute which is thought to contain as much more.

LANE COUNTY.

In Bohemia district 300 claims are represented by their owners in development work; several ledges are furnishing ore to the stamp mills.

A 5-stamp mill is being hauled from Cottage Grove to the Helena. The Noonday is working twenty stamps on rich ore. The 10-stamp mill of the Musick is being overhauled. The Champion is running a 10-stamp mill; the Star five, the Tom Johnson five.

In the Black Butte quicksilver mine work has progressed further than on the Mountain King. A plant has been installed, consisting of machinery, tramways and thirty buildings. There is a working force of seventy men. In the Black Butte mine is found cinnabarette.

UNION COUNTY.

Returns from a carload shipped by the Diadem G. M. Co., near Granite, shows 3 ounces gold, 9 ounces silver to the ton.

TEXAS.

BREWSTER COUNTY.

The deposits of cinnabar in this county are located on State lands, and this fact, since the publication in the issue of July 21st, of the illustrated account of the Terlingua district, written by H. W. Turner of the U. S. Geological Survey, has caused the State Land Office to be flooded with applications to purchase these mineral lands. The rush of prospectors into the rich district still continues, and improvements in the way of furnaces for smelting the ore are in progress.

UTAH.

SUMMIT COUNTY.

Park Record: The first contract for 100 cords of rock for the Silver King sampler has been delivered.——The Alice mine has closed down.

TOOELE COUNTY.

Consolidation is the order of the day. Near Mercur the Cigale, Helvetia, Omaha and Daisy at West Dip will consolidate.

FOREIGN.

BRITISH COLUMBIA.

An agreement is arrived at between the Iron Mask and Center Star companies by which all matters in dispute between the two companies have been amicably settled, and the case will not come up again in court.

The Heinze refinery at Trail, B. C., is torn down. The structure was removed to make room for the new lead furnaces for the smelter.

MEXICO.

Near the city of Oaxaca is reported a gold discovery in the Tavichi district. "Samples of the ore run as high as $4500 gold and $1500 silver to the ton."

Two Republics: The Las Vacas mines are 60 miles southeast from the city of Durango; there are two pumping engines which work an 8-inch Cornish pump, which lifts 600 gallons of water per minute. The shaft is vertical, 485 feet deep, and from that level a second shaft is in 268 feet; the mine is worked without timbering; the chambers are supported by pillars and show no sign of caving. The average amount of ore extracted daily is sixty tons. This is crushed, concentrated in the mill, hauled to Durango and sold to the ore buying firms. From that point it is shipped to a smelter and reduced to bullion. The Cornish pump lifts enough water for crushing purposes. The San Marcas mine is within 500 yards of the Las Vacas, has no veins or leads; it is a solid block of ore. H. W. Collins is Supt.; W. J. Grace, general manager.

THE KLONDIKE.

The Dawson Board of Trade has decided to reduce the value of commercial dust in circulation in that town from $16 to $15 per ounce. The action is inspired by the adulteration of the dust with black sand. Sept. 15th is the date set for the reduced valuation to go into effect.

Books Received.

"Municipal Improvements," W. F. Goodhue. This is a manual of the methods, utility and cost of public improvement for municipal officers, a sensible, practical treatise which would be of value to any city officer honestly interested in good city government, but would be laughed at by the peanut politicians who usually run municipal affairs. Its sale might be in direct proportion to the number of city officials in the country who really want to have good sewers, streets, etc. Published by Jno. Wiley & Sons, New York City.

"List of Data Required for the Proper Designing of Railroad Bridges and Trestles," is the long name of a little pamphlet published by Waddell & Herrick, Kansas City, Mo. What it lacks in volume is made up in condensed suggestion, and any one considering such structure would find many points in the data furnished that would be of economic value. There is no advertising about it, it seeming to be a pro bono publico proposition. The firm will send a copy free anywhere upon request.

"Mechanical Drawing and Elementary Machine Design," by Jno. S. & David Reid; 8vo, 389 pp., admirably illustrated, designed to show the best modern practice in construction and design of machine detail. In addition are drafting room methods and complete instruction regarding all manner of mechanical drawing, outfit required, how to use instruments, and also appear ten separate chapters devoted to details of various devices to insure their correct portrayal. The book is a useful one to advanced students. Published by John Wiley & Sons, New York City. Price $3.00.

Catalogues Received.

THE Westinghouse Companies, Pittsburg, Pa., send strong testimonial to the value of the Improved Roney mechanical stoker. There is no description, merely a catalogue of recent prominent purchasers, aggregating several hundred thousand H. P., the owners of which throughout the United States and foreign countries recognize the merit of the Roney mechanical stoker.

THE Robert Aitchison Perforated Metal Co., 305 Dearborn street, Chicago, Ill., which supplies perforated metals of all kinds, issue a handsome little trade treatise in black and gold, illustrating the style and character of their work. They have over 600 varieties and ask our readers to send for samples.

Personal.

DANA HARMON has returned to Gaston, Cal., from San Francisco.

E. C. VOORHEES has returned from San Francisco to Amador county, Cal.

R. H. CAMPBELL of the Miocene mine, Horsefly, B. C., is in San Francisco.

WM. REED, Capitola, Cal., is examining mining properties in White Pine county, Nev.

E. C. BROWN, manager Wehe Con. Co., has returned to Loomis, Wash., from the East.

S. P. POLAND has gone from the National mine, Shasta county, Cal., to San Jose.

M. L. REQUA of San Francisco is in Kingman, Ariz., looking after his mining interests.

J. M. WILSON, manager Hearst mining properties, Guanacevi, Mexico, is in San Francisco.

L. F. SHEPPARD of Shasta county, Cal., is Supt. Chainman mine, Ely, White Pine county, Nev.

D. H. LAWRENCE on the 1st assumed the duties of smelter Supt. for the Waldo G. & C. S. Co., Waldo, Or.

H. E. O. GREEN has been appointed secretary to the Buluwayo, S. A., Chamber of Mines, at an annual salary of $5000.

HENRY PARRY, Supt. Milwaukee & Arizona P. & M. Co., is at Ray, Ariz., to start operations on the company's property.

WINCHESTER DICKERSON succeeds P. N. Moore as manager German Bar & Conroy Placer M. Co.'s property, Virginia City, Montana.

BEN STANLEY REVETT, general manager North American Gold Dredging Co., has left Breckenridge, Colo., for Siberia, for the Venture Co. of London.

W. L. WATTS of the California State Mining Bureau has an office in the Academy of Science building, San Francisco, and is preparing an elaborate monograph on the oil formations of the State.

JOS. F. CHAMPION, formerly of the Silver King mine of Arizona, has returned from Quong Si, China, where he has been superintending the erection and operation of a smelting and refining plant for a Chinese syndicate.

G. M. DAWSON, Director of the Dominion Geological Survey of Canada, after whom Dawson City was named, is inspecting mining property at Grand Forks, B. C. He will inspect various Boundary mines before proceeding west as far as Camp McKinney and Penticton.

R. U. GOODE of the U. S. Geological Survey has gone from Bingham, Utah, to Seattle, Wash. Discussing the work in the field of economic geology which is now being prosecuted by the Government, Mr. Goode tells the S. L. Tribune that it is more extensive than at any period in many years. Already the regions in what is now commonly known as Nome are under survey, the corps which has been assigned to it constituting one of the strongest that has ever been in the field. All this activity on the part of Uncle Sam encourages the belief that he will yet consent to the creation of a "bureau" of mining, if not a distinct "department," for at no time has mining been pursued by so many persons, or when so many were equipping themselves to intelligently engage in it. That such a department should exist has long been urged by those associated with the U. S. Geological Survey, but, as suggested by Mr. Goode, "about 1% of the country's multifarious recommendations never get further than the congressional committee to which they are referred, and that relating to a department of mining has experienced no different fate up to the present."

Commercial Paragraphs.

AS an instance of direct returns from advertising the Burt Mfg. Co. of Akron, Ohio, report that they are crowded with orders as the result of an illustrated notice of their Burt exhaust head, which they have only recently commenced to advertise. "Any article of merit," says Mr. Warden, manager of the company, "can be pushed successfully through judicious advertising in the trade journals, as we have demonstrated, to our own satisfaction, at least.

Recently Declared Mining Dividends.

Calumet & Hecla M. Co., Mich., $20 per share....................Sept. 28
Daly-West M. Co., Utah, 25 cents per share, $37,500..............Sept. 13
Six Points G. M. Co., Colo., $120,000..........................Sept. 20
Elkton Con. G. M. Co., Colo., 3 cents per share, $75,000 ....Sept. 20
Wolverine Copper Co., Michigan, $2 per share.............. Oct. 1

List of U. S. Patents for Pacific Coast Inventors.

REPORTED BY DEWEY, STRONG & CO.,
PIONEER PATENT SOLICITORS
FOR PACIFIC COAST.

FOR WEEK ENDING SEPTEMBER 4, 1900.

657,377.—GRAIN CLEANER—J. P. Adams, Garfield, Wash.
657,080.—FUNNEL—W. C. Belden, Ioamosa, Cal.
657,190.—GAS GENERATOR—W. M. Crow, Lakeview, Cal.
657,191.—GRATER—E. Crupe, S. F.
657,192.—WATER ELEVATOR—T. J. Demorest, Garfield, Wash.
657,099.—RAILWAY SWITCH—G. H. Fairchild, S. F.
657,195.—ELEVATOR CUT-OFF—G. A. & A. G. Guenther, Orange, Cal.
657,105.—PENCIL TRAY—Edith L. Hamilton, Fresno, Cal.
657,106.—DRAWING BEER—L. H. Handy, S. F.
657,197.—LUNCH BOX—L. J. Hills, Fruitvale, Cal.
657,219.—LUBRICATOR—B. Jackson, S. F.
657,287.—BALING PRESS—C. J. Johnson, Paso Robles, Cal.
657,423.—LAMP BRACKET—B. F. Kent, Eugene, Or.
657,363.—SPRINKLER—J. W. Sanderson, Oakland, Cal.
657,460.—FISH TRAP—J. O. Sharpless, Fairhaven, Wash.
657,206.—FIBER FORMING MACHINE—C. M. & O. C. Terrell, Grant's Pass, Or.
657,258.—HYDROCARBON BURNER—S. M. Trapp, Tacoma, Wash.
657,259.—HARVESTER REELS—S. M. Warder, Winters, Cal.
657,376.—GAS GENERATOR—G. Woods, Bakersfield, Cal.
657,150.—GAS GENERATOR—Wonnald & Ames, Spokane, Wash.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

BOX PRINTING MACHINE.—No. 656,383. Aug. 21, 1900. John F. Ames, Portland, Or. This invention is designed to provide for the printing of the boards which are employed for making wooden boxes. These boards are not very carefully sawed and therefore vary in thickness, and it is necessary to so mount the printing rollers that they will adjust themselves to the varying thicknesses of material. The roller carrying the type of printing surface and the second roller have the ends journaled and turnable in independent and elastic bearings so that they are movable to and from each other, and one end is capable of a vortical hold independent of the other to compensate for different thicknesses of the ends of the board caused by irregularities in sawing. Means are devised for intermittently passing the boards to be printed between the rollers, and means for transmitting power to rotate the rollers in unison. By an arrangement of driving and idler pulleys and a rope or belt passing around them the automatic adjustment of the rollers is permitted without deleterious effect upon the belt.

HARNESS SUPPORT.—No. 656,405. Aug. 21, 1900. William R. Hewitt, San Francisco, Cal. This invention is designed for suspending harnesses in a spread condition as they are employed in fire, police departments and like places where it is necessary for the horses to be attached to the apparatus and in readiness to start in the shortest space of time after an alarm. These harnesses are usually spread out and suspended by ropes or equivalent attachments, but the devices by which they are thus held are not of permanent adjustment and are continually in need of repairs. In the invention is employed a series of telescoping tubes, with springs in the tubes whereby each of the set is independently spring supported. Devices are employed by which the springs may be compressed and shortened when a weight is hung from the device, and are extended and act to shorten and telescope the tube when relieved of the weight so that the tubes are carried to the upper part of the room and out of reach as soon as relieved of the harness. In conjunction with the springs may also be used pistons movable with the tubes so as to compress the air and to regulate the movement of the tubes when they are relieved of the weight of the harness so that they do not fly up too suddenly.

HYDRAULIC RIVETING APPARATUS.—No. 656,815. Aug. 28, 1900. S. Foreman, Sacramento, Cal., assignor to Schaw, Ingram, Batcher & Co., same place. This invention is designed for riveting the longitudinal seams of sections or joints socalled from which lengths of pipe are afterwards made up by riveting these sections together. It consists of a mechanism by which the overlapping edges of the plates are pressed together just previous to the heading of the rivet, a mechanism by which the section is advanced a distance equal to that between the rivet holes, means for automatically adjusting the same and means for reversing the movement of the feed apparatus so that one line of rivets is placed and headed through the length of the section and the apparatus then returns the pipe and the other line of rivets is fixed and headed. Means are provided for varying the feed and spacing to suit the difference between the rivet holes of different classes of pipe and improved construction of the riveting heads. The whole is designed to effect a perfect closure of the overlapping edges of the pipe before the rivet is headed so that leaky joints are prevented.

HYDRAULIC PLATE CLOSING AND RIVETING DEVICE.—No. 656,801. Aug. 28, 1900. J. H. Batcher, Sacramento, Cal., assignor to Schaw, Ingram, Batcher & Co., same place. This invention relates to an apparatus which is designed for riveting pipe sections together to form convenient lengths for transportation and subsequent use. It consists of a ram and its cylinder with pipes by which fluid under pressure is admitted thereto, a mandrel and a rivet head-forming tool opposed to the ram, a sleeve loosely surrounding the rivet heading tool, hydraulic pressure plungers and a head transversely connecting the upper end thereof and supporting the sleeve, and by which said sleeve is forced upwardly to form a support for the meeting pipe sections whereby the pressure of the ram first closes the sections together, and afterwards forces the support backwardly to allow the rivet to be headed. Water is brought to the ram cylinder and plate closing pressure cylinders by means of a swivel jointed pipe from an accumulator or pressure apparatus, and is distributed to the respective parts through suitable branches. The whole apparatus may be suspended or supported from a traveling carriage so that the apparatus may be moved alternately to two different parallel lines of pipe; and when one joint has been completed, the other line of pipe being in position, the apparatus can be shifted to the new line while another joint is being prepared from the first named line. Suitable carriages support and carry away the finished sections.

BALING PRESSES.—No. 656,767. Aug. 28, 1900. Charles Dodge, Davisville, Cal. This invention relates to improvements in baling presses of that class in which the follower moves in a vertically disposed box or chamber, and in which a door has its lower edge hinged near the bottom so that the top may drop outwardly to receive the charge of material, said door being closed when the press chamber is sufficiently filled and previous to raising the follower to compress the bale. The invention consists of a combination of levers operating similarly to what are known as carriage joints and connections, and by these levers the door is opened and closed. The levers are in turn connected by chains with the operating sweep which may be driven by horse or other power.

Latest Market Reports.

SAN FRANCISCO, Sept. 13, 1900.

SILVER—Per oz., Troy: London, 28⅞d (standard ounce, 925 fine); New York, bar silver, 62⅝c (1000 fine); San Francisco, 62⅝c; Mexican dollars, 50½c.

The Mexican Central Railway officials recently sold $250,000 worth of Mexican dollars at 50½ cents—the highest price obtained by the company since April, 1897, and above current quotations at that time. The sale was made in San Francisco.

COPPER.—New York: Lake, 1 to 3 casks, 17.00 cash; carload lots, 16.75; Electrolytic, 1 to 3 casks, 16.87½; carload lots, 16.62½; Casting, 1 to 3 casks, 16.87½; carload lots, 16.62½. San Francisco: 18. Mill copper plates, 20c; bars, 22@23c.

LEAD.—New York, $4.37½; Salt Lake City, $4.25; St. Louis, $4.32½; San Francisco $5.00, carload lots; 5½c 1000 to 4000 lbs.; pipe 6¾, sheet 7½, bar 6c. London, £17 15s.

In Jersey City, N. J., on the 12th at the annual meeting of the American Smelting & Refining Co. it was given out that the earnings for the first fiscal year ending April 30th are approximately $3,400,000, which is sufficient to pay more than 5% on the common after the regular 7% on the preferred. It is the intention of the company, however, not to declare a dividend on the common, but to keep the surplus for betterment. The company produced last year about $20,000,000 in gold and $30,000,000 in silver.

The new prices of the A. S. & R. Co., 50-ton lots, are as follows:

Delivered.	Desilverized.	Corroding.
St. Louis	$4 32½	$4 42½
Chicago	4 32½	4 42½
Cincinnati	4 37½	4 47½
Pittsburg	4 47½	4 52½
Philadelphia	4 42½	4 52½
New York	4 37½	4 47½
Boston	4 45	4 55

On carload lots 5c. per 100 lbs. higher.

SPELTER.—New York, $4.15; St. Louis, $4.00; San Francisco, ton lots, 5½c; 100-lb lots, 5¾c.

ANTIMONY.—New York, Cookson's, 10½c; Hallett's, 9½c; San Francisco, 1000-lb lots, 12c; 300 to 500 lbs., 13@14c; 100-lb lots, 15@18c.

IRON.—Pittsburg, Bessemer pig, $15; gray forge, $14.00; San Francisco, bar, per lb., 2.50c in small quantities.

STEEL.—Bessemer billets, Pittsburg, $17.50; sheet bars, $22.50; San Francisco, bar, 7c to 12c per lb.

TIN.—New York, pig, $31.75; San Francisco, ton lots, 33c; 1000 lbs., 33½c; 500 lbs., 34c; less, 35c; bar tin, ℔ lb, 40c.

QUICKSILVER.—New York, $51.00; large lots: London, £9 5s; San Francisco, local, $49.00 ℔ flask of 76½ lbs.; Export, $46.00.

MAGNESIUM.—New York, $3.00 ℔ lb.; San Francisco, $4.00.

ZINC.—San Francisco, 5½c; slab, 6c; bar, 7¾c.

SOLDER.—Half-and-half, 100-lb. lots, 21c; San Francisco, Plumbers', 100-lb. lots, 17¾c.

BABBITT METAL.—San Francisco, No. 1, 10c.

ASSAY LITHARGE.—San Francisco, 10c ℔ lb, small lots.

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 30c to 35c.

PHOSPHORUS.—F. o. b. New York or Philadelphia, 45@50c ℔ lb.

TUNGSTEN.—New York, ℔ lb., 95c; San Francisco, $1.15.

FERRO-TUNGSTEN.—New York, 37%, 35c; San Francisco, 65c (60%).

FERRO-MANGANESE.—Pittsburg, 80%, domestic, $85, large lots.

PLATINUM.—San Francisco, crude, $17 ℔ oz.; New York, $18.25; manufactured, $19.50@22.00.

BISMUTH.—New York, ℔ lb., $1.60 50-lb lots; San Francisco, $2.50 to $2.75 lb lots.

POWDER.—F. o. b. San Francisco: No. 1. 70% nitro-glycerine, per lb., in carload lots, 15¼c; less than one ton, 17¼c. No. 1*, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1** 50%, carload lots, 11¾c; less than one ton, 13¾c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9½c; less than one ton, 11½c. No. 2** 30% carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9, in lots not less than 1000.

FUSE.—Triple tape, $3.60 per 1000 feet; double tape, $3.00; single tape, $2.65; Hemp, $2.10; Cement No. 2, $3.00; Cement No. 1, $2.65, in lots of 3000 feet and up.

CANDLES.—Granite 6s, 16 oz., 40s., 12¼c ℔ set; 14 oz., 40s., 11¼c.

CHEMICALS.—Cyanide of potassium, 98%-99%, jobbing, 32½@34½c ℔ lb.; carloads, 31@32c; in 10-lb. tins, 40c; sulphuric acid, 66% B, 2c ℔ lb.; soda ash, $1.60 ℔ 100 lbs. 58%; hyposulphite of soda, 2¾@3c ℔ lb.; blue vitriol, 5½@6c ℔ lb.; borax, concentrated, 7@8c ℔ lb.; chlorate of potash, 12@13c; roll sulphur, 6c; alum, $1.90@2.00; flour sulphur, French, 2¼@2½c; California refined, 1¾@2c; nitric acid, in carboys, 8c ℔ lb.; caustic soda, in drums, 3@4c ℔ lb.; Cal. s. soda, bbls., $1.00; sks, 95c ℔ 100 lbs.; chloride of lime, spot, $2.50@2.60; nitrate of potash, in kegs, 8c; caustic potash, 10c in 40-lb. tins.

COAL.—San Francisco, coast, yard prices: Wellington, $9; Seattle, $7.00; Coos Bay, $5.50; Southfield, $9.00. Cargo lots, Eastern and foreign: Wallsend, $8.00; Brymbo, $7.50; Pennsylvania, hd., $14.00; Scotch, $8; Cumberland, $12; Cannel, $9.50; Welsh Anthracite, $12.00; Rock Springs, $8.50; Colorado Anthracite, $14.50. Coke, $16 per ton in bulk; $18 in sacks.

San Francisco Stock Board Sales.

SAN FRANCISCO, Sept. 13, 1900.

9:30 A. M. SESSION.

300 Andes.......07c
300 B. & B......27c
400 Challenge....20c
100 G. & C......36c
700 Mexican.....26c
200 Ophir 47c
200..............46c
200 Savage......18c
100 Silver Hill..36c

2:30 P. M. SESSION.

300 G. & C.....35c
200 C. C. & V.$1 20
400 Savage......17c
500 Chollar 18c
300 H. & N.....21c
100 Potosi.......12c
300 Y. Jacket ...18c
100 Belcher.....18c
300 Utah........05c
1200 Overman...10c
300 Caledonia....44c
300 Silver Hill...37c
800 Challenge...20c
200 Occidental...08c

SITUATIONS WANTED.

Position as chief engineer at mines. Go anywhere. Have family. Long experience with mining machinery. R. J. Blackwell, Temescal, Riverside Co., Cal.

WANTED.—SITUATION BY A COMPETENT and experienced millman on concentrators or battery frame. Highest references. Address L. W., 509 Kearny street, room 2, first floor, San Francisco, Cal.

WANTED.—SITUATION AS MANAGER OF producing or developing property. Twelve years' experience in gold mining and milling, copper mining and smelting. Address C. H., care of Mining and Scientific Press.

MINING ENGINEER (technical training), twenty years' experience as surveyor, assayer, superintendent and manager of mines and mills; business qualifications; linguist; at present general manager mining and milling proposition in Mexico; desires to make a change on account of health; best references. Address S. O., Mining and Scientific Press.

WANTED.—A SITUATION AS MANAGER OF A gold quartz mine in Colorado or California; understand assaying and chlorination; salary, one-half in mining stock and one-half in cash. $200 per month. Reference as to ability: L. X. Smith, manager of Gillett Gold Extraction Co. Address L. W. THIELE, Altman, Colorado.

WANTED SITUATION

AS MILLMAN, FOREMAN, OR ASSISTANT.

Have had eight years' experience with one of the largest mining companies in Idaho, in pan amalgamation, cyaniding and refining of bullion. Ability to do assaying. Refer to De Lamar Mining Co., De Lamar, Idaho. Address W. H., this office.

WANTED.

WANTED.—A COMPETENT AND RELIABLE man to take charge of a gold quartz mine and stamp mill in Sinaloa, Mexico. Must understand assaying and have business qualifications. References as to ability and honesty required. Address C. L. Merry, Pres. H. G. M. Co., Kansas City, Mo.

WANTED.

Experienced Promoter and Stock Operators

to handle the sale of stock for an oil company. State previous experience.

For particulars, address

C. J. TALLON,
308 Market Street,........San Francisco, Cal.

Experienced Coal Miners

can secure **steady employment** either on **contract** or by **day's work** at the **TESLA COAL MINES, Tesla, Alameda County, California.** Good wages guaranteed, also good board. Good climate, and also good accommodations and houses for families.

For further particulars, please apply to the Superintendent at the Mines, or to the Company at 328 Montgomery St., San Francisco, Cal.

REFRACTORY ORES WANTED.

1000 TONS or more which will assay $75.00 Gold per ton and over, delivered free of charge at San Francisco, Cal. Correspondence solicited.

C. J. TALLON,
308 MARKET STREET, SAN FRANCISCO, CAL.

WANTED.

A Rich Placer proposition, adapted to working by Railroad Steam Shovel, or Dry Land Excavator. Description, with price and terms, to receive attention must be accompanied by reliable reports and references.

Address: **EDWARD N. BREITUNG,**
MARQUETTE, MICH.

Quicksilver

—FOR SALE BY—
The Eureka Company,
OF SAN FRANCISCO.
ROOM 1, - - 320 SANSOME STREET,
SAN FRANCISCO.

BENJAMIN T. LLOYD, STOCKS, BONDS AND MINES.

Have immediate customers for well-developed Gold and Copper Properties.

P. O. Box 608, **SALT LAKE CITY, UTAH.**

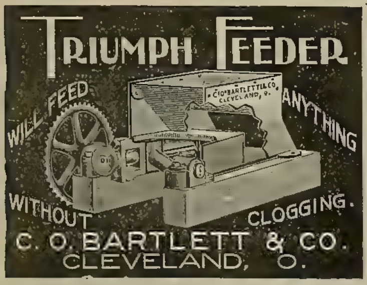
MILL PLANS.

Cyanide, Concentration, Smelting, Sampling.

F. D. BAKER, Mech. Eng., DENVER.

SPECIAL MEETING.

A Special Meeting of the Stockholders of the Electric Placer Mining Co. will be held at the office of the company, Room 202 Hearst Bldg., San Francisco, Cal., on Saturday, Sept. 29 h, 1900, at 3 o'clock P. M. A. R. VINING, Secretary.


TRIUMPH FEEDER
WILL FEED ANYTHING WITHOUT CLOGGING.
C. O. BARTLETT & CO.
CLEVELAND, O.

PRICE, $50.00.

INFORMATION WANTED

regarding whereabouts of John R. Williams, about 70 years old. Last heard of as Supt. of a mine in Copper's Hill, Vermont, in 1866. Has an adopted son about 32 years old. Supposed to be placer mining in the West, possibly California. $25.00 reward at Deseret News Office, Salt Lake City, Utah.

Quicksilver

For Sale in Lots to Suit.

REDINGTON & COMPANY, Wholesale Druggists, 23-25-27 Second Street, San Francisco.

FOR SALE.

FOR SALE.---A "Daniel Best" Gasoline Engine, 14 H. P., in perfect order.

Apply at Room 69, Nevada Block, San Francisco.

FOR SALE.

Lease and Bond, Eighteen Months, Easy Terms, Copper Property, New Mexico.

High grade ore with good gold values. Accessible. Plenty wood and water. Strong vein. Three shafts. Will pay from start. Adjoins large producing mine. **H. E. RUNKLE, El Paso, Texas.**

FOR SALE OR LEASE.

San Bartola Group of Mines,

PACIFIC COAST, TEPIC, MEXICO.

Three big old mines forming group, with any amount of gold, low grade, in sight. Timber and water power close to the mines. Reports and maps sent on application. Address to LIC. ELIAS GALINDO, P. O. Box 26, Tepic, Mexico.

FOR SALE.

Hydraulic Pump and Press.

Watson & Stillman Pump and Caking Press. Nearly new.

THE S. H. SUPPLY CO.
WRITE FOR CATALOGUE OF MINING MACHINERY AND SUPPLIES.
22nd and Larimer Sts., DENVER, COLO.

ASSAY OFFICE FOR SALE.

An old established and completely equipped Assay Office and Chemical Laboratory, doing a good business in Denver, Colo.; power plant with crushing and grinding apparatus in connection. Good business reasons for selling. Bargain if sold at once. Address Q 641, Mining and Scientific Press.

FOR SALE. Hoisting Outfit.

Webster, Camp & Lane $13\frac{1}{4}''$x15'', double cylinder, double drum Hoist. Drums 66'' diameter, good for 800 feet. Two boilers 60'' diameter by 16' long, with stack and fixtures complete.

One Cameron Sinking Pump, 4'' suction, 3'' discharge.

One Deane Feed Pump; two injectors, one for each boiler; pipe fittings and connections.

This plant is new, having been in service less than three months. Immediate shipment from Deadwood, S. D.

For price and particulars, address

WILLIS SHAW, Machinery,
Chicago, Ill.

D. Campbell Davies & Co.,

REPRESENTING THE LARGEST
EUROPEAN and AMERICAN
MANUFACTURERS
— OF —
Mills, Mine and Smelting Machinery Supplies.

EXPORT TRADE A SPECIALTY.

Apartado No. 83,
DURANGO, - - - MEXICO.

SPIRAL SAND PUMPS.

For Pumping Sand, Slimes, Tailings and Crushed Ores.

The Cheapest and Most Durable Pump on the Market. Manufactured by J. H. Frenier & Son.

Represented by M. S. HAUSER,
12 Front Street,............San Francisco, Cal.

EFFECTING ECONOMY IN

Steam and Power Plants

IS MY BUSINESS.

DOES IT INTEREST YOU?

Howard H. Fielding,
1328 Seventeenth St., DENVER, COLO.

THE CALIFORNIA DEBRIS COMMISSION HAVING received applications to mine by the hydraulic process from W. W. Treat and John H. Thomas, in the Good Hope Mine, near Eclipse, Plumas Co., to deposit tailings in Onion Valley Creek; from the Bader Gold Mining Co., in the Bader Gold Mine, near Magalia, Butte Co., to deposit tailings in Little Butte Creek; from the Ralston Divide Gold Mining Co., in the Lynchburg Mine, near Virner, Placer Co., to deposit tailings in Long Canyon; and from G. H. Lewis et al., in the Snake Gulch Gravel Mine, near Vallicita, Calaveras Co., to deposit tailings in Snake Gulch, gives notice that a meeting will be held at Room 59, Flood Building, San Francisco, Cal., Sept. 24, 1900, at 1:30 P. M.

THE ERICSSON SWEDISH
TELEPHONES
HAVE BEEN IN USE OVER 20 YEARS.
THEY ALWAYS TALK: GIVE THEM A CHANCE TO TALK TO YOU.
CATALOGUES FREE.
ERICSSON TELEPHONE CO
20 WARREN ST. NEW YORK, N.Y.

WE BUY very rich Ores, Dental Scraps, Tellurium Ores, Mill Wastes, Jewelers' Sweeps, Gold Retorts, Old Iron Retorts, Base Amalgam, Quicksilver, Amalgamated Plates, Gold and Silver, Old Slags.

A. M. DONALDSON & CO.,
ASSAYERS AND WASTE PRODUCT SMELTERS,
1661 Larimer St., Denver, Colo.

Donaldson's Assayers' Slag Hammer { 1 lb......$1.10 / 1 lb. 3 oz. $1.25 }

WEST COAST OF MEXICO.

WÖHLER, BARTNING Suc's, Mazatlan (Sinaloa), Mex.

Bankers, Importers, Exporters and Commission Merchants.

Representatives and Agents of the principal Mining Companies in the State of Sinaloa and the dependencies of the Pacific coast in the States of Durango, Chihuahua, Sonora, Lower California and Jalisco.

ORE BUYERS AND EXPORTERS. - MINING SUPPLIES.

Globe Engineering Company,

(INCORPORATED.)

STIRLING WATER-TUBE BOILERS.

Unequaled for Mines and Mills.
Easily Transported. Quickly Cleaned.

EXETER HOISTING ENGINES; CORLISS, SLIDE VALVE AND AUTOMATIC CUT-OFF ENGINES; BOILERS; STEAM PUMPS; SINKING PUMPS; HIGH DUTY PUMPING ENGINES; AIR COMPRESSORS; FEED WATER HEATERS AND PURIFIERS; JET AND SURFACE CONDENSERS; WALKER'S METALLIC PISTON ROD PACKING; LOCKE DAMPER REGULATORS; REFRIGERATING MACHINERY.

STEEL MILLS, ROCK AND SHAFT HOUSES.
OTTO AERIAL ROPEWAYS,

COMPLETE DESIGNS for STEAM PLANTS for MINES and MILLS.

GLOBE ENGINEERING COMPANY,
Mechanical, Civil and Mining Engineers, 509 Mission St., San Francisco, Cal.

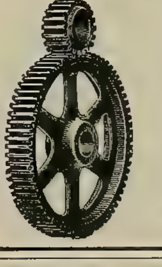
There are 500 Points to be Gained

from consulting our little "ENGINEERS' RED BOOK." In addition to answering that many problems of interest to the engineer, it tells you the good points of the

U. S. AUTOMATIC INJECTOR.

Let us mail you one of the books.

AMERICAN INJECTOR CO.,
Detroit, Mich., U. S. A.



P. T. TAYLOR & CO.,

525 MISSION ST., SAN FRANCISCO, CAL.

GEAR WHEELS, GEAR CUTTING,

ALL DESCRIPTIONS UP TO 50 INCHES.

GEARS FOR AUTOMOBILES A SPECIALTY.

FULL INFORMATION BY MAIL.

GENERAL PHOTO-ENGRAVING CO.

[SUCCESSORS TO DEWEY ENGRAVING CO.]

FINE ZINCOGRAPHS, HALF-TONES, AND DESIGNING.

ENGRAVINGS OF MACHINERY OUR SPECIALTY.

SEND FOR SAMPLES AND PRICES.
TELEPHONE BLACK 1466.

NO. 536 CLAY STREET,
SAN FRANCISCO, CAL

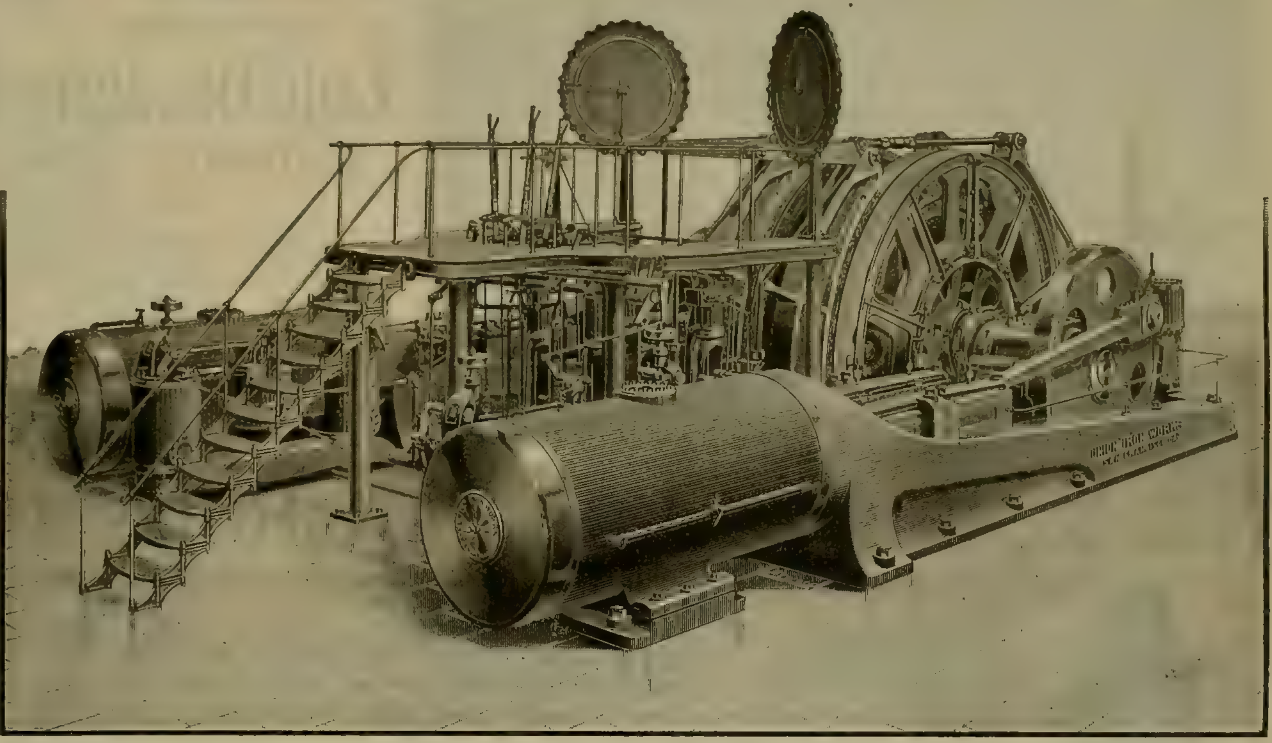
UNION IRON WORKS,

222 Market Street, San Francisco, Cal.

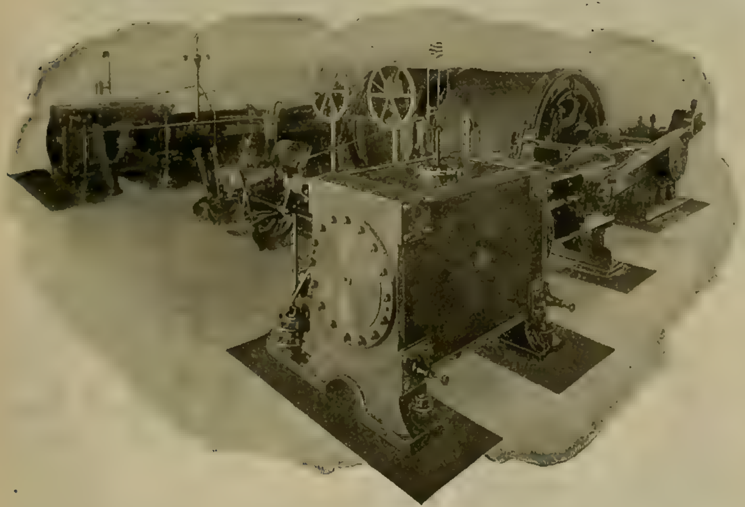
30in. x 72in. Direct Acting Hoisting Engine

BUILT FOR THE
Anaconda Copper Mining Company
OF MONTANA.

Embodying all that experience and practical working have demonstrated as valuable in this class of machinery.



The brakes, clutches and reversing gear are arranged to be operated by compressed air or steam, by means of auxiliary cylinders which are under full control of the engineer, stationed upon the elevated platform shown, insuring the most rapid work with absolute safety. Shaft hollow forged steel of ample strength and stiffness to withstand any strains; reciprocating parts of steel and are as light as consistent with the duty required; cylinders of the "overhung" type, weight being taken by a guide saddle, which admits of free longitudinal movement, due to expansion, causing no strain on bed plate or foundations; cylinders steam-jacketed, fitted with valves provided with Corliss releasing gear and hand cut-off, enabling the engines to be run economically with reference to the work to be performed; bed plates modification of the Porter Allen type, heavy and substantial, with large foundation base and anchor bolts. A duplicate of this engine has also been furnished the Homestake Mining Company of Dakota.



HIGH CLASS FIRST MOTION HOISTING ENGINES

Especially Designed

For Heavy Duty and Deep Mine Work.

Built with **CORLISS OR SLIDE VALVE ENGINES** and for either **ROUND OR FLAT ROPE.**

Our line of Hoisting Machinery is the most complete carried by any one concern in the United States. Write us of your wants.

THE HENDRIE & BOLTHOFF M'F'G & SUPPLY CO.,

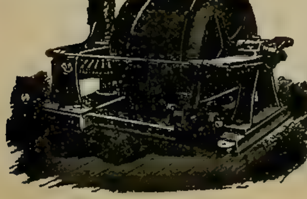
No. 35. **DENVER, - - - - - - COLORADO.**

JOSHUA HENDY MACHINE WORKS,

No. 42 FREMONT STREET, SAN FRANCISCO, CAL.

—BUILDERS OF—

"Davis" Horse Power Whims. Ore and Rock Cars.



Specialty of
PROSPECTING, MINING and MILLING PLANTS.

ORE and WATER BUCKETS.

"T" RAIL OF
USUAL WEIGHTS,
EITHER NEW
OR SECOND-HAND,
FOR SALE
CHEAP.

ADAMANTINE SHOES AND DIES.

◆◆◆◆◆CHROME CAST STEEL.◆◆◆◆◆

CANDA Improved Self-Locking CAMS.

TAPPETS, BOSSES, ROLL SHELLS AND CRUSHER PLATES.

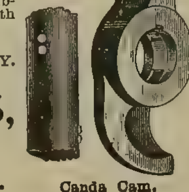
These castings are extensively used in all the mining States and Territories of North and South America. Guaranteed to prove better and cheaper than any others. Orders solicited subject to the above conditions. When ordering, send sketch with exact dimensions. Send for Illustrated Circular.

Manufactured by **CHROME STEEL WORKS,** Brooklyn, N. Y.

H. D. & H. W. MORRIS,

AGENTS,

Room 194 Crocker Building, San Francisco, Cal.



Canda Cam.

RISDON IRON WORKS,

SAN FRANCISCO, CALIFORNIA.

Cable: "Risdon's." Code: A. B. C. & Leiber's.

MANUFACTURERS OF

Gold Dredging Machinery

And COMPLETE EQUIPMENT for Placer Mines
OUR SPECIALTY.

We build **GOLD DREDGES COMPLETE IN RUNNING ORDER** to handle 2500 cubic yards per day at a cost of 3 cents per cubic yard.

We excavate 50 feet below water, 20 feet above water and handle boulders up to one ton weight.

Send for Dredging Catalogue No. 17.

—WE ALSO BUILD—

All kinds of Mining, Milling, Concentrating, Pumping, Air Compressing, Hydraulic, Water Wheel and Hoisting Machinery.

EVANS HYDRAULIC GRAVEL ELEVATORS.

We publish sixteen catalogues. Write for one in the line you are interested in.

THE RISDON HAMMERED SHOES AND DIES.

Manufactured from the best quality of projectile steel—which is stronger and tougher than any heretofore used—the best shoe and die ever made. Will crush more ore per pound of steel than any other. Will not chip or cup and will outcrush any other made. Wear smooth and true with hardly any perceptible decrease in their size, and those who use them say, "We never had shoes and dies wear so long." Send for circulars and dimension blanks to

RISDON IRON WORKS, San Francisco, Cal.

"Union" Hoist.

The above illustrates the 25 H. P. double cylinder, single drum "Union" hoist, with all the latest improvements.

THE UNION GAS ENGINE CO.

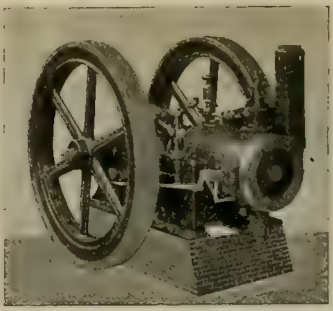
—BUILD THE—

"Union" Gas Engines,

Which use either MANUFACTURED or NATURAL GAS, ORDINARY STOVE GASOLINE (NAPHTHA or BENZINE), DISTILLATE or KEROSENE.

STATIONARY ENGINES for All Kinds of Work in Sizes from 3 to 300 h. p. in actual use.
"UNION" COMBINED HOISTS in Sizes from 2 to 130 h. p. in actual use.
"UNION" COMBINED COMPRESSORS—20, 30, 40 h. p.
HOISTS and COMPRESSORS Can Be Built in Larger Sizes to Order.
"UNION" MARINE ENGINES, 4 to 200 h. p., of Single, Double and Four-Cylinder Types.
FIFTEEN YEARS' EXPERIENCE Building Gas and Oil Engines.
"UNION" ENGINES Are In Use All Over the United States.
"UNION" ENGINES Are Simple, Durable and Economical.

Office, 248 First Street. Works, Corner First and Clementina Streets. SAN FRANCISCO, CAL.

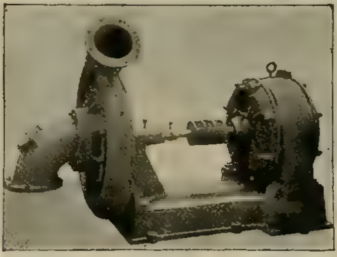


WE CAN SHOW YOU A

HERCULES Gasoline Engine

Running on less than ⅛-gallon of fuel per H. P. hour, with a speed regulation of 2½%.

JOHN WIGMORE & SONS CO.,
117-123 S. LOS ANGELES ST.,
LOS ANGELES, CAL.



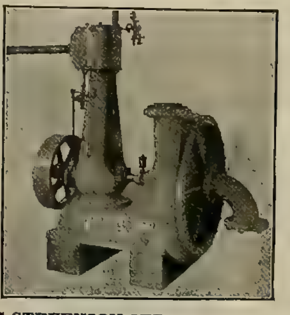
CENTRIFUGAL PUMPS

—FOR—

Mine Draining or Hydraulicking.

WE DESIGN PUMPS FOR ALL CONDITIONS.
WRITE FOR CATALOGUE.

BYRON JACKSON MACHINE WORKS, - SAN FRANCISCO, CAL.



MODERN MINING MACHINERY.

QUARTZ MILLS of any capacity,
IN UNITS OF TWO AND FIVE STAMPS.

Acme Amalgamators for CAPE NOME and other placer mining. Successfully applied to quartz mills in addition to or displacing plates.

SUCCESSFUL GRAVEL MILL RECENTLY IMPROVED.

Special Gold Dredging Pumps and Machinery. Concentrators, Feeders, Rock Breakers and Power Plants.

Largest manufacturers of Irrigation and Reclamation Pumps in the United States.

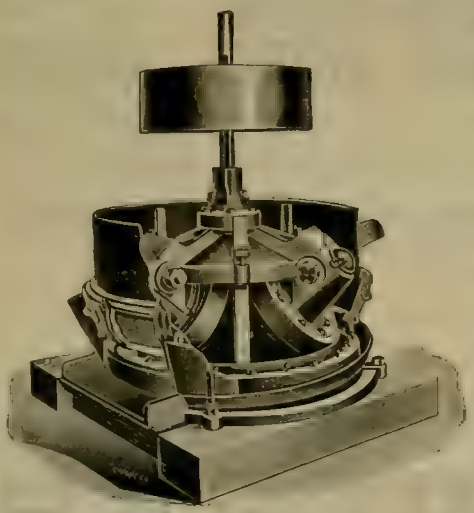
Catalogues: No. 20, Pumps; No. 22, Cape Nome; No. 25, Mining.

Krogh Manufacturing Co.,
9-17 STEVENSON STREET AND 134-136 MAIN STREET, - SAN FRANCISCO, CAL.

THE CAL. ANTI-CALORIC COMPANY,

Tel. Main 5752. Office, 217-219 Mission St., San Francisco, Cal.

Sole Manufacturers of CAL. ANTI-CALORIC SECTIONAL COVERINGS AND BLOCKS FOR BOILERS. PLASTIC (dry) for Steam Domes, Etc. Sole Agents for the Boston Asbestos Paper Co. Asbestos Goods of All Kinds. Send for Information. Factory, Potrero.

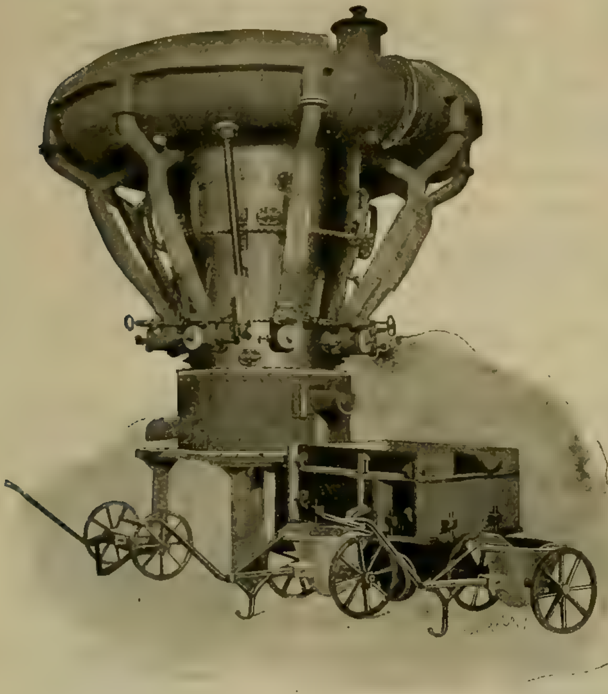


THE GRIFFIN
THREE ROLLER
ORE MILL.

The Griffin Three Roller Ore Mill is a simply constructed Mill, suitable for working all kinds of ores that require uniformly fine crushing by the wet process. This Mill is a modification of the well-known Chilian Mill, but the rollers run upon a crushing ring or die, which is inclined inwardly at an angle of about 30 degrees, the rollers themselves also being inclined to the central shaft of the Mill, thus utilizing the centrifugal force, as well as the weight of the rollers themselves as a crushing agent. The Griffin Three Roller Ore Mill is therefore a Mill of great strength, and has few wearing parts. We construct these Mills with extreme care, using only the best of raw materials, which are most carefully worked by men who are specialists as mill builders. We sell the Griffin Ore Mill on its determined merits, and will gladly supply full information regarding it to any one.

SEND FOR FREE ILLUSTRATED AND DESCRIPTIVE CATALOGUE TO

Bradley Pulverizer Co., Boston, Mass.



THE COPPER FURNACE

Here illustrated has OUR PATENT

WATER VAPORIZING ATTACHMENT.

Experience has proven this to be the best of all methods for applying water for the cooling of jackets. It has the further great advantage of using only about one-eighth the usual amount of water needed for that purpose, and all jackets are kept at the same temperature.

We Manufacture Smelting Furnaces and Equipments

FOR THE TREATMENT OF

GOLD, SILVER, LEAD, COPPER and NICKEL ORES.

of any desired tonnage capacity above forty tons per day, and put them into successful operation under guarantee. Write for catalogue showing different styles of furnaces.

We also design, manufacture and erect Smelter Sulphide Mills for crushing and sampling ores. We are the originators of the Narrow Face, Large Diameter, High Speed Crushing Rolls. A full description of our Crushing Machinery is given in a special catalogue, which will be sent on application.

THE COLORADO IRON WORKS CO.

ESTABLISHED 1860.

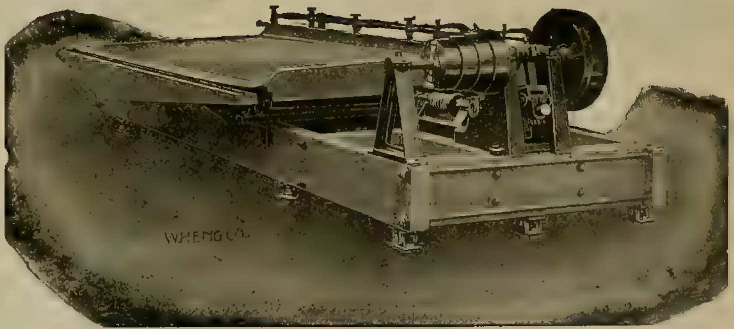
DENVER, COLO., U. S. A.

THE : CAMMETT : CONCENTRATOR.

Designed with some Regard for the Laws of Concentration.

From **The Denver Evening Post**, July 15th, 1900.

* * * "Now about concentrating tables. Here's a fellow who says there's nothing equal to the Wilfley, and I am trying to convince him that old man Woodbury over in California makes the finest table in the world." "No, sir," said his comrade, "you're way off. I've tried the CAMMETT too thoroughly to believe there's anything made to equal it."



Manufactured Under U. S. Patent No. 632,892; Dated Sept. 12, 1899.

Denver Engineering Works,---Shepard & Searing,---Sole Manufacturers,

30th and Blake Streets, - - - - DENVER, COLORADO.

CHAS. C. MOORE & CO.,

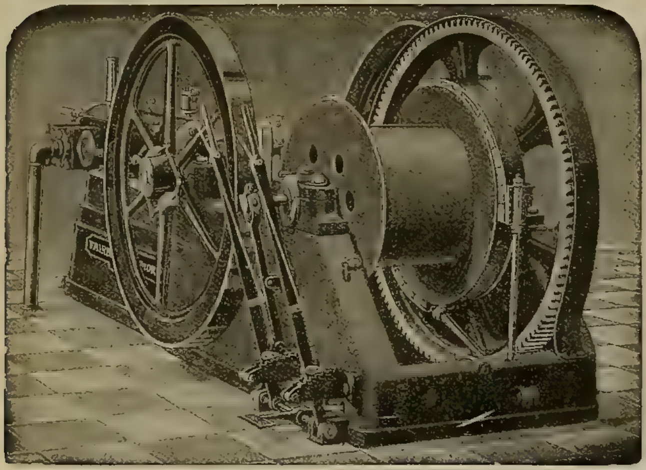
—ENGINEERS AND DEALERS IN—
MAGNOLIA ANTI-FRICTION METAL,
HAMILTON CORLISS ENGINES, N. Y. SAFETY AUTOMATIC ENGINES,
BABCOCK & WILCOX BOILERS, McINTOSH & SEYMOUR ENGINES,
GREEN'S ECONOMIZERS, HOPPES LIVE STEAM PURIFIERS,
WHEELER CONDENSERS, BARNARD-WHEELER COOLING TOWERS,
EDMISTON FEED WATER FILTERS, BUNDY STEAM TRAPS,
SNOW STEAM PUMPS, QUIMBY SCREW PUMPS,
GOUBERT FEED WATER HEATERS, STRATTON STEAM SEPARATORS,
SPENCER DAMPER REGULATORS, HYATT ROLLER BEARINGS.

Contracts for Installation of Power Plants,
Any Capacity.

SEND FOR CATALOGUES AND FULL INFORMATION.

32 FIRST STREET, SAN FRANCISCO, CAL.

SEATTLE BRANCH..............313 FIRST AVE. SOUTH.
LOS ANGELES BRANCH........103 SOUTH BROADWAY.



FAIRBANKS-MORSE
GASOLINE-DISTILLATE GEARED HOISTER.

An efficient and reliable combination of a Fairbanks-Morse Gasoline-Distillate Engine on the same base with a Friction Hoist. Modern and up to date. We publish a special catalogue describing our Hoister which we gladly mail prospective purchasers.

FAIRBANKS-MORSE GASOLINE-DISTILLATE ENGINES.
ALL SIZES UP TO AND INCLUDING 54 HORSE POWER.
For Pumping, Milling, Lighting, Air Compressors, Etc.

FOR CATALOGUES AND FULL INFORMATION, ADDRESS
FAIRBANKS, MORSE & CO.,
310 MARKET ST., SAN FRANCISCO, CAL.
201 N. LOS ANGELES ST., LOS ANGELES, CAL.
FIRST AND STARK STS. PORTLAND, OGN.
1600 SEVENTEENTH ST., DENVER, COL.
FRANKLIN AND MONROE STS., CHICAGO, ILL.

GATES IRON WORKS.
HIGH GRADE CRUSHING ROLLS.

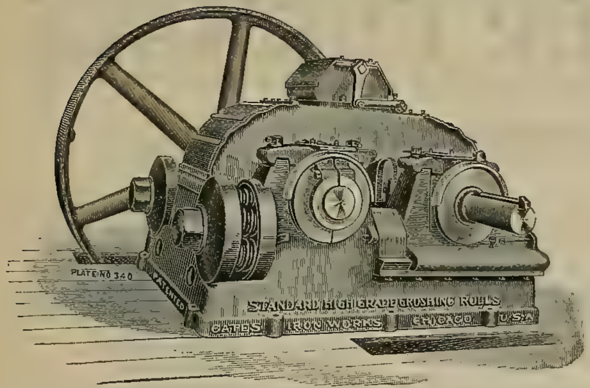


PLATE No 340
STANDARD HIGH GRADE CRUSHING ROLLS
GATES IRON WORKS CHICAGO U.S.A.

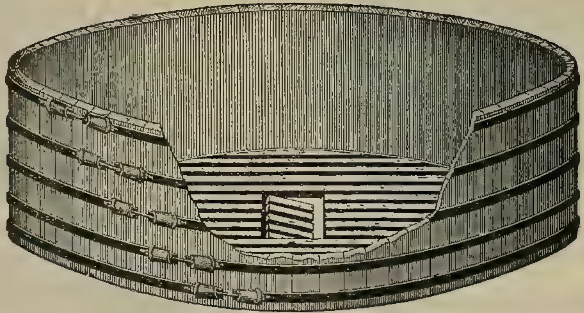
UNEQUALED IN ECONOMY FOR CRUSHING ORES DRY.
Extensively used in connection with Gates Rock and Ore Breakers, Ball Mills and Tube Mills in Cement Plants for very fine pulverizing. : : : : : : : :

BUILDERS OF ROCK AND ORE CRUSHING MACHINERY.

SEND FOR CATALOGUE NO. 5. Address Dept. UU, 650 ELSTON AVE., CHICAGO.

CYANIDE TANKS! MINING

LEACHING TANKS,
SOLUTION "
SUMP "
WATER "
EXTRACTION BOXES.



Estimates Furnished for Complete Cyanide Plants.

SEND FOR ILLUSTRATED CATALOGUE OF CYANIDE TANKS AND FIXTURES, MAILED FREE.
Pacific Tank Co., Manufacturers, 35 Beale St., San Francisco, Cal. 348 EAST SECOND STREET, Los Angeles, Cal.

THE MINE AND SMELTER SUPPLY CO.,
DENVER, - - COLORADO.
Mining and Milling Machinery and Supplies.

We beg to call your attention to
THE FINLAYSON PATENT
WIRE ROPE TRAMWAY—
the latest and best system of double-rope automatic aerial tramway in the market.
If interested in the most economical system of transporting ores from mine to mill and to shipping stations, send for our special tramway catalogue.

We carry a complete stock of Machinery and Supplies for immediate delivery.

Send for our special catalogues on Mining Machinery, Milling Machinery, Wilfley Concentrators, Tramways, Power Transmission Machinery, Machine Tools, Etc.

THE MINE AND SMELTER SUPPLY CO.,.....................Denver, Colorado.
THE MINE AND SMELTER SUPPLY CO.,.................Salt Lake City, Utah
THE MEXICO MINE AND SMELTER SUPPLY CO.,
No. 16 San Francisco St., City of Mexico.

BOILERS, ENGINES, STEAM HOISTERS, ELECTRIC HOISTERS, ROLLS, CRUSHERS, WILFLEY TABLES, CARS, CAGES, ORE BUCKETS, RAIL, PIPE, FITTINGS, BELTING, ETC., ETC.

DEWEY, STRONG & CO., Patent Agents, 330 Market St., S. F., Cal.

Finlayson Patent Aerial WIRE ROPE TRAMWAY

FOR TRANSPORTATION OF ORE, COAL,
DIRT, TIMBER, ETC.

Perfect Grip Clip,
Absolutely Safe,
Loads Automatically,
Unloads Automatically,
Operated by One Man,
Cost of Maintenance Low,
Capacity Largest Obtainable.

ALSO SOLE MANUFACTURERS
PATENT FLATTENED STRAND
HERCULES WIRE ROPE
[TRADE MARK REGISTERED.]
—AND—
Wire Rope
OF EVERY DESCRIPTION.
—o—
MANILLA, SISAL, BLOCKS, ETC.

A. LESCHEN & SONS ROPE CO.,
Home Office: 920-922 North Main St., ST. LOUIS, MO. Branch Office: 47-49 South Canal St., CHICAGO, ILL.

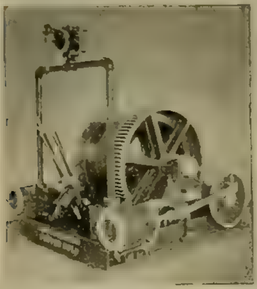
Westinghouse Electric
& Manufacturing Co.
BUILDERS OF
Electrical Apparatus
For the operation of Mining Machinery.

All Principal Cities
in U. S. and Canada.

Adopted for service in the best equipped mines.

Pittsburg, Pa.

651



The above cut illustrates my new and improved Hoister.

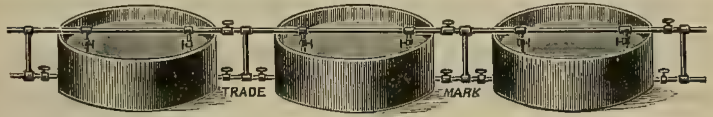
Hoisting Engines
A SPECIALTY.
REVERSIBLE, LINK-MOTION, GEARED and FRICTION CLUTCH HOISTS carried in stock.
Special Machinery Built to Order.
GEO. G. JACKSON,
1724-34 Wynkoop St., DENVER, COLO.

TRADE MARK.

(M'ARTHUR-FORREST PROCESS.)

CYANIDE PROCESS.
The MacArthur-Forrest Cyanide Process is the Best
For the Treatment of Refractory and Low Grade Gold and Silver Ores and Tailings. We are the Originators of the Cyanide Treatment, and have kept up with the times in all Improvements in Cyanide Methods.
Successful Plants in Operation in all Western Mining States.
Samples Assayed and Fully Reported Upon. Properties Examined Designs Furnished. For Terms and Particulars, Address
The Gold and Silver Extraction Co. of America, Ltd.
GEO. A. ANDERSON, General Manager,
Testing Works: 1716 Blake Street, Denver, Colo. 208-210 McPhee Building, Denver, Colo.
ALMARIN B. PAUL, Agent, 27 Crocker Building, San Francisco, Cal.

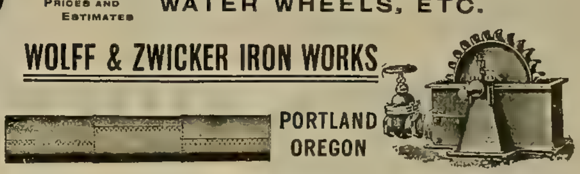
"PNEUMATIC" CYANIDE PROCESS.
(Patented in U. S., So. African Republic, New Zealand, Victoria, New So. Wales, So. Australia.)

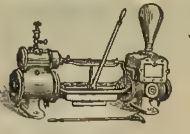


WILL DO IN 7 HOURS WHAT REQUIRES FROM 2 TO 6 DAYS BY OLDER METHODS.
SEND FOR PAMPHLET.
THE PNEUMATIC CYANIDE PROCESS CO., 306 Boston Bldg., Denver, Colo.

Are You Confronted With a Difficult Ore-Separating Problem?
THE WETHERILL MAGNETIC SEPARATING PROCESS
may prove the solution. Apply to Wetherill Separating Company, 52 Broadway, N. Y.

HYDRAULIC, MINING AND DREDGING MACHINERY, RIVETED STEEL PIPE,
WRITE FOR PRICES AND ESTIMATES
AMERICAN IMPULSE WATER WHEELS, ETC.
WOLFF & ZWICKER IRON WORKS
PORTLAND OREGON





SOLE AGENCY
Worthington Steam Pumps and Water Meters.
Pumping Plants of any Capacity.
TATUM & BOWEN,
34-36 Fremont Street, San Francisco, Cal. 29-35 First Street, Portland, Or.
MACHINERY—ALL KINDS

FOR Removing Slimes
BROMINE
CYANIDE
CHLORINATION
And Other Aquarious Chemical Solutions.
Our FILTER PRESS
Removes all Slimes and Hastens the Deposition of the Metals.
THE STILWELL-BIERCE & SMITH-VAILE CO., 276 Lehman St., Dayton, Ohio. Risdon Iron & Locomotive Works, San Francisco, Cal.; C. B. Boothe & Co., Los Angeles, Cal., Sales Agents.

THE BUCYRUS COMPANY,
DESIGNERS AND BUILDERS OF
DREDGES, STEAM SHOVELS, EXCAVATING MACHINERY,
WRECKING CARS, LOCOMOTIVE CRANES, PILE DRIVERS,
CENTRIFUGAL PUMPS, WITH SIMPLE, COMPOUND OR TRIPLE EXPANSION ENGINES,
MACHINERY FOR PLACER MINING.
SOUTH MILWAUKEE, WISCONSIN.

RELIANCE ORE CRUSHERS

(BLAKE STYLE.)

FOR SILVER, LEAD AND COPPER ORES.

COMPLETE LINE OF SMELTER TOOLS.

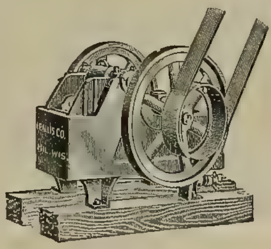
CHLORINATION AND CYANIDE PLANTS.

COLLOM AND HARTZ JIGS.

HYDRAULIC CLASSIFIERS.

RELIANCE VANNER.

Single and Double Deck SLIME TABLES.



AIR COMPRESSORS AND HOISTING ENGINES.

THE EDWARD P. ALLIS COMPANY,

RELIANCE WORKS,

MILWAUKEE, - WIS.

THE MARION STEAM SHOVEL CO.,

Steam Shovels Dredges and Traction Dredges

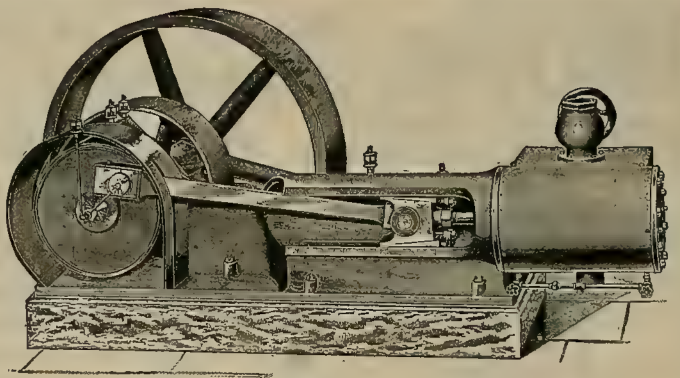
Suitable for all kinds of Excavating Work, making a specialty of

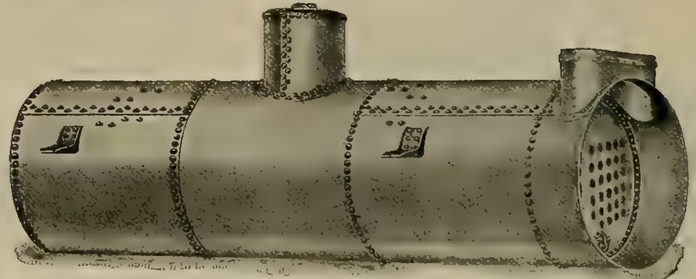
PLACER MINING MACHINES,

separate or self-contained, either as a dry land excavator or floating dredge.

The Marion Steam Shovel Co.
MARION, OHIO.

GEO. W. BARNHART, No. 4 Sutter St., San Francisco, Cal.





ENGINES, BOILERS,

UP-TO-DATE MACHINERY.

WRITE US FOR PARTICULARS.

THE COMPRESSED AIR MACHINERY CO., 11-13 First St., San Francisco, Cal.

The only roofing without a fault

P & B
Ready
Roofing

Paraffine Paint Co
116 Battery Street—San Francisco

The best builders in America use P & B Ready Roofing

Shingles may warp, slate may chip, tin may sweat, tar may run, or iron expand, but P & B will stand any climatic condition — the weather of the west requires it

Demand it of your dealer

The Copper King, Limited.

Pacific Coast Smelting and Refining Works.

Works:
Seal Bluff Landing,
Cal.

Mines:
Fresno County,
Cal.

Purchasers, Samplers and Smelters

of

Gold, Silver and Copper Ores, and Furnace Products.

Offices:

222 Sansome St.,
San Francisco, California.

Basildon House, 7-11 Moorgate St.,
London, E. C., England.

ATTENTION! USERS OF PIPE WRENCHES.

THE LATEST, BEST AND CHEAPEST PIPE WRENCH.

NO THREADS TO STRIP.
NO NUTS TO JAM.
MADE OF SPECIAL WRENCH STEEL, AND DROP FORGED.

The good qualities of Chain Pipe Wrench and Screw Pipe Wrench combined, without the faults of either.

Quick, effective and positive in adjustment. Cannot slip, crush or lock on the pipe.

Made in four sizes: 10, 18, 24 and 36 inches. Handling from ⅛ of an inch wire to 4½-inch pipe. Price no higher than other pipe wrenches on the market.

ATLAS PIPE WRENCH CO.,
Flood Building, SAN FRANCISCO.

NEW YORK OFFICE, 121 LIBERTY ST. WORKS, NEW HAVEN, CONN.

WHO BUILD THE BEST

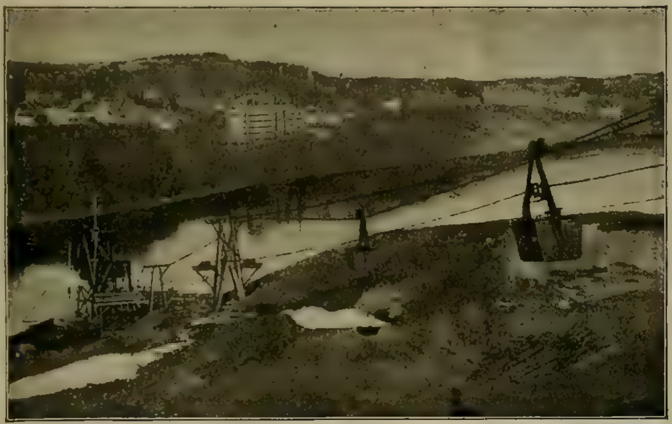
STAMP MILL?

FRASER & CHALMERS,

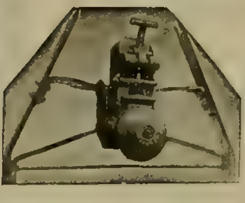
CHICAGO, ILL., U. S. A.
AND LONDON, ENGLAND.

THE PATENTED
Locked-Coil Cables AND Webber Compression Grips

Are features of the patented BLEICHERT WIRE ROPE TRAMWAY And other systems of aerial transportation.



Bleichert Tramway of the Maine Insane Hospital, Augusta, Me. View of Loading Terminal and Dock Hoist.



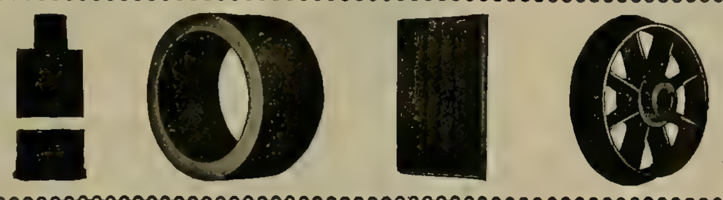
Manufactured by
The Trenton Iron Co.,
TRENTON, N. J.

Engineers and Contractors, and sole licensees in North America for the Bleichert System. Also, Wire Rope Equipments for Surface and Underground Haulage, Etc.

FOR PARTICULARS, ADDRESS
NEWTON M. BELL, Agent, 308 Market St., S. F.

☞ A full stock of the Trenton Iron Co.'s Wire Ropes, made from "SPECIAL" Crucible and Plough Steel, carried in San Francisco.

HARD ✤



TOUGH

TAYLOR IRON AND STEEL COMPANY,
HIGH BRIDGE, NEW JERSEY, U. S. A.

Sole Licensees in America under the HADFIELD System and Patents for MANGANESE STEEL,

Best Metal Known for Roll Shells, Stamp Shoes and Dies, Crusher Plates and Side Liners, Toggles and Toggle Bearings, Gyratory Cones and Concaves, or Liners, Mine Car Wheels, Coal Crushing Rolls, Etc.

PACIFIC COAST PARTIES INTERESTED PLEASE ADDRESS PARKE & LACY CO., SAN FRANCISCO, CAL.

WRITE FOR INFORMATION AND PRICES.

Established 1865. NOTICE TO GOLD MINERS. Incorporated 1890.

Silver-Plated Copper Amalgamated Plates
FOR SAVING GOLD
IN QUARTZ, GRAVEL OR BEACH MINING. MADE OF BEST SOFT LAKE SUPERIOR COPPER.

AT REDUCED PRICES.

Our Plates are guaranteed, and by actual experience are proved, the best in weight of Silver and durability. Old Mining plates replated, bought, or gold separated. THOUSANDS OF ORDERS FILLED.

SAN FRANCISCO NOVELTY AND PLATING WORKS,
☞ SEND FOR CIRCULARS. Telephone Main 976. 68, 70, 72, 74 and 76 FIRST STREET, COR. MISSION, SAN FRANCISCO, CAL.

LARGE VARIETY.

Perforated Metal

THE ROBERT AITCHISON PERFORATED METAL CO
303-305 DEARBORN ST. CHICAGO ILLS.

SUPERIOR WORK.

QUARTZ SCREENS
A specialty. Round, slot or burred slot holes. Genuine Russia Iron, Homogeneous Steel, Cast Steel or American planished Iron, Zinc, Copper or Brass Screens for all purposes. CALIFORNIA PERFORATING SCREEN CO., 145 and 147 Beale St., S. F.

Mining Screens
A SPECIALTY.

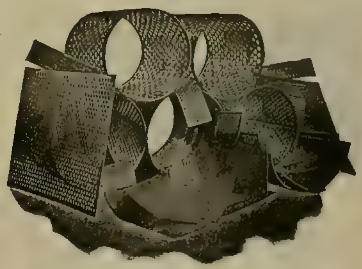
Diagonal Slot,
Straight "
Burred "
Round Holes.

In American planished or Russian iron or steel for all purposes. GEO. WIMMER, 312 Iowa Street, San Francisco. Telephone Mint 1332.

—EASTERN PRICES BEATEN.—

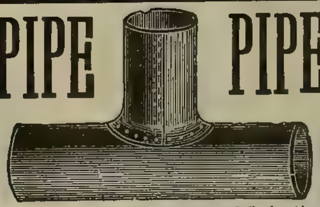
SAN FRANCISCO
Pioneer Screen Works,
JOHN W. QUICK, Prop.
Improved Facilities! Finest Work! Lowest Prices!
Perforated Sheet Metals, Steel, Russia Iron, American Planish, Zinc, Copper and Brass Screens for All Uses.
MINING SCREENS A SPECIALTY.
221 and 223 First Street, San Francisco, Cal.

For Best Satisfaction and Lowest Prices
—IN—
PERFORATED METALS
—AND—



MINING SCREENS
PLACE YOUR ORDERS WITH
Fraser & Chalmers,
CHICAGO, ILL., U. S. A.
SEND FOR SAMPLES, MENTIONING THIS PAPER.

PIPE PIPE



PIPE for Hydraulic Power and Irrigation.
OIL STORAGE TANKS.
GENERAL SHEET IRON WORK.
Lacy Manufacturing Co.,
LOS ANGELES.

FRED C. MILES,
CISCO, PLACER CO., CAL.
COPPER AND GOLD PROSPECTS.
A GOING GOLD PROPERTY.

THE IDEAL CONVEYOR BELT

Is the one that will carry stone, ore, coal, wet or dry material, holding buckets firmly and securely; will stand all kinds of exposure, and resist the heaviest strains during a long period of service. This is what the **LEVIATHAN BELT** has done, and we quote the following from a letter from the New York Steam Co.:

"We have used Leviathan Belting for four years, up to 24-inch by 8-ply, elevating and conveying coal. Some of the Belting is outside, exposed to freezing weather; some in a steam bath. In both conditions the results have been very gratifying, over 500 tons having been handled in ten hours time."

MAIN BELTING COMPANY,
1225-41 Carpenter Street, Philadelphia.
55-57 Market St., Chicago. 120 Pearl St., Boston.
SEND FOR PRICE LISTS AND SAMPLE.

OIL OR GREASE?

Whichever you use, you will obtain the BEST RESULTS if you feed it to the bearings from a

We have them for all purposes, all styles, all sizes.

TRADE PENBERTHY MARK

Send for Circulars

OILER OR GREASE CUP

And DO NOT FORGET we Manufacture and Guarantee the ERWIN STEAM RAM MOST ECONOMICAL WATER ELEVATING DEVICE

And the World Renowned PENBERTHY AUTOMATIC INJECTOR Over 200,000 in Use.

PENBERTHY INJECTOR CO.
WINDSOR, CANADA. DETROIT, MICHIGAN.

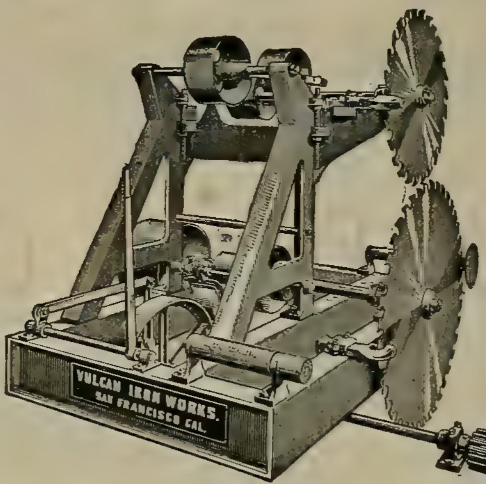
Portable Saw Mills.

No. 0
Single Circular.
4000 - 6000 feet per day.

No. 1
Single Circular.
8,000 - 10,000 ft. per day.

No. 2
Double Circular.
15,000-20,000 ft. per day.

No. 3
Double Circular.
20,000-25,000 ft. per day.


VULCAN IRON WORKS. SAN FRANCISCO CAL.

For Mining Companies
—OR—
Other Consumers of Lumber at Remote Points.

SEND FOR CATALOGUE.

Manufactured by
VULCAN IRON WORKS, Office, 505 Mission Street, SAN FRANCISCO, CAL.

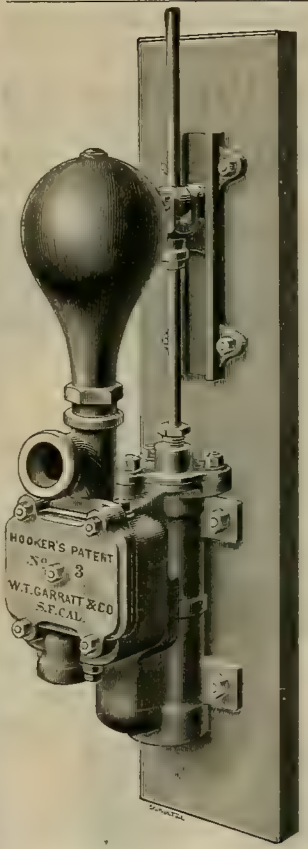
Small Portable Saw Mills and DRAG SAWING MACHINES FOR RANCHES AND MINES.

Woodworking Machinery.

LINK BELTING, SPROCKET WHEELS, ELEVATOR BUCKETS & BOOTS, TAKEUPS, FRICTION CLUTCH PULLEYS, ETC.

ALL STYLES AND SIZES IN STOCK FOR IMMEDIATE DELIVERY.

JNO. D. EBY,
17 & 19 MAIN STREET, - SAN FRANCISCO, CAL.

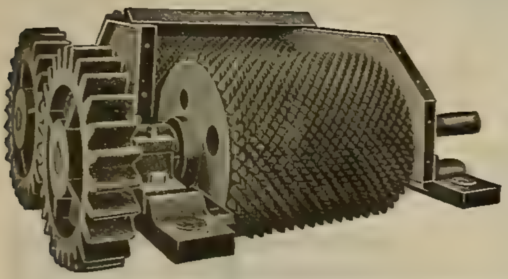


A GOOD MINING PUMP.

The Hooker Double Acting Pump.
Well Built, Simple, Durable, Efficient.
All Working Parts Easy of Access.
Duplicate Parts in Stock.
We furnish these pumps with suction pipes, hose and strainers complete. Estimates on application.
Can furnish up to number three with double brake for hand power.
Just the pump for a small mine. Larger sizes, larger capacities.
Send for our catalogue on pumps.

W. T. GARRATT & CO.,
Cor. Fremont and Natoma Sts.,
SAN FRANCISCO, CAL.

LINK-BELT ELEVATORS —AND— CONVEYORS.



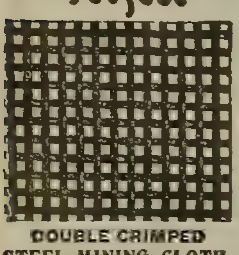
BREAKER ROLLS,
PICKING TABLES,
MALLEABLE IRON BUCKETS
SHAFTING, PULLEYS,
GEARING, CLUTCHES, Etc.
Catalogue Upon Application.
LINK-BELT MACHINERY CO.,
Engineers, Founders, Machinists,
CHICAGO, U. S. A.
DENVER, 1328 17th St.,
A. E. LINDROOTH, Manager.

General Electric Company's
Mining Locomotives

increase the output of the mine and diminish operating expenses; can be run economically on grades and are readily adaptable to the conditions of mine working.

General Office: Schenectady, N. Y.
San Francisco Office: Claus Spreckels Bldg. Denver Office: Kittredge Building.

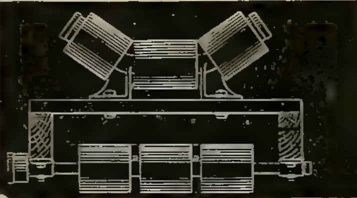
"The Perfect"


DOUBLE CRIMPED STEEL MINING CLOTH

THE LUDLOW-SAYLOR WIRE CO.,
ST. LOUIS, MO.

USE "THE PERFECT"
Double Crimped Cloth.

❧ ❧ ❧ ❧
MINERS' STEEL CANDLESTICKS.



ROBINS BELT CONVEYORS

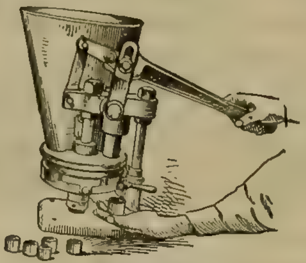
For handling Ore, Coal, Tailings and Dredgings. Catalogue mailed on application.
ROBINS CONVEYING BELT CO., Park Row Building, NEW YORK.

DEWEY, STRONG & CO., Patent Solicitors, 330 Market St., San Francisco, Cal.

ONE OF OUR MANY SPECIALTIES FOR ASSAYERS.

The Calkins Cupel Machine.

WALL PATTERN.
In position for filling mold.



THE AUTOMATIC.
Showing finished cupel being expelled.

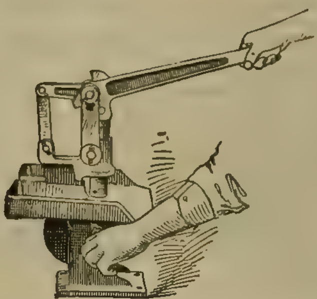


TABLE PATTERN
Showing position of lever when greatest compression is obtained.

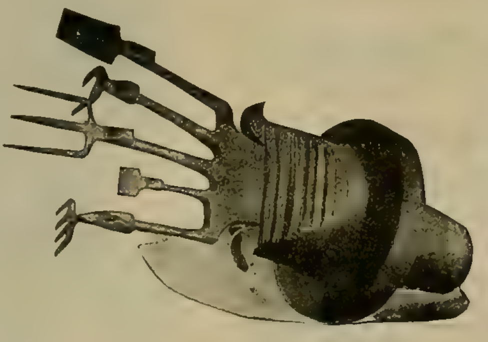
To Assayers:

With these machines perfect cupels can be made by anyone with great ease and rapidity.
They are the greatest labor-saving machine of the Assayer that can be had.
Compact, easily operated, can't get out of order, everlasting.

WRITE FOR OUR NEW, DESCRIPTIVE PAMPHLET IN WHICH ALL OUR SPECIALTIES ARE FULLY DESCRIBED.

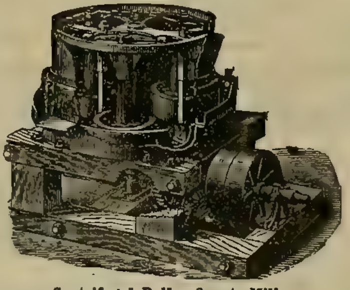
F. W. BRAUN & CO.,
Manufacturers of Modern Appliances for Assayers,
LOS ANGELES, CAL.

SHOES and DIES of SUPERIOR quality and at prices 20 to 30% lower than any other maker.
FURNISHED BY
ARTHUR KOPPEL, 66 Broad St., N. Y. City.
WRITE FOR PARTICULARS.



MINING CARS of every description.
PORTABLE RAILWAYS, Rolling Stock, Railway Outfits for Mines of every description. Export Work a specialty.
ARTHUR KOPPEL, 66 Broad St., N. Y. City.
SEND FOR CATALOGUE AND ESTIMATES.

Pacific Coast Agents, Baker & Hamilton, San Francisco and Sacramento.



Centrifugal Roller Quartz Mill.

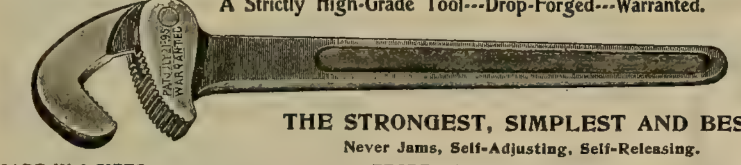
F. A. HUNTINGTON,
—Manufacturer of—
CENTRIFUGAL
Roller Quartz Mills.
CONCENTRATORS and ORE CRUSHERS.
Mining Machinery of Every Description.
Steam Engines, Shingle Machines.
Room 1, 3d Floor, Mills Building,
SAN FRANCISCO, CAL.

THE WM. HAMILTON MANUFACTURING CO.,
LIMITED,
MINING MACHINERY,
PETERBOROUGH, ONTARIO,
CANADA.

OUR 24-INCH WRENCH IS ESPECIALLY ADAPTED FOR MINE WORK.

The Johnston Patented Pipe Wrench.

A Strictly High-Grade Tool---Drop-Forged---Warranted.



THE STRONGEST, SIMPLEST AND BEST.
Never Jams, Self-Adjusting, Self-Releasing.

MADE IN 3 SIZES:

	10 in.	16 in.	24 in.
Pipe	⅛ to 1 in.	¼ to 1½ in.	½ to 2½ in.
List	$2 25	$3.00	$6.00

WM. B. VOLGER,
SOLE MANUFACTURER,
88 Chambers St., NEW YORK.

Agencies: THE MINE & SMELTER SUPPLY CO., Denver and Salt Lake City.

CARY SPRING WORKS,
240 & 242 WEST 29th STREET, NEW YORK, U. S. A.
Telephone, 3346—38th St.

WIRE SPRINGS
OF EVERY DESCRIPTION.

MANUFACTURERS OF
All kinds of ROUND AND FLAT WIRE, TEMPERED AND UNTEMPERED.
SPRINGS
For Machinery, Rolling Shutters, Motors, Etc.

MUSIC BOX AND FINE SPRINGS OUR SPECIALTY.

STRICTLY C. P. ACIDS
and C. P. AMMONIA

MANUFACTURED BY
The Western Chemical Co.,
DENVER, COLO.
For Laboratory Use and Fine Chemical Work
PURITY GUARANTEED.
Also COMMERCIAL ACIDS.

PIPE BARGAINS.

Suitable for Water Mains, Mining, Irrigation, Air, Oil, etc , etc. New Spiral Welded Asphalted Steel Pipe with any style coupling desired.

460 ft. 6-in. 3,480 ft. 10-in. 1,828 ft. 14-in. 1,077 ft. 18-in.
50,000 " 8 " 2,428 " 12 " 520 " 16 " 1,623 " 24 "

All Sizes Wrought Pipe, Well Casing and Straight Riveted Pipe in Stock. Equipment of All Kinds for Mine, Railroad and Contractors' Outfits. Write for Prices and Particulars.

BOWES & CO., 23 Lake St., Chicago, Ill.

PROFESSIONAL CARDS.

R. H. POSTLETHWAITE, M.I.E.E.
Hydraulic Mining Engineer.
River Dredging for Gold a Specialty.
1315 Leavenworth St........San Francisco, Cal.

THEO. F. VAN WAGENEN, E. M.
Consulting Mining and Hydraulic Engineer.
1508 Fillmore St., DENVER, COLO.

D. B. HUNTLEY,
Mining Engineer and Metallurgist,
De Lamar, Owyhee Co., Idaho.

BERNARD MACDONALD,
Consulting Mining Engineer.
General Manager British America Corporation, Ltd., Rossland, B. C.

DRAPER & McLEOD,
Assayers, Chemists, and Mining Engineers,
1736 CHAMPA STREET,
DENVER.............................COLORADO.

A. F. WUENSCH, M. E.
Inspection and Valuation of Mines.
Ref. D. H. Moffat, Pres. 1st Nat'l Bank, Denver.
827 Equitable Bldg..................Denver, Colo.

Established 1879.
CHAS. B. GIBSON,
Chemist, Metallurgist and Mining Engineer,
81 CLARK ST., CHICAGO, ILL.

W. C. WYNKOOP, M. E.
Woodbury (Cochiti District), New Mexico.
Economic Geology and Mine Examinations.

E. H. BENJAMIN, Mining Engineer.
A. M. HUNT, Mechanical & Hydraulic Engineer.
WYNN MEREDITH, Electrical Engineer.
C. L. CORY, Electrical & Mechanical Engineer.
EXPERT EXAMINATIONS. ADVISORY REPORTS.
CONSTRUCTION SUPERVISION.
331 Pine Street,..........San Francisco, Cal.
Telephone Main 1870. Cable Address "Edben."

JOHN W. GRAY,
Mining and Hydraulic Work.

Prospecting Operations and Exploration Work.
Examinations, Surveys, Development, Equipment of Mines, Gold-Bearing Gravels, and Water Supplies.
923 Linden St.,.................Oakland, Cal.
Cable "Espra." Correspondence invited.

ABBOT A. HANKS,
CHEMIST AND ASSAYER.
Successor to Henry G. Hanks, est. 1866. The supervision of sampling of ores shipped to San Francisco a specialty.
—531—
California Street,
San Francisco.

RICHARD A. PEREZ, E. M.
Assayer and Analytical Chemist,
120 North Main St., - Los Angeles, Cal.

S. W. TYLER,
Mining and Metallurgical Engineer,
6 Windsor Hotel Block.
Cable: Retyl, Denver. DENVER, COLORADO.

The SPOKANE BUREAU OF MINING,
N. E. LINSLEY, Manager.
SPOKANE, : : WASHINGTON.
Consulting Mining and Milling Engineer.
Will Examine and Report on Mines.

FRANK C. MANDELL,
MINING ENGINEER,
U. S. Deputy Mineral Surveyor for Idaho and Oregon.
Mine Examinations, Surveys and Reports.
HAILEY, IDAHO.

CLARENCE HERSEY,
Assayer and Chemist,
(Established 1879.) LEADVILLE, COLO.
Gold, Silver and Lead..................$1.00.
Any two of above 75c; any one of above 50c.
Copper analysis...............................$1.00.
Platinum, Nickel or Tin, each..............$5.00.

Twenty-one years successful experience in the mining metropolis of Colorado.

Write for mailing envelopes and price list.

ALMARIN B. PAUL, M. E.,
ROOM 27, CROCKER BUILDING, SAN FRANCISCO.
Will act as AGENT for the sale of RELIABLE Mining Property. SPECIAL AGENT FOR
MacArthur-Forrest Cyanide Process
for California north of and including Mono, Madera and Merced counties; also for State of Nevada. Will act as agent for Eastern parties owning mining interests in California.

F. H. HARVEY,
GALT, CAL.,
Mining and Metallurgical Work in All Branches.

Assays, Chemical Analysis of Ores and experiments on rebellious ores for treatment by cyanide or other processes. Surveys and reports upon mining properties.

Simonds & Wainwright,
Mining Engineers,
Assayers and Chemists,
159 Front Street,
NEW YORK.

HUDSON H. NICHOLSON,
Consulting Mining Engineer,
Rooms 216 and 217, Boston Building,
DENVER, COLO., U. S. A.
Cable address: Aichen, Denver.

Expert examinations of and advisory reports on mining propositions.

Specialty: The chemical treatment of ores

EDWARD L. HAFF,
MINING ENGINEER,
U. S. DEPUTY MINERAL SURVEYOR.
Mine Examinations and Reports.
National Annex Block,
P. O. Box 21. CRIPPLE CREEK, COLO.

RALPH E. STEVENS,
ATTORNEY AND COUNSELOR,
43-44 Jacobson Building, DENVER, COLO.

Special attention to examination of titles. Corporation, commercial, mining law. Collections receive prompt attention. Notary in office. Refers to Denver representative of Mining and Scientific Press.

ERNEST H. SIMONDS,
Late Instructor in Assaying, University of California.
ASSAYS AND ANALYSES.
LABORATORY TESTS OF ORES.
Special Attention Given to the Instruction of Students.
521 Sacramento St., Cor. Leidesdorff, S. F., Cal.

School of Practical Mining, Civil,
Mechanical and Electrical Engineering.
Surveying, Architecture, Drawing, Assaying, Cyanide Process and Metallurgy.
933 Market St., S. F., Cal. OPEN ALL YEAR.
A. VAN DER NAILLEN, President
Assaying of Ores, $25; Bullion and Chlorination Assay, $25; Blowpipe Assay, $10. Full course of Assaying, $50. Established 1864.
☞ Send for Circular.

DANIEL G. JEWETT.
Specialty: The Mining and Smelting of Copper or Lead Ores.

General Manager of Boston G. M. & M. Co., Venture G. M. & M. Co., The Boston Tunnel.
P. O. BOX 5, GUFFEY, PARK CO., COLO.

MINERS' ASSAY OFFICE.
(JNO. HARRIGAN)
10 Stevenson Street, - San Francisco, Cal.
Telephone Clay 972.

Assaying, Analyses, Sampling, Grinding and Pulverizing of all kinds.

Practical Working Tests of Ore by all Processes. Mining Machinery Bought and Sold. Check Assays. Instructions given in Assaying. All Work Guaranteed. **Mines Examined, Sampled and Reported on by M. P. BOAG, M. E. and Cyanide Expert.**

LOUIS FALKENAU,
STATE ASSAY OFFICE,
538 Sacramento St., below Montgomery.

Analysis of Ores, Metals, Soils, Waters, Industrial Products, Foods, Medicines, etc., etc.

Court Experting in all branches of Chemical Technology. Working Tests of Ores and Investigation of Metallurgical and Manufacturing Processes. Consultations on all questions of applied chemistry. Instructions given in assaying and all branches of chemistry.

FRED H. BROWN,
Electrical Mining Expert.
Inventor of the Electro-Geodetic Mineral Locator. Patented March 20, 1900.

Will electrically survey mines and lands for mineral; furnish charts showing run of ore, extensions, pay-streaks, and their approximate depth from surface.

References include scientific men, and miners for whom we have located rich mines.

Address, 1025 West 7th St.,
LOS ANGELES, CAL.

RELIABLE ASSAYS.

Gold...............	$ .50	Gold and Silver....	$ .75
Lead	.50	Gold, silver, copper	1 50

Samples by mail receive prompt attention.
Rich Ores and Bullion Bought.
OGDEN ASSAY CO.,
1429-16th St., Denver, Colo.

E. E. BURLINGAME & CO.,
ASSAY OFFICE AND CHEMICAL LABORATORY
Established in Colorado, 1866. Samples by mail or express will receive prompt and careful attention
Gold & Silver Bullion Refined, Melted and Assayed OR PURCHASED.
Concentration Tests—100 lbs. or car load lots. Write for terms.
1736-1738 Lawrence St., Denver, Colo.

Independent Assay Office.
ESTABLISHED 1888.
D. W. Reckhart, E. M., Proprietor.
Agent for Ore Shippers.
Assays and Chemical Analysis.
Mines Examined and Reported Upon.
BULLION WORK A SPECIALTY
P. O. Box 88. Office and Laboratory:
Cor. SAN FRANCISCO & CHIHUAHUA Sts.
EL PASO, TEXAS.

INVENTORS, Take Notice!
L. PETERSON, MODEL MAKER,
544A MISSION STREET, bet. First and Second Sts., SAN FRANCISCO. Experimental machinery and all kinds of models. Tin and brasswork. All communications *strictly confidential.*

WM. VAN SLOOTEN,
Consulting Mining Engineer and Metallurgist.
Cable address: "Yadoplata."
35 WALL STREET.......... ....NEW YORK, N. Y.

DAVIDGE & DAVIDGE, Attorneys and Counsellors at Law, Corcoran Building, Washington, D. C. Practice in the Supreme Court of the United States, the Court of Claims, the Courts of the District of Columbia, and the General Land Office. Western Union Code.

W. J. ADAMS, E. M.,
Mining Engineer and Metallurgist.
Graduate of Columbia School of Mines.
Author of "Hints on Amalgamation," etc., etc.
ROOM 14, 434 CALIFORNIA STREET,
SAN FRANCISCO, CAL.

R. J. WALTER,
1452 Blake St., DENVER, COLO.
Mining Engineer and Metallurgist.
Reports on mining properties.
Assay office and chemical laboratory. Established in Colorado 1879.

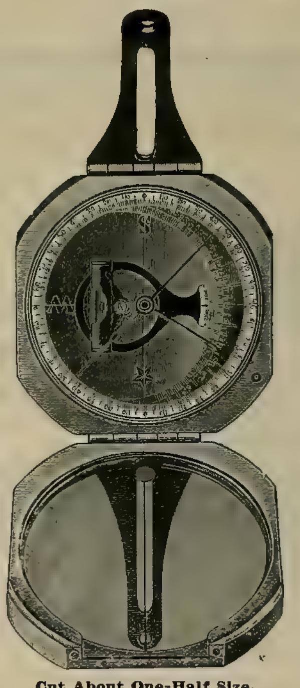
SAM'L A. RANK,
MINING ENGINEER,
U. S. DEPUTY MINERAL SURVEYOR.
Mine Examinations and Reports.
514 Cooper Building,
DENVER.........................COLORADO.

J. W. RICHARDS,
(Late of Aspen, Colo.)
ASSAYER AND CHEMIST. 1754 Champa Street, DENVER, COLO.
Ore Shippers' Agent. Write for Terms.

JAMES ANGUS SNEDAKER,
Mining Engineer,
721-722 Equitable Building, Denver, Colo., U. S. A.

Samples by Mail or Express Will Receive Prompt Attention.
ALBERT I. GOODELL,
ASSAYER AND CHEMIST,
1430 Stout Street......................DENVER, COLO.

Brunton's Patent Pocket Mine Transit.



Cut About One-Half Size.

The accompanying illustration shows this valuable instrument as it appears to the operator when taking courses or horizontal angles.

A tripod or Jacob's staff is unnecessary, as the sighting and reading are accomplished simultaneously.

Dimensions when folded for the pocket, 2¾x2¾x1 inches.

For complete description send for catalogue B to

WM. AINSWORTH & SONS,
SOLE MANUFACTURERS,
DENVER, COLO., U. S. A.

For sale by dealers in mathematical instruments everywhere.

F. W. Braun & Co., Los Angeles, Cal., Agents for balances and the Brunton Patent Pocket Transit.

John Taylor & Co., San Francisco, Cal, Agents for balances and the Brunton Patent Pocket Transit.

H. S. Crocker Co., San Francisco, Cal., Agents for the Brunton Patent Pocket Transit.

Pacific Optical Co., Los Angeles, Cal., Agents for the Brunton Patent Pocket Transit.

CHAS. BUTTERS & CO., Limited.
E. S. LEAVER, Manager.
Ore Testing Works, ❦ ❦ ❦
Chemical and Metallurgical Laboratory,
Assay Office, ❦ ❦ ❦ ❦
DOOLY BLOCK, - SALT LAKE CITY, UTAH.

Telephone, MAIN 5104. —◆ ESTABLISHED 1869. ◆— A. H. WARD.
Cable Address, LUCKWARD.
C. A. LUCKHARDT CO.,
NEVADA METALLURGICAL WORKS,
71 & 73 STEVENSON STREET, - - - - SAN FRANCISCO, CAL.
Assaying, Analyses, Sampling.
PRACTICAL WORKING TESTS OF ORE BY ALL PROCESSES.
STAMP MILL AND CONCENTRATOR IN OPERATION ON PREMISES.

Thomas Price & Son,
Assay Office, Sampling Works
And Chemical Laboratory.
526 Sacramento Street, San Francisco, Cal.

HERMANN J. VAN DIEREN,
Assayer and Metallurgist,
1407 Seventeenth St., DENVER, COLO.
Stamp Mill and Reduction Works: 19th St. and Platte River.

Buyer of every description of Ores and Precious Stones. Rights for sale for process of treating refractory gold ores; also process for treating low grade copper ores. Write for particulars.

HENRY E. WOOD, ASSAYER,
1734 Arapahoe St., DENVER, COLO.
Ore Tested in Carload Lots.
Write for Circular.

Hoskins' Patent Hydro-Carbon Blow-Pipe and Assay Furnaces.

No dust. No ashes. Cheap, effective, economical, portable and automatic.

SEND FOR PRICE LIST TO
W. HOSKINS, 81 South Clark St., Room 55, CHICAGO, ILL.

The State Ore Sampling Co.
DENVER, COLO.

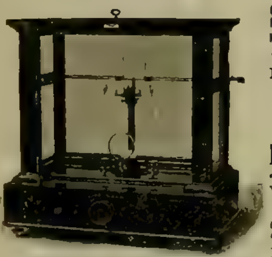
We buy Gold, Silver, Lead, Copper, Bismuth, Uranium, Wolframite, Cobalt, Molybdenite and Antimony Ores. We have modern sampling mills, also test ore for the new processes of ore reduction.

Our long experience in the market enables us to obtain the highest prices for all marketable ores. Write for our "Reference Book." Send analysis of your ore for prices and information.

BAILY & MONNIG, Managers.

ALVIN PHILLIPS & CO.,
Chemists, Mining and Metallurgical Engineers,
1761 MARKET STREET,
DENVER, - COLO.

Complete Ore-Testing Works — capacity ten pounds to two tons. Modern Methods of Lixiviation, Cyanide and Chlorination. Concentration on Bartlett Table. Assaying and Bullion Refining. Chemical Analyses of Oils, Coal, Water, and all solutions. WRITE FOR PRICES.



SMITH & THOMPSON,
Manufacturers of Fine
ASSAY BALANCES
Write for Catalogue.
2219 Stout St.,
Denver, Colo.

THE ROESSLER & HASSLACHER CHEMICAL CO.,
100 William Street, New York.

CYANIDE

Peroxide of Sodium

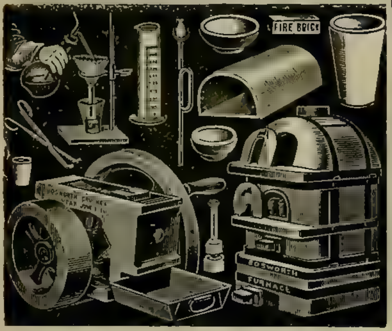
Hyposulphite of Soda

Chloride of Lime

Sulphide of Iron

And Other Chemicals for Mining Purposes.

THE DENVER FIRE CLAY CO.,
1742 to 1746 Champa St., DENVER, COLO.



Manufacturers, Importers and Dealers in
Chemicals, Apparatus and Assayers' Supplies, Fire Brick and Tile.
Sole Agents for the "AINSWORTH BALANCES."
WRITE FOR CATALOGUES.

DEARBORN Drug and Chemical Works. Laboratories. Water Chemists. Vegetable Boiler Compounds.

ALL KINDS OF ANALYSES. WATERS FREE. OILS A SPECIALTY.

10,000 Boiler Feed Waters Are Being Treated by DEARBORN METHODS.

29, 30, 31, 32 and 33 Rialto Bldg. - - - CHICAGO, ILL.

Taylor's Coal Oil and Gasoline Burner
(PATENTED)

A new heating burner for Assayers and Chemists, or for brazing, in which coal oil at 33 deg. to 45 deg., Beaume and 150 deg. fire test, or gasoline at 74 deg. test can be used for fuel. Adapted to crucible, muffle and brazing work. Price $6. For sale by

JOHN TAYLOR & CO.,
63 FIRST STREET,
SAN FRANCISCO, CAL.

MINE AND MILL SUPPLIES.
Importers and Manufacturers of Assayers' Materials, Chemicals and Acids, Etc.
CATALOGUE ON APPLICATION.

IMPROVED BONE ASH.

It is 100% better than Bone Ash now being used; will absorb more lead, will never crack or split in the Muffle, can be dropped before or after using without breaking. Cupels can be made and used at once; no drying required. Excessive heat has no effect on them. Will stand shipping any distance. It takes up none of the precious metals in cupeling. Cupels much quicker. Once used always used. Sold under a positive guarantee or money refunded. Now being used by all smelters and assayers who have tried it.

Correspondence solicited.
Samples given if required.

J. J. CUMMINGS & CO., Sole Mfrs.,
Telephone Clay 972. 10 STEVENSON ST., SAN FRANCISCO, CAL.
For Sale also by Justinian Caire Co., Dealers in Assay Goods and Mining Supplies, 521-523 Market St.

PIONEER REDUCTION CO.
Established 1858. Nevada City, Cal.
Buyers of Gold, Silver and Copper Ores and Concentrates.
HIGHEST PRICES PAID FOR COPPER ORES.
WRITE FOR RATES.

ESTABLISHED 1856.
Controls AND Check Assays
(A SPECIALTY.)
MARINER & HOSKINS,
ASSAYERS AND CHEMISTS,
Mining Engineers and Metallurgists.
81 South Clark Street.
Rooms 51-55,
CHICAGO, ILLINOIS.
SEND SAMPLES BY MAIL OR EXPRESS.
MAILING SACKS ON APPLICATION. : :

ST. LOUIS SAMPLING & TESTING WORKS,
1225 and 1227 Spruce St.,
ST. LOUIS, MO.

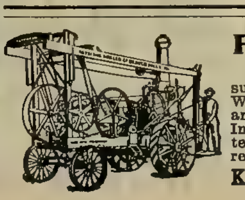
The Largest and Most Complete Ore Testing Works in Existence for Making all Kinds of Practical Working Tests of Ore, etc., to Determine the Most Suitable Method of Treatment.

PLANT FOR COAL WASHING, COKING AND STEAMING TESTS OF FUELS. ASSAYS, ANALYSES, CHEMICAL AND PHYSICAL INVESTIGATIONS OF ALL KINDS. MINERAL PROPERTIES, MINES AND METALLURGICAL PROCESSES EXAMINED AND REPORTED UPON. CORRESPONDENCE SOLICITED.

New Process of Copper Extraction.
CHEAP, CLEAN AND EFFECTIVE.
THE GARDINER LEACHING PROCESS
FOR COPPER ORES.

TESTS MADE ON ANY QUANTITY OF ORES AT REASONABLE RATES.
FULL PARTICULARS ON APPLICATION.

THE AMERICAN COPPER MINING & EXTRACTION CO., DENVER, COLO.



Prospecting Machinery.

Multitudes in use for testing for minerals. Sizes and equipments to suit any and all conditions. Unexcelled for Placer Testing, Oil Wells, Water Wells, testing for Lead and Zinc, Iron and Coal; goes through anything; brings up everything. Large sizes drill as much as 1500 feet. In use all over the world. Every purchaser pleased. Used on boats for testing river and lake beds. Water no hindrance. No skilled labor required.

KEYSTONE DRILLER CO., Beaver Falls, Pa., U. S. A.

Ammonia Process.

The practical success of this process is well known and is demonstrated chemically, technically and mechanically in every detail on a large scale. Refractory ores and tailings containing gold, silver, copper and zinc are extracted successful and profitable. Mail average sample and $10 and receive full report about the extraction.

Pocketbook, Ammonia Process, full description, $1.

Instructions in Chemistry and all successful and practical Lixiviation Processes

Office and Laboratories:
334 KEARNY STREET, SAN FRANCISCO, CAL.
H HIRSCHING,
Mining Engineer and Chemist.

THE JEFFREY MFG. COMPANY,
COLUMBUS, OHIO, U. S. A.
ELEVATING-CONVEYING MACHINERY.

JEFFREY SPECIAL MALLEABLE ORE BUCKETS for extraordinary heavy usage.

Chains,
Sprocket Wheels,
Buckets,
Dredges,
Coal Washers,
Boots,
Bolts.
Spiral Conveyors,
Cable Conveyors,
Crushers,
Hoists,
Dump Cars,
Skip Cars,
Sheaves,
Screens.

Western Branch, Equitable Bldg., Denver, Colo.
Frank R. Field, Representative.

DENVER & RIO GRANDE R.R.
SCENIC LINE OF THE WORLD

The ∴ Mining Man's Favorite Route
BETWEEN

Denver, Colorado Springs, Pueblo and Florence, Cripple Creek, Leadville, Glenwood Springs, Aspen, Gunnison, Lake City, Creede, Durango, Silverton, Telluride and Ouray,

Reaching all the Mining, Milling, Cyaniding, Chlorinating and Smelting centers in Colorado and Utah, and all mining points in California, British Columbia and the Pacific Northwest by close connections and a perfect system of through car service.

Pullman Palace and Tourist Sleeping Cars between Denver and San Francisco and Los Angeles, and Pullman Palace and Tourist Sleeping Cars and Free Reclining Chair Cars between Denver and Portland. : : A Perfect Dining Car Service on All Through Trains. : :

For Illustrated Pamphlet, address

W. J. SHOTWELL,
G. A. D. & R. G. R. R.,
126 California St.,
San Francisco, Cal.

S. K. HOOPER,
G. P. & T. A.,
Denver,
Colo.

THE MINES OF
Eastern Oregon
Which are now attracting so much attention are reached only by the lines of the
OREGON RAILROAD & NAVIGATION CO.
For Descriptive Pamphlets, Through Rates, Etc., Address
E. C. WARD, Gen. Agt.,
630 Market Street, San Francisco

COLORADO'S GOLD

Output for 1899 is unequaled by any State in the Union. Cripple Creek, Leadville, and all the important mining towns are reached by

THE COLORADO & SOUTHERN RY...

For copies of our publications on the Swandyke and Pine Creek Gold Districts, or our pamphlet "Hints to Prospectors," address
T. E. FISHER, GEN. PASS. AGT.,
DENVER, COLO.

Notice the Shape of
GLOBE BOX---THE BEST BABBITT.

J. M. HAYDEN & CO.
GLOBE BOX METAL
GRAND RAPIDS MICH.
THE BEST BABBITT.

Send for trial order, Ladle free.

The Globe wire lace makes the smoothest joint, runs the stillest and lasts the longest of any lacing. Sent on approval. Write us for booklet with instructions, etc. J. M. HAYDEN & Co., 58 Pearl St., Grand Rapids, Mich.

DEWEY, STRONG & CO.,
PATENT AGENTS, 330 Market St., S. F.

SULLIVAN

Diamond Core Drills

FOR PROSPECTING. Catalogue 29.

The most extensive line of sizes and styles ever offered.

CONTRACTORS FOR PROSPECTING WITH DIAMOND DRILL.

ROCK DRILLS

FOR MINING. Catalogue 30.

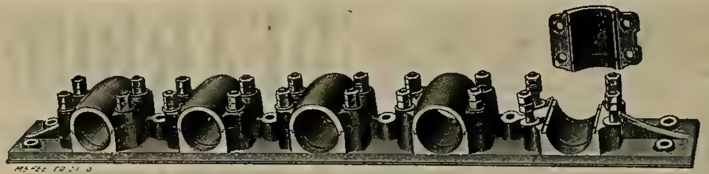
Superior valve and ratchet motions. The highest possible grade.

Send for Our New Catalogues.

Sullivan Machinery Co.,

New York. Pittsburg. Claremont, N. H.

Main Office, CHICAGO....................54 to 60 N. CLINTON ST.
Western Office, DENVER..................332 SEVENTEENTH ST.
Pacific Agency, SAN FRANCISCO, HENSHAW, BULKLEY & CO.
Cable Address, Diamond, Chicago. Codes: A. B. C. 4th Edition, Postal Directory, Western Union, Liebers.



Globe Battery Stem Guide.

PATENTED AUGUST 24, 1897.

RIGID. SIMPLE. DURABLE. EFFICIENT. ECONOMICAL.

Effect a Saving in Friction Losses. No Trouble to Install.
No Alterations of Mill Necessary. No Keys or Wedges to Adjust.

——MANUFACTURED ONLY BY——

GLOBE IRON WORKS, STOCKTON, CAL., U. S. A.

Manufacturers of All Classes of Mining Machinery. Estimates Furnished.

RAND ROCK DRILLS and Drill Mountings.

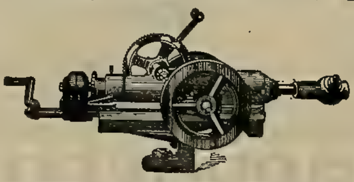
HIGHEST DEGREE OF PERFECTION ATTAINED. ∴ INDISPENSABLE IN MINING, TUNNELING & EXCAVATING.

AIR —AND— Gas COMPRESSORS.

STANDARD TYPES! SPECIAL PATTERNS! ALL SIZES!

RAND DRILL CO., 100 BROADWAY, New York, U. S. A.

San Francisco Office: 223 First St.
1328 Monadnock Blk., CHICAGO, ILL.



THE JACKSON HAND POWER ROCK DRILL.

Works in Any Rock, in Any Position.

Write for Circulars and References.

THE JACKSON DRILL & M'F'G CO.,
1756 Larimer Street, DENVER, COLO.

Sole Licensees for all Foreign Countries and Eastern United States: THORNTON N. MOTLEY COMPANY (INC.), 43 John St., New York.

AGENTS: CHAS. B. BOOTHE & CO., 126 SO. LOS ANGELES ST., LOS ANGELES, CAL.

FIRTH'S DRILL STEEL.

USE THE BEST.

Has no equal in Hard Rock Drilling.

ABNER DOBLE COMPANY, GEN. AGTS.,
FREMONT AND HOWARD STS, SAN FRANCISCO.

Sold by Seattle Hardware Co., Seattle, Wash.

CANTON STEEL COMPANY,

——Manufacturers of——

CANTON DRILL STEEL.

UNEQUALED FOR TOUGHNESS AND ROCK-CUTTING QUALITIES. WRITE FOR 1900 STEEL LIST, CONTAINING ENDORSEMENTS AND USEFUL INFORMATION.

Works: CANTON, OHIO. Branch Warehouse: DENVER, COLO.

TO SECURE GOOD RESULTS BUY

JESSOP'S STEEL

FOR TOOLS, MINING DRILLS, ETC.

Chief American Office,
91 John St., New York, N. Y.

Wm. Jessop & Sons. Ltd.
Manufactory, Sheffield, England.

I. WILLARD BEAM, Agent,
29 MAIN STREET,
SAN FRANCISCO, CAL.

Established 1837.

I. C. Yawger,

Successor to VICTOR BISHOP & CO.

IMPORTER OF CARBONS FOR DIAMOND DRILLS.

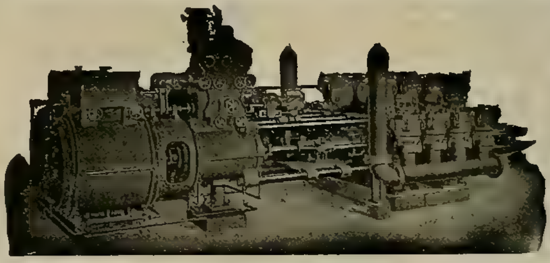
21 Maiden Lane, - NEW YORK

DIAMOND DRILLS
FOR PROSPECTING.
AMERICAN DIAMOND ROCK DRILL CO.
120 LIBERTY ST N.Y.

The Best MINE PUMPS in the World.

COMPOUND CONDENSING AND TRIPLE EXPANSION STATION PUMPS.

We carry in our Denver store a stock of Improved Pattern Sinkers and Duplex Station Pumps, with duplicate parts for repairs.



Write for Catalogue and Estimates.

Jeanesville Iron Works Co.,
JEANESVILLE, PA.

Western Office,
Columbia Hotel Building,
1328 17th St.
Denver, Colo.
Telephone 2298 A.
A. MIDDLEBROOK, Manager.

THEODOR LEXOW, 14 JOHN STREET, N. Y.
......Importer of......

CARBONS

(BLACK DIAMONDS)

For DIAMOND DRILLS and all Mechanical Purposes.

HENRY DEMMERT.

TELEPHONE MAIN 5303

Union PHOTO-ENGRAVING Co.

DESIGNING HALF-TONES ZINC ETCHING

523 MARKET ST
SAN FRANCISCO, CAL.

BULLOCK DIAMOND DRILLS

If you are interested in prospecting send for our new Diamond Drill Catalogue (No. 33).

BULLOCK MINING MACHINERY

PORTABLE HOISTS—Send for our new Catalogue (No. 40). CHAMPION MINE VENTILATORS—Send for our new Catalogue (No. 35).
HOISTING AND HAULAGE PLANTS, ORE CARS, SKIPS, CAGES, ETC., ETC.

PARKE & LACY CO., Agent,
21 & 23 Fremont St., San Francisco, Cal.

M. C. BULLOCK MFG. CO.,
1172 West Lake St., Chicago, Ill., U. S. A.

SELBY SMELTING AND LEAD CO.,

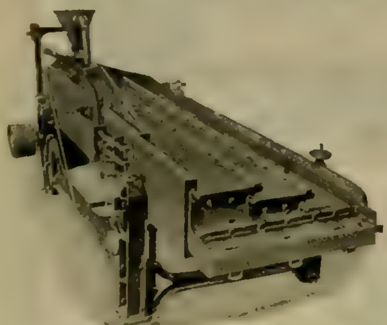
REFINERS OF GOLD AND SILVER BARS, GOLD DUST, ETC.

Buyers of Gold, Silver, Lead and Copper Ores, Gold Concentrates, Lead Bullion, Cyanide Product, Etc.

ORE AND BULLION ASSAYERS.

Works at VALLEJO JUNCTION, CAL. Office, 416 MONTGOMERY ST., SAN FRANCISCO, CAL.

THE IMPROVED BARTLETT CONCENTRATING TABLE.



The BARTLETT CONCENTRATING TABLE has been GREATLY IMPROVED recently by the substitution of iron in place of wood wherever possible. It is now built with SOLID IRON TOP, PLANED TO A TRUE SURFACE AND POLISHED; all parts are made by template and EACH PART BEING INTERCHANGEABLE. As now constructed, the table has no special wearing parts and will last for many years. It has a CAPACITY OF FROM FIFTEEN TO FORTY-FIVE TONS IN TWENTY-FOUR HOURS, according to the class of ore worked. It is the only table in the world which will take the place of jigs and do away with all costly and complicated machinery.

It is Especially Designed for Separating Zinc from Lead.

Send for our illustrated catalogue, containing all the latest information on the concentration of ores.

THE COLORADO IRON WORKS CO.,

Established 1860. DENVER, COLO., U. S. A.

THE

Pelton Water Wheel Company

Gives exclusive attention to the development and utilization of water powers by the most modern, economic and improved methods. An experience of more than fifteen years, involving both the theory and practice of hydraulic engineering as relates to power development in its widest range of application, is at the service of its customers.

Nine Thousand Wheels Now Running,

Averaging some 700,000 H. P.

ELECTRIC POWER TRANSMISSION.

Pelton wheels afford the most reliable and efficient power for such service and are running the majority of stations of this character in the United States, as well as most foreign countries. Highest efficiency and absolute regulation guaranteed under the most extreme variations of load.

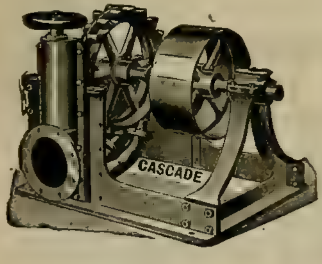
The Pelton Water Wheel Company,

121 & 123 MAIN STREET, SAN FRANCISCO, CAL.

TURBINE AND CASCADE WATER WHEEL

Adapted to all Heads from

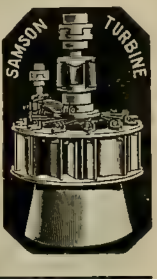
3 Feet to 2000 Feet.



Our experience of 38 YEARS building Water Wheels enables us to suit every requirement of Water Power Plants. We guarantee satisfaction.

State your Head and requirements. Send for pamphlet.

JAMES LEFFEL & CO.
SPRINGFIELD, OHIO, U. S. A.



McFARLANE & CO.,

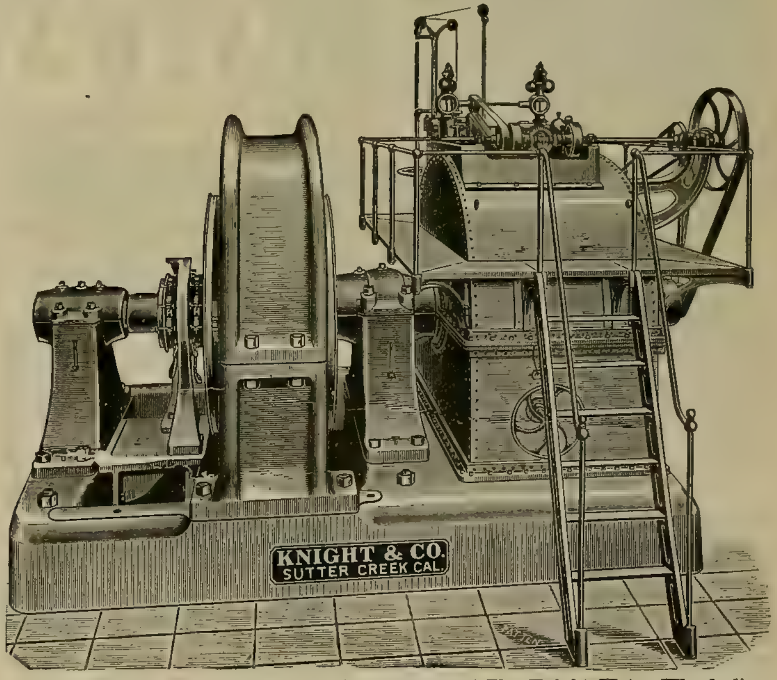
1734 FIFTEENTH ST., DENVER, COLO.

Mining and Milling Machinery.

STAMP AND CONCENTRATING MILLS BUILT AND ERECTED.

STEAM AND ELECTRIC HOISTS, CRUSHERS, ROLLS, REVOLVING SCREENS, JIGS, ORE CARS, CYANIDE TANKS, CORNISH PUMPS, CORLISS ENGINES.

KNIGHT'S WATER WHEEL.


KNIGHT & CO.
SUTTER CREEK CAL.

The accompanying cut shows the general arrangement of **The Knight Water Wheel,** direc-coupled to a 750 kilowatt generator, with governor mounted on top of wheel casing.

These wheels are designed for **100 to 2500 H. P. Highest efficiency and regulation guaranteed.**

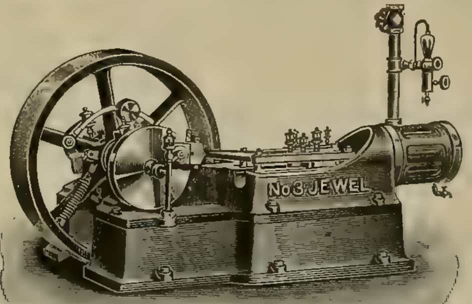
WHEELS FROM 6 TO 24 INCHES, ENCLOSED IN CAST-IRON CASING.

Wheels for mill and reversible hoisting works a specialty.

KNIGHT & CO., Sutter Creek, Cal.

For full particulars, send for descriptive catalogue.

JEWEL ENGINES



A THOROUGHLY RELIABLE, SIMPLE, HIGH CLASS, PERFECTLY GOVERNED AUTOMATIC ENGINE AT A REASONABLE PRICE.

BAKER & HAMILTON,

SAN FRANCISCO, SACRAMENTO, LOS ANGELES

DEWEY, STRONG & CO., Patent Solicitors, 330 Market St., San Francisco, Cal.

Founded by Mathew Carey, 1785.

HENRY CAREY BAIRD & CO.,

INDUSTRIAL PUBLISHERS, BOOKSELLERS & IMPORTERS,

810 Walnut St., Philadelphia, Pa., U. S. A.

☞ *Our New and Revised Catalogue of Practical and Scientific Books, 92 pages, 8vo; a Catalogue of Books on Steam and the Steam Engine, Machinery, etc.; a Catalogue of Books on Sanitary Science, Gas Fitting, Plumbing, etc., and our other Catalogues and Circulars, the whole covering every branch of Science applied to the Arts, sent free and free of postage to any one in any part of the world who will furnish his address.*

ASSESSMENT NOTICES.

MARIPOSA COMMERCIAL AND MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Mariposa County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 31st day of August, 1900, an assessment (No. 18) of Ten ($10) Dollars per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 320 Sansome street, room 24, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 10th day of October, 1900, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on THURSDAY, the 8th day of November, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

JOSEPH H. MOOSER, Secretary.

Office—320 Sansome street, room 24, San Francisco, California.

SAVAGE MINING COMPANY. — Location of principal place of business, San Francisco, California; location of works, Virginia, Storey County, Nevada.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 13th day of August, 1900, an assessment (No. 101) of ten cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Rooms 20-22, Nevada block, No. 309 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 18th day of September, 1900, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 8th day of October, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

JOHN W. TWIGGS, Secretary.

Office—Rooms 20-22, Nevada block, No. 309 Montgomery street, San Francisco, California.

AMERICAN OIL AND REFINERY COMPANY.—Location of principal place of business, San Francisco, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 21st day of August, 1900, an assessment of ten (10) cents per share was levied upon all the subscribed capital stock of the said corporation, payable immediately to J. C. Anthony, secretary of said corporation, at its office, at room No. 323 of the Parrott building, Nos. 825 to 855 Market street, in the City and County of San Francisco, State of California.

Any stock upon which this assessment shall remain unpaid on the 26th day of September, 1900, will be delinquent and advertised for sale at public auction; and, unless payment is made before, will be sold on MONDAY, the 29th day of October, 1900, to pay the delinquent assessment, together with costs of advertising and expenses of sale.

By order of the Board of Directors.

J. C. ANTHONY, Secretary.

Office—Room 323 Parrott building, Nos. 825 to 855 Market street, San Francisco, California.

ALLIANCE EXPLORATION & MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Ophir, Placer County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 3d day of August, 1900, an assessment (No. 3) of five (5) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 236 Sutter street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 11th day of September, 1900, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 2nd day of October, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

S. GOLDSMITH, Secretary.

Office—236 Sutter street, San Francisco, California.

POSTPONEMENT.

By order of the Board of Directors, the day of delinquence in the above assessment has been postponed to October 11th, 1900, and the day of sale to THURSDAY, the 1st day of November, 1900.

S. GOLDSMITH, Secretary.

Office—236 Sutter street, San Francisco, California.

EUREKA CONSOLIDATED DRIFT MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Forest Hill, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 9th day of August, 1900, an assessment (No. 26) of one (1) cent per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 214 Pine street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 8th day of September, 1900, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on SATURDAY, the 29th day of September, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

GEO. W. DIXON, Secretary.

Office—214 Pine street, San Francisco, California.

POSTPONEMENT.

The date of the delinquency of the foregoing assessment (No. 26) has been postponed to TUESDAY, the 18th day of September, 1900, and the day of sale from the 29th day of September, 1900, to TUESDAY, the 9th day of October, 1900.

By order of the Board of Directors.

GEO. W. DIXON, Secretary.

Office—Room 31, No. 214 Pine street, San Francisco, California.

DELINQUENT SALE NOTICE.

MAMMOTH GARFIELD GOLD MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Shasta County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment levied on the 5th day of June, 1900, the several amounts set opposite the names of the respective shareholders, as follows:

Name.	No. Cert.	No. Shares.	Amt.
Andrew Corbin	13	20.000	$3500 00
Philip Corbin	14	20,000	3500 00
Charles Glover	16	1,750	306 25
Jos. S. Silver	5	5	87
J. M. Spring	15	2,000	350 00

And in accordance with law, and an order from the Board of Directors, made on the 5th day of June, 1900, so many shares of each parcel of such stock as may be necessary, will be sold at public auction, at the office of the company, Rooms 54 and 59, No. 120 Sutter street, San Francisco, California, on TUESDAY, the 2nd day of October, 1900, at the hour of 2 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

SAM W. CHEYNEY, Secretary.

Office—Rooms 54 and 59, No. 120 Sutter street, San Francisco, California.

HEALD'S

BUSINESS COLLEGE.

24 Post Street, - - - San Francisco.

MINING AND CIVIL ENGINEERING DEPARTMENT: Mathematics, Draughting, Strength of Material, Chemistry, Assaying, Blow-Pipe Analysis, Geology, Mineralogy, Surveying, etc., under the direction of Prof. O. H. Packer, an engineer of national reputation.

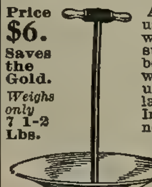
ELECTRICAL DEPARTMENT: Theory and Practice; Construction.

BUSINESS: Bookkeeping, Shorthand, Typing, Modern Languages, etc.

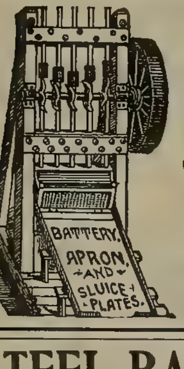
Twenty teachers; individual instruction; can enter at any time; Catalogue and Journal free.

THE LITTLE ALASKA GOLD WASHER.

Price $6. Saves the Gold. *Weighs only* **7 1-2 Lbs.**



After several years' practical use in different fields, our washer has established its superiority over all placer or beach washers. It is just the washer for Cape Nome; it was used extensively in Alaska last year with every success. In working the operator does not have to wet his hands and can stand in an upright natural position. It is just the washer for the poor man who has not the money to put in expensive machinery. It will do the work of ten men with gold pans. It is just the washer for the prospector, being light and easy to pack. Don't fail to write us if in need of a washer; we can save you *time*, *labor* and *money*. RUSSELL & KINSEY, 1237 Magnolia Ave., Los Angeles, Cal.



To Gold Miners!

Silver Plated Copper Amalgamating Plates

For Saving Gold in Quartz and Placer Mining.

ONLY BEST COPPER AND REFINED SILVER USED. OLD MINING PLATES BOUGHT OR TAKEN IN EXCHANGE FOR NEW PLATES. GOLD EXTRACTED FROM OLD PLATES AT A MODERATE COST. OLD PLATES REPLATED. GOLD, SILVER, NICKEL, COPPER AND BRASS PLATING.

Denniston San Francisco Plating Works,

652 Mission Street, Cor. Annie, San Francisco, Cal.

E. G. DENNISTON, - - - - - - - - - Proprietor.

—:Send for Circular.:—

STEEL RAILS, TRACK FIXTURES,

PRODUCT PENNSYLVANIA STEEL COMPANY.

BAR, SHEET AND BOILER STEEL,

STRUCTURAL MATERIAL,

Cold Rolled Shafting.

GEORGE W. GIBBS COMPANY,

33-39 Fremont Street, 38-40 Beale Street,

CORRESPONDENCE SOLICITED. SAN FRANCISCO, CAL.

THE DAVIDSEN

PATENT TUBEMILL.

FOR FINE GRINDING,

Uniformity of Output, Effectiveness, Simplicity, or Economy of Operation and Maintenance, "THE DAVIDSEN" HAS NO EQUAL.

ENORMOUS GRINDING SURFACE. ❧ SLOW SPEED. ❧ ANY DEGREE OF FINENESS.

WRITE FOR CATALOGS.

F·L·SMIDTH & CO

ENGINEERS

66 MAIDEN LANE, NEW YORK

COPENHAGEN, VESTERGADE 29.K. LONDON. 9 BRIDGE ST., S.W.

THE SMIDTH BALLMILL

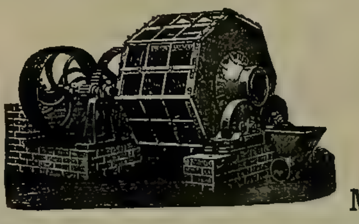
Crushes, Grinds and Sifts in One Operation, Working Continuously.

AMONG ITS SPECIAL FEATURES OF MERIT ARE:

Maximum Output, Slow Speed, Low Horse Power, Absolute Uniformity, Ease of Access, Slight Cost of Repairs.

OUR AUTOMATIC FEEDER INSURES REGULARITY AND EFFECTIVENESS.

THE SMIDTH BALLMILL.



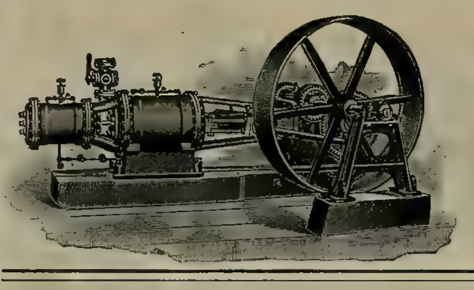
BEST.

CHEAPEST.

MOST SIMPLE.

WHY NOT have our catalogues, specifications and prices before you purchase

AIR DRILLS OR COMPRESSORS?



Our guarantees are strong; our customers are satisfied. We can satisfy YOU.

J. Geo. Leyner,

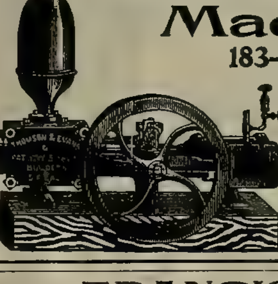
729 Seventeenth St.,

DENVER, COLO.

C. H. EVANS & CO.,

Machine Works,

183-185-187 FREMONT STREET,



Where, with Enlarged and Increased Facilities, they are better than ever prepared to do

First-Class Machine Work

Promptly, and at Reasonable Prices, and will continue the manufacture of

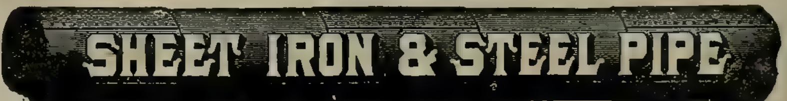
Thomson & Evans Steam Pumps,

Deep Well Pumps, Power Pumps, Etc.,

Also Marine Engines, Ship and Steamboat Work, Pipe Cutting, General Jobbing and Repairing.

FRANCIS SMITH & CO.,

—MANUFACTURERS OF—



FOR TOWN WATER WORKS.

Hydraulic, Irrigation and Power Plants, Well Pipe, Etc., all sizes.

46 FREMONT STREET, - - - - SAN FRANCISCO, CAL.

Iron cut, punched and formed, for making pipe on ground where required. All kinds of Tools supplied for making Pipe. Estimates given when required. Are prepared for coating all sizes of Pipes with Asphaltum.

Two Styles:
STAR and U.S.

Made in Brass Also. ★

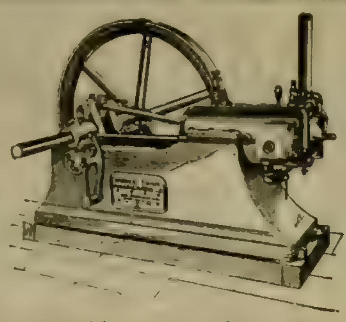
STAR PATTERN for Heavy Pressure.
U. S. PATTERN for Ordinary Pressure.

We warrant them for all service where a quick reliable action is required.

It will pay you to investigate.

Full particulars from any jobbing supply house, or direct from the manufacturers.

THE WM. POWELL CO., CINCINNATI, O.



Distillate Engines and Hoists.

Air Compressors.

HADWEN SWAIN MFG. CO.,
215-217 SPEAR ST., SAN FRANCISCO, CAL.
CATALOGUES MAILED.

WITTE GASOLINE HOISTS

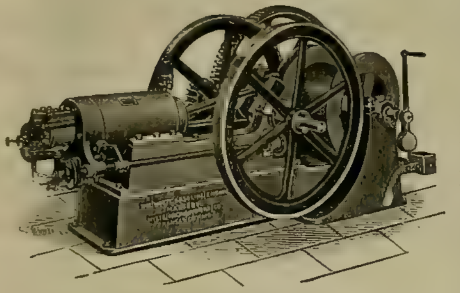
ARE MONEY EARNERS.

Made for use in places far from factory. Are built in parts and in duplicate. Renewals easy and quick to get. Strong, substantial and reliable.

Operate on GAS, GASOLINE or DISTILLATE.

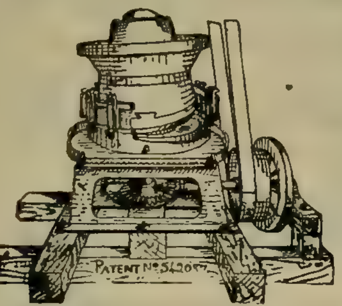
There Are Others, but None as SAFE AND RELIABLE.

Write for Illustrated Catalogue G.



WITTE IRON WORKS CO.,
515 WEST 5th ST.,
KANSAS CITY, MO., U. S. A.

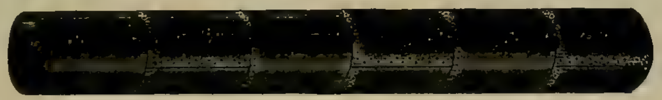
Hendrie & Bolthoff Mfg. & S. Co., Denver, Colo.
C. B. Boothe & Co., Los Angeles, Cal.
Tracy Engineering Co., San Francisco, Cal.



THE "LIGHTNER" QUARTZ MILL.

W. H. Birch & Co.
No. 127 to 135 First St., San Francisco, Cal.
— BUILDERS OF —
LIGHTNER QUARTZ MILLS.
No. 1 works 3 tons per day with 1½ H. P.
No. 2 " 4 to 7 " " " 2½ "
No. 3 " 10 to 15 " " " 3½ "
LARGER MILLS BUILT. SEND FOR CIRCULAR.
"Birch" Two-Stamp Mills, McGlew Concentrators,
And All Kinds of Mining Machinery.

RIVETED IRON AND STEEL PIPE



FOR HYDRAULIC MINES, IRRIGATION AND POWER PLANTS. Manufactured from the best grades of IRON or STEEL by MODERN MACHINERY.

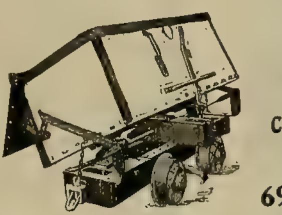
AGENTS FOR THE Celebrated CANTON STEEL.

Schaw, Ingram, Batcher & Co.,
539 Mission St., SAN FRANCISCO.
211 to 219 J St., SACRAMENTO.

TRUAX ORE CARS

OUR CARS HAVE BEEN IN USE FOR NINE YEARS.

CARS ALWAYS IN STOCK TO FILL RUSH ORDERS.



CUT REPRESENTS OUR SIDE DUMP CARS.

SEND FOR PAMPHLET.

CARS MADE FOR ALL KINDS OF WORK.

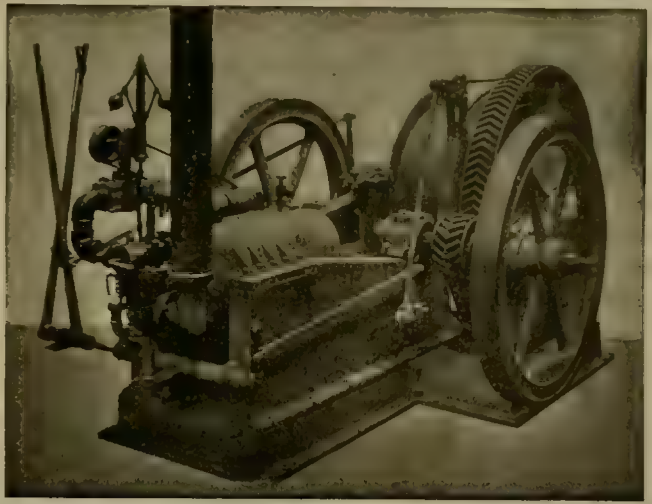
TRUAX MFG. CO.
69 Stevenson St., S.F.

SMOOTH-ON CASTINGS.
TRADE MARK

An iron cement for repairing leaks or fractures in steam or hydraulic work. When hard it will withstand a red heat, steam, water or oil, and expands and contracts with heat and cold the same as iron, insuring a tight joint at all temperatures. Difficult flange connections can easily be made with Smooth-On, as it adapts itself to the flanged faces whether parallel or not. Connections are easily taken apart. Unequaled for boiler patching, and repairing blemishes in iron castings. Write for catalogue and prices. Sole proprietors and manufacturers: Smooth-On Mfg. Co., Jersey City, N. J., U. S. A.

MESSRS. MADISON, BRUCE & SELLERS,
34-36 STEUART ST., SAN FRANCISCO, CAL. .... AGENTS FOR PACIFIC COAST.

HERCULES HOISTS Are Sold the World Over.



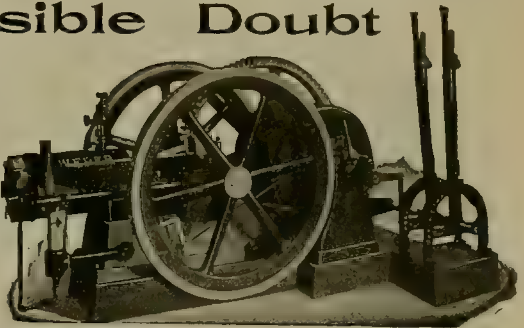
Hercules Gasoline Hoist--Speed 385 Ft.; Load 2500 Lbs.

HERCULES GAS ENGINE WORKS, ... 141-143 FIRST STREET, SAN FRANCISCO, CAL.

No Possible Doubt

about the usefulness of Weber Gasoline or Oil Engines and Hoists. They are in use everywhere under all sorts of conditions, and are making friends right along. Ask for full particulars.

WEBER GAS & GASOLINE ENGINE CO.,
P. O. Box 1132-I,
Kansas City, Mo.



The · Lunkenheimer · Company
Manufacturers of SUPERIOR BRASS AND IRON SPECIALTIES for Steam, Water, Gas, Air, Oils, etc.
WRITE FOR CATALOGUE.
26 Cortlandt Street, NEW YORK.
35 Great Dover Street, LONDON, S. E.
GENERAL OFFICES AND FACTORIES, Cincinnati, U. S. A.

BRANCHES: NEW YORK, 26 Cortlandt St.; PHILADELPHIA, Bourse Bldg.; LONDON, S. E., 35 Gt. Dover St.; MEXICO CITY, Puente de San Francisco No. 6.

VALVES FOR EVERY REQUIREMENT.

Regrinding.
Victor.
Clip.
Pop Safety.
Blow-off.
Double Disk Gate.
Iron Body Globe.
Lever Throttle.

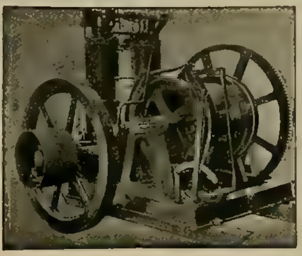
Unequaled for quality, and always specified where best is wanted. All valves trade-marked "Lunkenheimer" are warranted. In stock by dealers everywhere.

ALL ABOUT
Sight Feed Lubricators.

Our new catalogue for 1900 is ready for distribution. It explains in detail the principles governing the operation of **Sight Feed Lubricators**, using sectional view to show the internal construction, and containing cuts of the different styles in parts before being assembled into the complete lubricators, thus enabling every one to understand their construction and operation thoroughly.

In addition it shows our full line of **Glass Oilers, Oil Pumps, Oiling Devices, Multiple Oilers, Valves, Etc.** It will be sent to any address on application.

DETROIT LUBRICATOR CO., DETROIT, MICH.



Mining Hoist.

THE GOLDEN GATE GAS ENGINE
Will raise more ore than any other AT LESS COST.

MANY IN USE, Giving Satisfaction.

Built for any Capacity and for any Purpose.
Pumping Water, Propelling Boats, Hoisting Ore, Machine Shop Power, Etc.

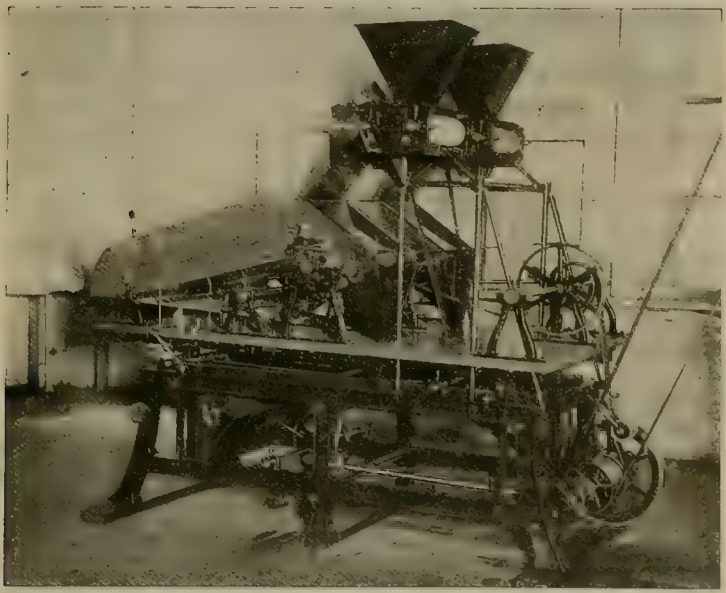
Send for Particulars and Catalogue.

ADAM SCHILLING & SONS,
213 & 215 Main St., San Francisco, Cal.

CROWN GOLD MILLING CO.

Manufacturers of the "CROWN" CONCENTRATOR and CROWN ORE SIZER. A dry process of sizing and concentrating ore, sand or gravel. Designed to accord fully with the laws of specific gravity, and especially adapted to refractory ore or localities where there is no water.

The chief claims for the Crown Concentrator are that it occupies less floor space and has nearly four times the capacity of any wet concentrator; that it will concentrate ores containing base and refractory metals that ordinarily slime and carry off values; that it effects a saving of values far above the ordinary methods of concentration.



We have, now in operation, a complete plant for crushing, sizing and concentrating ores by the

Crown Dry Milling Process.

Mine owners desiring tests made can forward us, freight prepaid, not less than 1000 lbs. nor more than 4000 lbs. of sample, for which a charge of $20 will be made. (This amount includes assaying, etc.)

Ores for which this process is adapted and of which consignments are solicited are any concentratable ores, pulps, tailings, or sands, carrying sufficient values, whether they have heretofore been profitably concentrated or not.

* * *

Office,........................230 Post St.
Works,.................23 Stevenson St.
SAN FRANCISCO, CAL.

THE HALLIDIE ROPEWAY

For Transporting Ore, Fuel, Earth, Sugar Cane, etc., by Wire Ropes.

SIMPLE, ECONOMICAL, PRACTICAL, DURABLE.

LOADS MECHANICALLY. DUMPS AUTOMATICALLY.

WIRE TRAMWAYS (Single and Double Rope Systems),

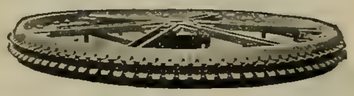
Cableways, Transmission by Wire Ropes,
Incline Planes, Cable Grips,
Logging by Cables, Automatic Loaders,

PLOWING, SCRAPING AND TRANSPORTING by Wire Ropes,

DESIGNED, SUPPLIED AND ERECTED. Estimates Furnished.

Improved GRIP PULLEY.

Patents Nos. 483,442; 610,353.



EFFECTIVE, SIMPLE, AUTOMATIC.

Saves Wear on Wire Rope and Cable.

Send for Illustrated Pamphlet.
Correspondence Solicited.

CALIFORNIA WIRE WORKS, - 9 Fremont St., San Francisco, Cal.

THE BARTLETT CONCENTRATING TABLE.

One of these Machines will take the place of TWO or THREE Belt Concentrators of any make and do as good work.

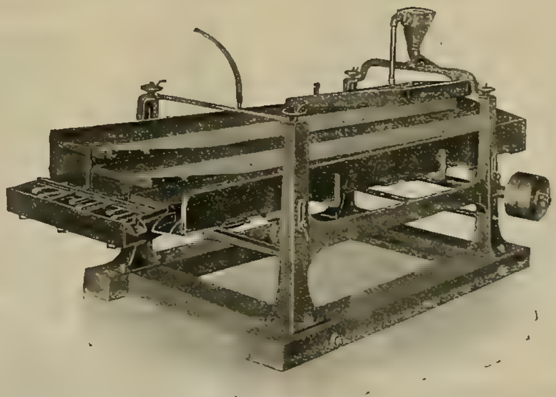
Separates ALL the minerals from each other at one operation.
Gives THREE CONCENTRATES on the one Machine at the same operation.
The Machine is especially adapted to the separation of Zinc and Lead.

- PRICE: -

12-ft. Table, $400.

SHIPPING WEIGHT - - - - - 2200 POUNDS.

CAPACITY - - - 10 to 30 tons per 24 hours.



Parties desiring tests made can send 500 lbs. or more, charges prepaid, and a run will be made and reports forwarded of the results, free of all charges, except for the assays, which will not exceed $10.00.

CAN BE SET UP ANYWHERE.
REQUIRES NO SPECIAL
FOUNDATION.

Licensee for the Manufacture and Sale, **PARKE & LACY CO.,** 21 & 23 FREMONT STREET, San Francisco, Cal.

SOLE AGENT FOR

INGERSOLL-SERGEANT ROCK DRILLS and AIR COMPRESSORS.
KNOWLES PUMPS and PULSOMETER PUMPS, BULLOCK DIAMOND DRILLS.
CATALOGUES FREE ON APPLICATION.

This Paper not
to be t n from
the Libr

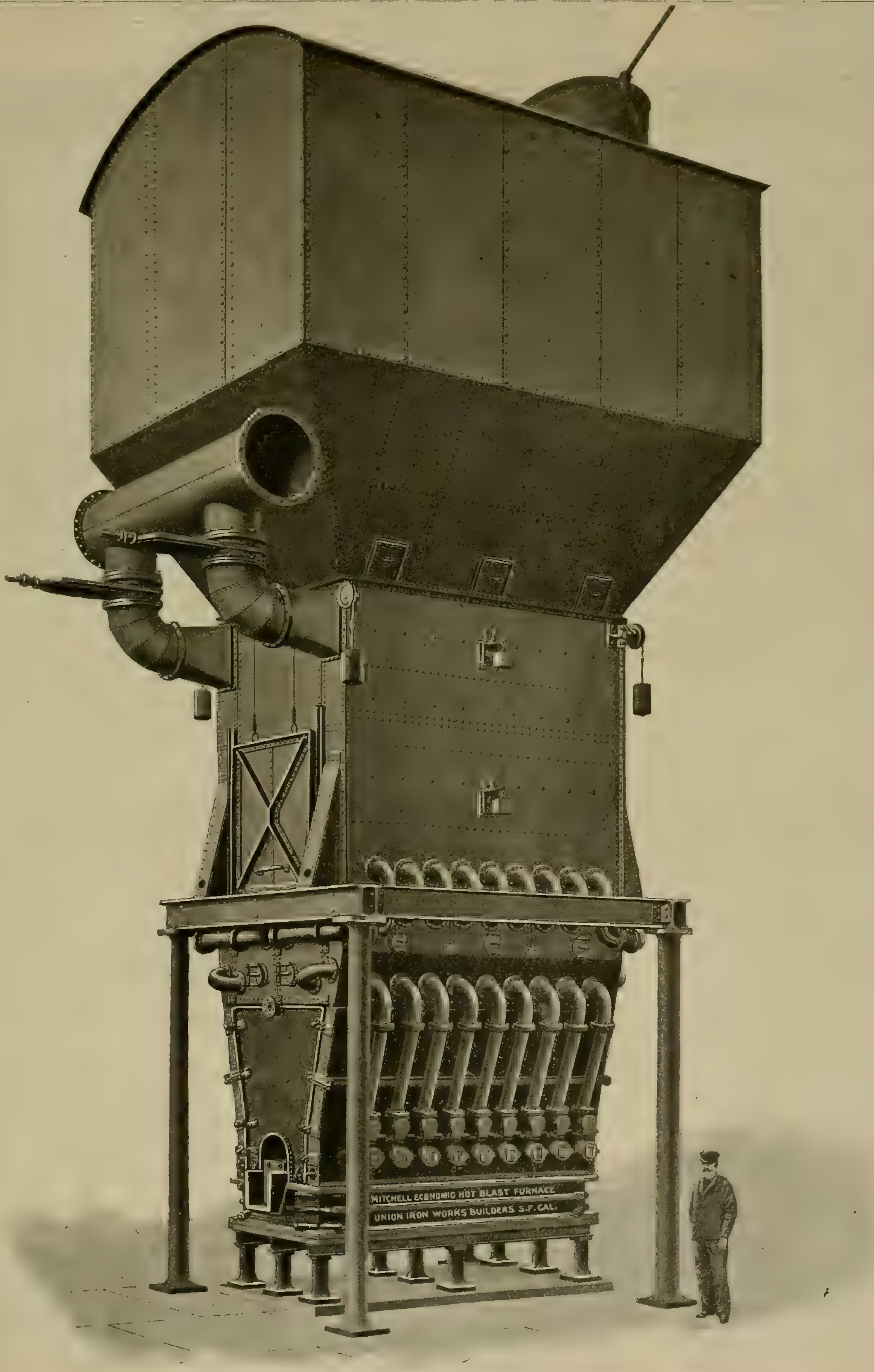
IFORNIA
STATE

MINING AND SCIENTIFIC PRESS. AND PACIFIC ELECTRICAL REVIEW.

No. 2096.—VOLUME LXXXI. Number 12. SAN FRANCISCO, SATURDAY, SEPTEMBER 22, 1900. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

A Big Copper Furnace.

At no period in the history of the world has the demand for copper been so great as at the present time, and the appliances for its reduction are being steadily improved. On this page appears an illustration of the Mitchell economic hot blast water jacket furnace, recently built by the Union Iron Works for the Copper Queen Consolidated Min-Company of Arizona. This structure, standing 50 feet in height, is foremost among the largest and most improved furnaces ever built, having a capacity of 300 tons per day. The main feature of this furnace consists in its adaptability for reducing, at one operation, raw copper sulphide ores to a matte suitable for bessemerizing, without preliminary roasting. The blast is first introduced into air jackets located above the smelting zone, and is heated to a temperature varying from 500° to 900° F., and is then introduced into the furnace through tuyeres as shown. The condensing chamber, located on top of the air jackets, collects most of the fine dust, which is run out through suitable openings, bricked and returned with the charge to the furnace. The makers say that this furnace, by means of the hot blast and special features introduced, affords the nearest approach to pyritic smelting that has been performed with success, the fuel used being about 3% of the charge, which marks an advance in the economy of smelting.


MITCHELL ECONOMIC HOT BLAST FURNACE
UNION IRON WORKS BUILDERS S.F. CAL.

HOT BLAST WATER JACKET FURNACE.

The inventor of this furnace, Mr. George Mitchell, is a progressive metallurgist, having given a life study to the smelting and refining of copper.

The works referred to are now building furnaces of this type, of 200 tons daily capacity, for the Greene Consolidated Copper Company and also the Copete Copper Company, together with all accessories constituting complete plants.

◆

The Leadville, Colorado, Mining Stock Brokers' Association has decided to appoint a "rustling" committee whose duty it shall be "to interview the business men with the view of inducing them to subscribe money to be invested in mining stocks" under the direction of another committee which the brokers will appoint, the object of the scheme being to "strengthen the stock market." It is to be explained to the business men that the brokers' committee could spend the money, if the business men would put it up, in buying such stocks as were sure to advance and at the same time "strengthen the market."

MINING AND SCIENTIFIC PRESS.

ESTABLISHED 1860.

Published Every Saturday at 330 Market St., San Francisco, Cal.

ANNUAL SUBSCRIPTION:
United States, Mexico and Canada.............$3 00
All Other Countries in the Postal Union.............4 00

Entered at the S. F. Postoffice as second-class mail matter.

J. F. HALLORAN.............Publisher.

Special Representatives:
EASTERN.
E. H. HAVEN.............150 Nassau St., New York City.
MIDDLE WEST.
CHAS. D. SPALDING.............153 La Salle St., Chicago, Ill.
INTER-MOUNTAIN.
W. A. SCOTT.............43 Jacobson Building, Denver, Colo.
SOUTHERN CALIFORNIA.
W. D. CURTIS.............223 W. Second St., Los Angeles, Cal.

San Francisco, September 22, 1900.

TABLE OF CONTENTS.

ILLUSTRATIONS.—Hot Bla st Water Jacket Furnace, 337. Telescope Mountain, Rico, Dolores County, Colorado, 341. Latest Mining and Metallurgical Patents, 343. Preparing Roofing Slate for the Market, 344. A Scene in the California Sierras—A Source of Light and Power; An Effective Pipe Wrench, 345. Town of Chloride, Sierra Co., New Mexico, Foothills of Black Range; The Atlas Pipe Wrench, 346.

EDITORIAL.—A Big Copper Furnace, 337. Strike of Coal Miners; Of General Application; Miscellaneous, 338.

MINING SUMMARY.—347-348-349.

LATEST MARKET REPORTS.—350.

MISCELLANEOUS.—Concentrates, 339. California Crude Petroleum as a Fuel; A Tale of Two Engines, 340. Mines of Rico, Dolores County, Colo., 341. Filtration Instead of Distillation for Petroleum; Underground Oil Tanks in Canada; Experiments Regarding the Influence of Silica on the Loss of Silver in Scorification, 342. Latest Mining and Metallurgical Patents, 343. Volumetric Method for the Determination of Copper; Preparation of Roofing Slate, 344. The Colorimetric Assay of Copper; From the Sierra to the Sea; An Effective Pipe Wrench, 345. Constitutionally Affirmed; The Black Range District, New Mexico; A New Enterprise; The Atlas Pipe Wrench, 346. Personal; Books Received, 349. Commercial Paragraphs; Obituary; List of U. S. Patents for Pacific Coast Inventors; Notices of Recent Patents; Recently Declared Mining Dividends, 350.

IF eight persons should make eight distinct and separate placer locations of twenty acres each, and seven of the locators should convey their claims to the other, it would require annual assessment work of the value of $800 to maintain the possessory right to all of the claims; but in the case of a single location, embracing 160 acres of placer mining land, the owner thoreof, in order to maintain his possessory right thereto, would not be required to expend $100 worth of mining labor on each twenty acres thereof, but his possessory right to the entire 160 acres might be maintained by performing thereon $100 worth of actual mining work, designed in good faith for the improvement of the 160-acre location as a single mining claim.

To PROF. S. B. CHRISTY, Dean of the College of Mining, University of California, this paper is indebted for opportunity to publish the valuable data on the comparative value of coal and crude petroleum as fuel, which appear in the issues of last Saturday and to-day. The experiments, of which the published article is the condensed result, cost nearly $1000 and months of skilled effort. The article supplies the latest published data of the kind. Since the early part of 1898 this paper has published a number of technical articles on the subject of petroleum in California, and it is probably not too much to say that the articles so published throughout 1898, 1899 and 1900 formed the basis for the present successful development of California's oil wealth.

IN depth from surface and magnitude of operations Michigan is pre-eminent in American metal mining. The Lake Superior region first produced copper in 1845, the product that year being 26,880 pounds, worth $6000. Over half a century of mining and scientific progress resulted last year in giving employment to 13,051 men in the mines of Houghton county, the product being 146,950,338 pounds, worth $28,098,382. The total production of the Lake Superior copper mines to the close of 1899 was 2,521,378,296 pounds refined copper, valued at $389,588,204. In the last ten years the product and the number of mine workers have nearly doubled. In 1890 there were 7310 men employed in the mines of Houghton county. It is estimated by the mine inspector that 14,000 men now find employment therein. The Hecla paid its first dividend of $5 per share in December, 1869; the Calumet its first in August, 1870. In thirty years the Calumet & Hecla has paid over $70,000,000 in dividends.

Strike of Coal Miners.

The threatened strike in the Pennsylvania anthracite coal mines has come to pass and 100,000 coal miners are idle. The same conditions that caused strikes there before occasion the present disagreement, with probably the same result. J. Fahey, president district No. 9, sends from Hazleton, Pa., a statement in which he says:

> The causes that have led the miners to make their present demands have been stated generally, but not in detail. Briefly, they are the manner in which the men are overcharged for the necessaries of life at the company stores, for their tools and powder, and the exorbitant rent they are compelled to pay for company houses; the fact that at the present time the ton of coal gotten out by a miner usually weighs about 3500 pounds, and even with this great surplus the fact that he is docked for slate and dirt; the fact that there is no uniformity of pay, and a score of things that need not be spoken of here. The changes that we ask for are few and all are not so great that they might not be made. In regard to the stores, food costs from 15% to 20% more than it should. An ordinary celluloid collar button, the brand that sells for 5 cents a dozen in a store, is sold by the company for 5 cents each. From a collar button to a keg of powder is about everything a miner needs. The DuPont powder works manufacture this powder and sell it at 90 cents a keg. The companies charge the miners $2.50 for this same powder. In the soft coal mines and in other mines this powder is sold to miners at $1.50 a keg, which gives the company a profit of about half a dollar. The anthracite operators demand a profit of $1.50 on every keg. They demand the same amount of profit on all tools. We demand that the price of powder be reduced to at least $1.50 a keg. We ask that the other necessities of life be reduced equally. We seek lower rent. We also ask that hereafter the coal mined shall be weighed and that a ton shall be the same number of pounds as that sold by the operators. We ask that the pay be uniform throughout the region. In some mines the workmen get $1.25 a day for work that men get only $1 for in other mines. This condition creates discontent. We seek to have the same amount paid for the same class of work in all mines. The miner earns on an average about $1 a day, and the extra cost of his food and other necessities means a lot to him.

The employers and operators claim that the strike is incited mainly for political effect, the same as the Homestead strike in July, 1892, which many think determined the result of the presidential election the following November. Such a strike as the present one always entails great loss, even though the strike be short-lived, as strikes among coal miners usually are. The chief element to be feared is the uncontrollable Hungarian and Pole contingent that so quickly resorts to violence, riot and destruction of property, of course resulting in calling out the militia with the usual unfortunate termination.

Like every other class of workers, coal miners undoubtedly have their grievances, but, probably, the operators and owners have their own troubles. If at all practicable, it would seem better to have a conference of employers and employes. Considerable of the ill will and consequent disaster arises from lack of knowledge of conditions, each side viewing matters solely from its own point of view. The complaints voiced above from the strikers' representative manifestly demand fair hearing and an attempt at adjustment, and probably a sincere and well-meant effort to secure mutual justice would avert the present trouble, with its inevitable disastrous conclusion; but if, as the employers claim, the order to strike was sent out almost simultaneously with such demand for adjustment, that would give color to their assertion that the whole thing is mainly and primarily intended to influence votes next November—an assertion that does not admit of present proof. The mine owners allege that the interests of the bituminous coal operators favor the strike as a matter of business competition.

The right of organized labor to strike is a natural one, and in the State of Pennsylvania is made legal by statute; and so long as the men are within their rights, they naturally have strong claims upon public sympathy. Such sympathy is, however, immediately forfeited by injury on the part of the strikers to persons or property, and in this respect the worst enemy to the success of a strike is the lawless element, whose violence constantly menaces the effort to secure justice from employers.

REGISTERS AND RECEIVERS of land offices are in receipt of orders from Washington, D. C., instructing them to keep their offices open to the public for business from 9 A. M. to 4 P. M. each day, except Sundays and holidays. The important part of the order is as follows: "No original business should be transacted before 9 o'clock A. M. nor after 4 o'clock P. M." It has been the custom in some localities to attempt to use the Land Office in getting "snap judgment" in filing entries, applications or adverses at hours others than those officially designated, and with the official order in plain view the local land officials can now decline to transact business at any other time than that officially prescribed.

Of General Application.

At a recent banquet to prominent visitors given by mining men at Rossland, B. C., in the course of several speeches many good things were said, among the best being the following in the course of some remarks by E. B. Kirby, manager War Eagle and Center Star mines:

> In the progress of civilization no factor has ever been known to exercise such a powerful influence as mineral wealth in attracting energy and capital to a country. * * * * Mining men realize that apart from their selfish interest in the question, it is always a matter of the wisest policy to do everything possible to encourage mining. Nature places enough obstacles in the way, and it is surely the part of wise government to remove them so far as possible, and to encourage and aid in every way those who are devoting their lives and fortunes to the work of developing these resources. The interdependence of all citizens in the mining districts is so great that they stand or fall together according to the success or failure of the work. It is the experience of the oldest mining regions that every burden or restriction imposed upon the mines invariably affects every one in the community. For all these reasons mining men everywhere feel that they are justified in asking, in the name of public welfare, for special considerations.

Mining is the basic industry of a nation. On it rests as on an underlying foundation the prosperity of a country, and when the industry is hampered, and that which is necessarily difficult is made more so by indifference or hostility, the result is injurious to all.

A DENVER, COLO., daily asserts that T. F. Walsh will receive several million dollars for his Camp Bird mine at Ouray, Colo., from a syndicate of English and American investors headed by A. Beit of South Africa and J. P. Morgan of New York. The further assertion is made that a draft covering the first payment is now on deposit in a Denver bank, that a mining expert is now at Ouray to make a final examination of the mine on behalf of the syndicate, and it is expected in Denver that the deal would be closed by Oct. 1st. There has been considerable attention of late given the rumored sale of the Camp Bird property. About the 1st inst. a MINING AND SCIENTIFIC PRESS staff correspondent was detailed to visit the mine. The result of his visit is published on page 347, being devoted largely to mill practice.

THE apex law, with its extralateral rights and all the ills of litigation that follow in its train, is a legacy of the old Spanish rule. It was a Spanish institution adopted when California was added to the United States and perpetuated in our mining statutes. All Spanish speaking countries discarded it on attaining their independence, Bolivia alone excepted. In the United States and Bolivia that ancient ruling is still the supreme law, in defiance of the great principle of common law observed by all the rest of the world.

THE U. S. transport Lawton is bringing back stranded and penniless men from Cape Nome, lured there by fairy tales told by transportation companies and repeated by a venal press. The only punishment to those who occasioned so much suffering and loss must be the consciousness of their own identity. It is fortunate for their dupes that the Government took pity on them.

THE payment of the current $20 dividend of the Calumet & Hecla Mining Co. makes an aggregate of dividends declared by the directors of that company of $70,850,000, being a larger amount than has ever been paid in an equal space of time to the stockholders of any gold or silver mine, and is exceeded only by the amount of dividends paid by the Con. Cal. & Va. of the Comstock, Nevada.

Concentrates.

THERE is no bullion tax in Arizona.

A CUBIC FOOT of lead ore weighs 674 pounds.

THE annual consumption of "blue vitriol" on the Pacific coast is about 1200 tons.

PROBABLY $3 per ton would be a fair minimum estimate of cost to give on barrel chlorination.

CALIFORNIA'S average yearly output of gold for the past fifty years has been about $26,000,000.

AN illustrated article on cheap ventilation in small mines appeared in the issue of March 18, 1899.

THE Chicago Pumice Co. buys pumice; the finished product sells in Chicago for about $25 per ton.

IT is not considered that quartzite was deposited as molten rock, it being a hardened crystallized sandstone.

TO SOFTEN iron and steel, cover it over with a coating of tallow; heat in a charcoal fire and then let it cool.

AN ounce of pure gold—1000 fine—is worth exactly $20.671834625; a grain of gold 1000 fine is worth $0.0430663.

GARMENTS made of textile fabrics, if dipped in a 25% solution of phosphate of ammonia, are rendered uninflammable.

THE entire subject of "fatigue" and breakage of stamp stems was scientifically considered in the issue of Jan. 7, 1899.

ABSOLUTE ZERO is understood to mean a temperature so low that there would be no heat present. It is indicated at 460°.

SIX POUNDS bicarbonate soda, 4 pounds litharge and 2½ pounds powdered borax ought to make a good flux for the ore described.

TO FILL holes in castings, take lead nine parts, antimony two parts, bismuth one part; melt and pour in enough to fill the holes.

ELECTRICITY was first used in mining in Colorado in 1889; first used in mining in California at the Big Bend mine, Feather river, in 1888.

A MILLSITE may be patented by compliance with the same requirements regarding survey and notice as are applicable to mines or lodes.

SINKING was discontinued on the Comstock, Nevada, March 28, 1882. The combination shaft of the C. & C. had then reached a vertical depth of 3250 feet.

WAVE MOTORS are interesting toys, but the present state of the art is not encouraging to those desirous of viewing it from the standpoint of commercial profit.

ORDINARY AMALGAM from a hydraulic sluice box will run about 65% quicksilver and 35% gold. In retorting there would be an average loss of 10% of the quicksilver.

ASBESTOS and carbonate of magnesia are among the best substances to cover a pipe or steam heated surface for protection or prevention of heat radiation or conductivity.

NO ONE other than the original locator can legally locate a lode claim in the bounds of a properly located placer claim unless there has been abandonment by the placer claimants.

THE late Adolph Sutro got his tunnel franchise from the Nevada Legislature in 1865, and, subsequently, congressional authorization. The tunnel was begun in 1869 and finished in 1879.

"THE first gold mine in the United States" is believed to have been the Barringer, in Stanley Co., North Carolina—a placer claim that later was developed into a paying quartz lode mine.

CONTINUED USE of cyanide of potassium for removing the green copper oxide sometimes found on copper amalgam plates will ultimately make them too hard for the mercury to sufficiently adhere.

AN ounce of standard gold in London, i. e., gold of 916.6 one-thousandths fine, is worth £3 17s 9½d. An ounce of fine gold in London, i. e., of 1000 fine, is worth £4 4s 10d. An ounce of fine gold in New York is worth $20.67, or £4 4s 10d.

ONE can always concisely explain what he thoroughly understands, and in any event his explanation of it is usually in proportion to his knowledge of the subject. Indistinctness of expression is inevitable where there is obscurity of thought.

IF one wants to write a good book on mining and milling gold ore, a bunch of catalogues issued by mining machinery manufacturers and a file of this paper would fill all requirements except the mechanical work of compilation and writing a preface.

A RUST JOINT that will stand heat and cold and rough usage is made as follows: Mix ten parts of iron filings and three parts of chloride of lime with water to a paste. In twelve hours it will set so that the iron will break sooner than the cement.

A DRAWBACK of the duties paid on imported lead refined in a bonded establishment and subsequently withdrawn on payment of duties for domestic consumption, is allowed upon the exportation of the articles manufactured wholly from such lead.

FOSSILIZED cedar tree trunks 3 feet in diameter have been found in California drift mines at points over which were 700 feet of lava, a few inches of the outside changed to lignite, the remainder perfect in the grain and retaining the pungent odor of the wood.

THERE is no "prospecting" east of the Missouri river for two reasons—1st, there isn't much to "prospect" for, and, 2nd, as there are no public lands, even if there were anything to prospect for, the prospector would have to get permission from the owner of the ground.

FOR a loose rubble wall the height should never exceed 10 feet, and the base width should be at least one-half the height. To get a well-proportioned wall of this material the base can be three-fourths the height, with a face having a half to one slope and a back with a one to one slope.

THERE are mines in Pitkin, Park and San Juan counties, Colorado, almost 14,000 feet above the level of the sea, in limestone in connection with porphyry. There are mines in California the lower workings of which are nearly 1000 feet below the level of the sea, in slate, quartz and granite.

STONE for building should not absorb more than 5% of water in twenty-four hours. It needs to be insoluble. A simple test for insolubility is to put some of the crushed stone in a glass of water, let it alone for an hour, then stir. The cloudier the water becomes the more soluble material there is in the stone.

TO TEMPORARILY stop small leaks in seams of boilers or pipes, mix equal parts of air-slaked lime and fine sand with finely powdered litharge, in parts equal to both the lime and sand. Keep powder dry in a bottle or covered box. When wanted, mix as much as needed to a paste with boiled linseed oil and apply quickly, as it soon hardens.

SULPHIDE of mercury may be found at Sulphur Bank, Colusa Co., Cal., where also may be seen in decomposed volcanic rocks fissures from which issue steam and hot alkaline water, the sulphur springs depositing siliceous sinter which contains cinnabar and sometimes gold, as do Steamboat Springs, Nevada, where can be seen ore deposits in process of formation.

IN the progress of practical mining our readers can greatly aid by sending accounts of mining or metallurgical work, notices of what is done in the mine that is deemed of sufficient value to merit publication, thus adding to the stock of common knowledge. Where possible the matter would be of added value if accompanied by photographs or sketches for suitable illustration.

IF the quicksilver flours in an arrastra grease may have got into the basin, or the pulp may be too thick; arsenic and black oxide of zinc tend to sicken quicksilver. If it be so finely floured that the minute particles will not unite, it can be collected by patient addition of a little sodium. Where black oxide of manganese can be shown to be the cause of flouring, a little quicksilver added to the charge will help.

AN explosive intermediate in power between nitroglycerine and ordinary blasting powder consists of a mixture of the nitrates of sodium and potassium with sulphur, bichromate of potassium and coal tar. The latter constituent renders the explosive impervious to damp and holds the whole together. The proportions used are: Sodium nitrate, 69 parts; potassium nitrate, 5 parts; sulphur, 10 parts; potassium bichromate, 1 part; coal tar, 15 parts. After mixing the powder is compressed between warm plates. Taking ordinary powder as 1, the power of this explosive is 4.9 to 7, nitro-glycerine being represented as 9.

THE introduction of electric motor driving on machinery has led to such modifications in the design of machinery as would naturally follow from the differences between belting and motors. For example, since the motor is small and can be built into the machine close to the cutting tool, or the part which uses the power, all shafts, gearing, wheels, etc., within the tool, which have been heretofore necessary to receive the driving belt and transmit its power to the tool, may be dispensed with, and then the frame of the machine may be made a different shape, or much lighter, since it does not have these additional parts to support.

IT is not unusual for a man with a mining claim for lease or sale to endeavor to get it in some line connecting it with a well-known producer, on the theory that the trend of the ore body is in that particular direction. Nature never laid down these ore channels with such mathematical exactitude. If anything, the ore shoots follow the lines of least resistance, and these may be very irregular. While it may be an aid in inducing capital to invest in some enterprise to show a colored map with red lines all leading to a famous producer, yet ore bodies can and will be opened up without reference to any such arbitrarily drawn lines.

AIR in its passage through pipes is subject to friction in the same manner as water or any other liquid. The pressure at the compressor must be greater than at the point of consumption in order to overcome the resistance of the pipe. The power which is needed to produce the extra pressure, representing the resistance of the pipe, is lost, as there can be no useful return for it. The losses by friction may be serious if the piping system be poorly designed, and on the other hand extravagant expenditure in pipe may result from a timid overrating of the evils of friction. The difference in pressure between the entrance to the pipe and the point of use is, in hydraulic engineering, termed the loss of head, and the power lost—in hydraulics—is directly in the ratio which this loss of head bears to the entire head. The same line of figuring is sometimes applied to pneumatics. Friction of air in a properly designed pipe system is not a serious matter, and can be made as small as the most exacting requirements may demand. To reduce pipe friction the pipes must be enlarged, and, as this means additional expense, it is advisable to have a careful plotting made of the entire plant to see what may be true economy.

FOR the first seven months of 1899 New York city imported $8,456,053 gold; for the first seven months of 1900 New York city imported $1,884,761 gold; for the first seven months of 1899 New York city imported $10,299,464 silver; for the first seven months of 1900 New York city imported $10,369,783 silver. For the first seven months of 1899 New York city exported $25,778,035 gold; for the first seven months of 1900 New York city exported $29,657,620 gold. For the corresponding periods San Francisco imported respectively $10,828,228, $9,049,679 gold; $1,546,894, $1,725,025 silver; and exported $2,808,249, $4,646,680 silver. These figures are furnished by the Sub-Treasurers of the two cities.

THE laws governing the flow of air in pipes are somewhat complex. For any given velocity the loss in head due to friction, if stated as a per cent of the total head, will not be affected by the pressure; but, as usually stated, in pounds on a gauge, it becomes greater for the same velocity in the pipe, as the pressure becomes greater. The velocity varies approximately as the square root of the loss of pressure. The loss is not directly as the length, except for short distances and low velocities. As a pipe is extended, the velocity of the flow of air in the distant end of pipe becomes greater, by reason of the increase in the volume of air at that point. This increased velocity causes a greater loss of head for each length of the distant pipe.

THE durability of building stones is indicated by their chemical composition, both in the crystalline and the non-crystalline, or sedimentary groups. The nature of both the grains and the cementing material is also to be considered. The latter may be such as to be really acted upon by atmospheric elements, and the stone fall to pieces as a heap of quartzose sand. each grain of which, by itself, would have resisted for ages. Without the bond the tottering wall gives way. The principal atmospheric agents which attack stones are carbonic, hydrochloric, nitric and sulphuric acids, ammonia, and several organic acids. These agents, carried by rainwater, act by solution, oxidation, deoxidation and hydration and the constituent minerals, as well as the cement, are affected by them. The durability of any given stone is determined by that chemical constitution which is least liable to change under their action.

FLAT ROPES are composed of a number of wire ropes called "flat rope strands," of alternate right and left lay, placed side by side, secured or sewed together with soft Swedish iron or steel wire, forming a completed rope. The sewing or filling wires, being softer than the steel wires comprising the strands of the rope, act as a cushion or soft bed for the strands, and wear out faster than the harder wires composing the latter. When the sewing wires are worn out the flat rope can be resewed with new wire, and if any of the rope strands are also worn or damaged these can be replaced with new portions. Flat ropes are used principally for hoisting purposes. When large and long ropes are used in hoisting heavy loads out of deep shafts round ropes require large and heavy drums on which to wind; flat ropes, winding on themselves, need a reel very little wider than the width of the rope. Flat ropes do not spin or twist in the shaft.

OSMIUM is one of the rare metals, the densest of all metals and the most refractory, being infusible at any except the highest attainable temperatures. It is found native as an alloy in certain ores of platinum and iridium. It is a hard, bluish-gray metal, with an atomic weight of 191.1 and specific gravity 22.477—the heaviest substance known. Its tetroxide has a strong odor of chlorine, from which circumstance its name was originally derived. It is suggested as the material of a new electrical filament because of its practical infusibility—its known resistance to temperatures in which platinum and iridium volatilize and disappear. The intensity of light emitted by an incandescent substance increases rapidly with its absolute temperature. By heating osmium in a vacuum with an electrical current strong enough to volatilize platinum, it attains a luminosity hitherto almost unknown, emitting a white light of agreeable quality and color, but of great intensity.

A DRILL SHARPENER says: "The most important thing in tempering drills is to heat just the edge of the drill as short as it is possible to do; for this reason: suppose you heated it back, say, 2 inches from the end, and tempered it in that way, the chances are at the first or second blow the drill is struck off flies a piece of the face of the drill—sometimes 1 inch and at other times ¾-inch. Then this has to be all cut up before you can go on. I had this occur to me once when I was engaged at drill sharpening. I worked at it for eighteen months, and in the first week I had a piece drop off of the end about 1 inch. That gave me a sufficient lesson never to let it occur again. Now, if you want to make a drill larger or smaller than it was before, you have then to heat it just as long as you want, and, as soon as made ready for tempering, put it down to cool off, and when cold take it and temper as I describe above. When a drill is put into water it wants to remain until completely cooled off, because if you take it out not completely cooled it is liable to fly off."

California Crude Petroleum as a Fuel.

NUMBER II.—CONCLUDED.

By ERNEST H. DENICKE, College of Mining, University of California.

While coal was being used very careful working tests were made continuously, one boiler being set aside for this purpose. The amount of water entering the boiler was measured by a meter on the feed pipe and the amount of coal burned was weighed. Besides this, chemical analyses were made of every kind of coal used. The following table gives some of these:

ANALYSES OF COAL USED AT THE WESTERN SUGAR REFINERY, SAN FRANCISCO.

COAL.	Water	Ash	Volatile	Fixed Carbon	Heating Power.	Evaporation at and from 212° F.
Nanaimo, B. C	2.54	11.92	34.51	51.03	69.0	7.29
Brimbo, Australian	4.86	4.36	28.65	62.13	80.56	....
Newcastle, Australian	2.75	10.06	34 9	52.29	72.8	....
Anthracite, Welsh	1.97	4.04	6.65	87.34	91.2	....
Anthracite, China	3.21	11.73	4.08	80.98	86.3	....
Seaham, Australian	2.25	9.93	33.42	54.4	74.7	....
Wallsend, Australian	2.64	6.93	31.31	59.12	76.6	8.88
Greta, Australian	2.26	8.20	33.87	55.67	70.69	7.56
East extension of Greta.	3.04	13.15	31.35	52.46	65.3	7.24
Sunderland Screenings.	1 53	1.13	25.16	72.18	88.9	....
Beaver Hill, Oregon	12.5	8.5	40 5	38.5	54.4	4.84
Kobe, Japanese	.71	7.33	37.0	54.96	81.6	....
Cardiff, Australian	3.32	7.25	32.5	56.93	75.4	....
Bulli, Australian	1.07	13.90	20.48	64.55	71.3	7.26
West Hartley, Austra'n.	8.8	.70	30.3	60.2	77.0	....
Wallawah, Australian	3.46	8.0	29.1	59.44	75.6	7.70
Corral Hollow, Cal.*	16.6	10.5	43.5	29.4	50.4	4.32
Coke (Gas Co., S. F.)	3.3	19.0	1.0	76.7	91.0	....
Brisbane, Australian	2.82	13.31	29.63	54.24	72.4	....

*NOTE.—In justice to the Corral Hollow coal, it should be stated that the coal first mined was from the surface and was a quality inferior to that now put on the market. A boiler test with Corral Hollow coal made by W. R. Eckart gave an evaporation from and at 212° F. of 7.192 pounds.—S. B. CHRISTY.

The Western Sugar Refinery has exceptional opportunity for getting cheap coal, and handling it cheaply. It has its own wharf and bunkers, and from the bunkers the coal drops to the fireroom by gravity. The coal was always bought by the shipload and thus very low rates were obtained. The price of coal varies greatly from time to time and, especially within the last few years, the prices have been high. The following table may be of some interest, as it shows the fluctuations and steady increase of price, and also gives some idea of the amount of coal burned and the shipping necessary to supply this coal:

COAL.

Ship.	Kind of Coal.	Price.	Date. 1896.
Red Rock	Anthracite	$5 40	Mar. 10
Hawaiian Isles	Co-operative	5 50	Mar. 28
Inveresk	Co-operative Wallsend	5 50	Apr. 12
* Brablock	Cardiff Coal	4 15	May 5
Hollinwood	Wallsend	5 45	May 4
Craigmore	Greta	5 45	June 2
Cardiganshire	Bulli	5 30	June 10
General Fairchild	Nanaimo	5 55	June 22
Courser	Nanaimo	5 55	July 13
Kynance	Nanaimo	5 55	July 27
General Fairchild	Nanaimo	5 55	Aug. 10
Afghanistan	Bulli	5 30	Aug. 11
General Roberts	Bulli	5 25	Aug. 22
Muskoka	Anthracite	5 80	Sept. 1
Bunkers of Beaver Hill Coal	Beaver Hill	3 50	Sept. 5
* Roos-shire	Bulli	4 90	Sept. 23
Peru	West Hartley Steam	5 50	Sept. 17
Oregon	Nanaimo	5 55	Oct. 8
Albyn	Co-operative	5 20	Nov. 5
Laurelbank	Co-operative	5 15	Dec. 9
Bracadale	Co-operative	5 20	Dec. 19
			1897.
Swanhilda	Duckenfield	5 40	Mar. 11
Doventy Hall	Nanaimo	5 55	Apr. 3
Rosenfeld's Lighters	Anthracite	7 24	Apr. 16
Rufus E. Wood	Nanaimo	5 55	Apr. 26
Alpene	Anthracite	7 24	Apr. 30
Carollton	Nanaimo	5 55	May 10
Harry Morse	Wallawah	5 30	May 20
Rufus E. Wood	Nanaimo	5 55	June 4
Blairhoyle	Greta	5 45	June 2
Australia	Anthracite	7 25	July 2
Novelty	Greta	5 40	July 7
Yarana	Anthracite	7 25	June 8
Lindley	Teaham	5 30	July 19
Corral Hollow Coal Co.		3 00	June 15
Thistle	East Greta and Northern	5 05	Aug. 14
Itjorn	Wallsend	5 84	Aug. 26
Nanaimo Barge	Anthracite	6 50	Aug. 28
Pendeen	Co-operative	5 80	Sept. 15
More Eilian	Whitwood	5 65	Sept. 18
Iverness-shire	North'n Extended.	5 15	Oct. 7
Louis Walsh	Duckenfield	5 75	Oct. 21
Merioneth	Anthracite	7 25	Oct. 25
Wilhelm Tell	Anthracite	7 25	Oct. 27
Duus Law	Co-operative	5 95	Nov. 17
Bannockburn	Co-operative	5 95	Dec. 9
Susanna	Duckenfield	5 85	Dec. 10
Vincent	Co-operative	5 95	Dec. 14
			1898.
Glenogil	Co-operative	6 20	Jan. 25
Prince Robert	Co-operative	6 45	Mar. 8
Abie Albercrom	Anthracite	7 25	Mar. 2
Dominion	Greta	6 25	Apr. 9
Snow and Burgess	Wallsend	6 50	Apr. 22
Prince Robert	From Bunkers	6 71½	May 3
Port Logan	Co-operative	6 50	May 7
Columbia	Roslyn	5 20	May 14
McNear	Co-operative	6 50	May 24
Rosenfeld's Bunkers	Nanaimo	7 25	June 1
Prince Robert	Co-operative	6 70½	June 3
Rosenfeld's Bunkers	Nanaimo	7 25	June 13
Rosenfeld's Bunkers	Nanaimo	7 25	June 20
Steamer Bunkers	Pyrenees	6 15	June 21
Belford	Co-operative	7 12½	July 8
Gladys	Co-operative	7 12½	July 12
Caithness-shire	Co-operative	6 75	Oct. 11

*Part of this cargo was damaged by fire, and thus the coal was bought at a reduced figure.

EVAPORATIVE TEST OF COALINGA OIL.

Duration of test	22 hours.
Pounds of oil burned	5,233
Pounds of water evaporated	61,208
Temperature of water	67° Fahr.
Steam pressure above atmosphere	90 pounds.
Actual water evaporated per pound of oil	11.69 pounds.
Equivalent evaporation from and at 212°	13 9 pounds.

It was originally intended to run this test four days continuously, but in consequence of poor combustion, due to defective arrangement of boilers, it was decided to stop at the end of twenty-two hours to make alterations.

This was the first test made of Coalinga oil at the Western Sugar Refinery and was made under unfavorable conditions, but on the strength of this test the whole method of heating was changed.

STATEMENT OF COAL BURNED IN 1897, SHOWING AVERAGE EVAPORATIVE EFFICIENCY FROM AND AT 212° FAHR. EFFICIENCY FIGURES FROM TESTS UNDER BOILER NO. 22.

Coal.	Tons.	Evaporation from and at 212°.
Co-operative	8,986	8.88
Duckenfield	2,957	7.37
Nanaimo	9,850	7.29
Wallawah	676	7.70
Greta	9,207	7.56
Teaham	2,591	8.05
Wallsend	1,080	8.88
Total	35,347	Average 7.88

From this table, obtained from best results, and the foregoing, there has been prepared the following table, which shows a saving of $46,012.15 per year by burning oil. But as it was based on the first test, it is safe to say that the minimum saving over coal is $60,000. This does not take into account wear and tear on the boilers, and general convenience:

STATEMENT OF COMPARATIVE VALUE OF OIL AND COAL. BASED ON THE FIRST TRIAL TEST.

COAL—Basis of 1897.

Total bituminous coal received during 1897	35,347 tons.
Average evaporation of that coal from and at 212°	7.88 pounds.
Total water evaporated on that basis	624,183,481 pounds.
Fireroom cost of handling that coal, reckoning 300 days at $64 26	$19,278 00
Cost of coal for this work on basis of present price—35,347 tons at $6.55	$231,522 85
(Have paid as high as $7 25 this month.)	
Total cost of evaporating above quantity of water coal	$250,800 85

OIL—Basis of $1.30 per barrel and 13.9 evaporation.

Barrels of oil necessary to evaporate above quantity of water	152,739
Cost of oil at $1 30	$198,560 70
Fireroom cost of handling that oil—300 days at $20 76	$6,228 00
Total cost of evaporating above quantity with oil	$204,788 70
Equivalent value per ton of coal on the above basis, $\left(\frac{\$204,788\ 70 - 19,278}{35,347}\right)$	$5 25
Saving on year's work by burning oil under the above conditions	$46,012 15

COMPARATIVE VALUE OF COALINGA OIL WITH DIFFERENT FUELS USED ON THE PACIFIC COAST.

Coal.	Evaporation from and at 212°.	Value per ton compared with Oil at $1.30.
Co-operative Wallsend	8.88	$5 53
Nanaimo	7.29	4 44
Greta	7.56	4 60
Bulli	7.26	4 42
Wallawah	7.70	4 69
Corral Hollow	4.32*	2 63

* See previous note.

This table is made up of average coal tests and compared with oil at $1.30 per barrel, and an average evaporation from and at 212° of 15.5 pounds. The intermittent demand for steam at the refinery does not allow them to work all the time on the most economical methods, and instead of a test evaporation of 16.4 pounds, the average evaporation comes to 15.5 pounds.

Many tests have been made at the refinery with air-blowing instead of steam, and it has been found cheaper, but as their demand for steam is subject to extreme fluctuations and as air-blowing does not "respond" as quickly as steam-blowing, it is not used under their boilers. It is now used under their kilns and gives great satisfaction. For a plant where the demand for steam is constant, it is much cheaper to use air-blowing. A different kind of a burner must be used; instead of the lip of the nozzle being less than 1 inch wide, as in a steam burner, it must be from 2½ to 3 inches wide, according to the flame desired. Air-blowing does not give as perfect a flame as steam-blowing, because the latter heats the oil and volatilizes it.

In using air to blow with, practical tests show that about 15% more air must be added than is necessary for complete theoretical combustion.

The National Ice Co. of San Francisco has burned crude oil with great success for some time. Their boiler plant generates about 250 H. P. They have until lately burned Los Angeles oil of 11° to 12° gravity, but tests are now being made with Coalinga oil. Five per cent of the generated steam is used to blow with, but an air-blowing appliance is soon to be put in. Their grate construction is a peculiar one, and, from the results and experiences of others, seems to be rather poor and wasteful. No target is used, the grate bars simply being covered with loose firebrick and the flame is shot along the bottom of the boiler, as in accompanying engraving. (See Fig. 4.)

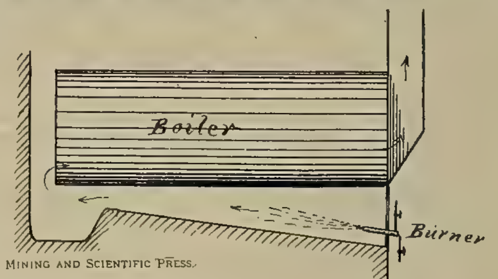


FIG. 4.

Probably the greatest future for crude oil burning in California is in metallurgical work, for there seem to be but few processes where it can not be applied. The Selby Smelting Works furnish a fine example of what can be done in this line with fuel oil. Here three Ropp furnaces and one Pearce furnace are fired with oil and give great satisfaction. The amount of heat to be used can be adjusted to such nicety that a saving can be effected. It needs no attention, and as there are no furnace doors to open and shut, the constancy of the air supply is never disturbed.

Two different methods are used for firing the Ropp furnaces. In one the burners are on the side of the furnace and in the other they are inserted through the top and point directly downwards. Mr. Ropp considers the latter method to be the more successful. Oil is also used in melting down the precipitated silver in a reverberatory furnace, in the retorts and in a large reverberatory slag furnace. Exact commercial figures could not be given, but it was understood that it was cheaper than coal, not to speak of the convenience and perfection obtained. The oil used is Ventura oil and is pumped from the Union Oil Refinery. All the oil used is blown with steam, air not having been tried as yet, but there seems to be no reason why it should not work equally well.

California contains rich copper ores which have not been worked, mainly on account of the high price of suitable fuel. It appears that the solution of this problem has come, and that crude oil is the key. So, in many respects, this natural fuel promises much, but it needs capital to make the necessary experiments. As a steam producer its value has been undoubtedly proven, at least for plants exceeding 100 H. P., but for the other uses experiment must yet determine its value.

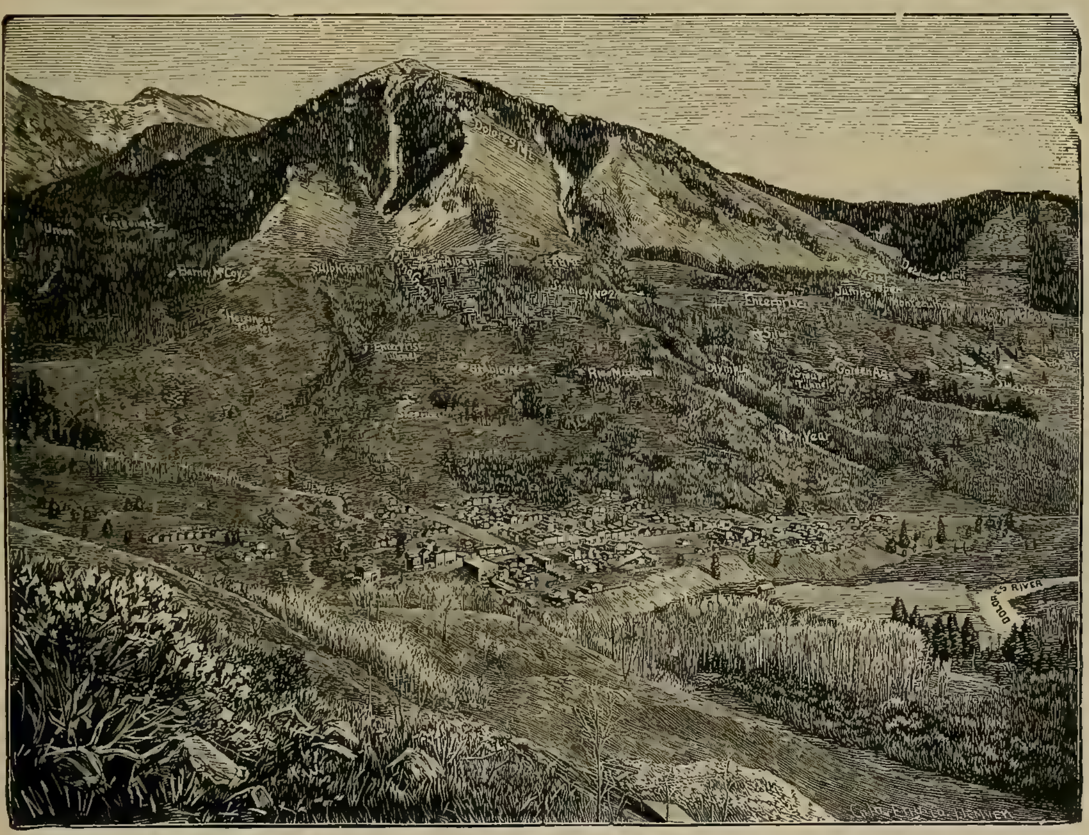
For the tables and figures herein given, and for their kindness and assistance, I am indebted to Mr. Oswald Rothmaler, manager of the Western Sugar Refinery; Mr. W. J. Wayte, engineer of the Western Sugar Refinery; Capt. Quinan, superintendent of the California Powder Works; Mr. Alfred Ropp, manager of the Selby Smelting Works, and Mr. Palmer, manager of the Union Oil Refinery.

A Tale of Two Engines.

"I saw two beautiful engines recently," says a machinery man, "that were perfect twins in every particular except one—there was a difference of about $400 in their cost. In design, finish, size, weight, power and every mechanical detail they were as like as two peas, and, as a matter of fact, they were from duplicate patterns, built in the same works at the same time. The variation in price was due to a curious business principle of the firm of builders, which, by the way, is one of the largest and wealthiest concerns in the country. The establishment never undertakes to construct an engine for a fixed sum of money. When it executes an order a careful account is kept of every item of expense—the cost of material, the pay of the men, the wear and tear of the tools, and anything else that contributes to the outlay. Then a fixed percentage is added for profit, the figures footed up and a bill rendered for the sum total. Now, anybody who has ever had any experience with machinists and machine building," continued the speaker, "knows perfectly well that no two men can accomplish exactly the same results. They will have their good days and their bad days, and unavoidable accidents, delays and breakage will sometimes make a difference of hundreds of dollars on identical jobs. As far as I know, all firms except the one I am talking about have a scale of averages on which they base their charges, and, while they occasionally lose on some particularly unluckly piece of work, they make it up on the next. But this house has always stuck to the old-fashioned, primitive system of charging the actual outlay plus a fixed profit, and it enjoys such a reputation for fair dealing that its figures are never questioned. Exactly what percentage repesents the profit I am unable to say. I have heard it stated at all the way from 5 to 15; but, whatever it is, it never changes and is exactly the same for big jobs and small."

Mines of Rico, Dolores County, Colo.

Rico is on the Dolores river, at an altitude of 8700 feet, in a section where the mountains are neither so high nor precipitous as is the case near Telluride and Ouray. The location of the mines here range from 9000 to 10,500 feet altitude, the slopes of the hills being such as to make the roads and trails that traverse them of comparatively easy grade. All mining interest centers on three different hills—Dolores and Telescope mountains, on the east side of the river, and Expectation mountain, on the west side. The earlier workings, which for years made Rico an active mining center, comprised those of the Enterprise and Rico–Aspen, on Dolores mountain, and the C. H. C., on Telescope. At a point in the north end of the town there appears to have occurred an up heaval, from which the formation dips. Thus, the strata of Dolores mountain dips, in the main, towards the south; that of Telescope to the north and northeast, while the dip of Expectation range corresponds to that of Dolores on the south and to the dip of Telescope on the north end.



Mines of Rico, Dolores County, Colorado.

The vein structure and ore bodies of Dolores and Telescope mountains have been pretty well exploited and determined, being quite similar on the two mountains, though different as regards character of ore. In general, the ore is found in nearly vertical fissures and contact deposits which apparently were fissures; there are also numerous vertical veins which form a part of the somewhat broken and irregular structure.

Telescope mountain is characterized by three great fissures cutting through it from northwest to southeast, nearly paralleling each other and being about 1000 feet apart at the apex of the mountain. These are locally known as the Logan, Leap Year and Bourbon fissures. The Logan, being the principal one, has been traced from Horse gulch, on the northwest, through Telescope mountain, across Silver creek, into Blackhawk mountain on the southeast, the Blackhawk being a spur from Dolores mountain. This takes in a distance of about 3 miles, and the fissure has been opened at points on contiguous claims the entire distance. The Leap Year appears to branch off from the Logan fissure on the southeast side of Telluride and join it again on the northwest side. The Bourbon fissure has been opened only on the western slope of Telescope and seems not so well marked as the Logan. The latter fissure is from 10 to 25 feet wide, carrying a lead and copper sulphide, with silver, lead and gold values; but at present depth of workings on this fissure the formation is so broken that the principal values have filtered down, and better values must be looked for at greater depth, where the formation is solid and the walls are intact. But the contact veins, which are an overflow from the fissures, lie between an iron capping above and a lime bedding plane below. These contact deposits drop down in benches, following the structure that has broken from the main formation and slid downward. Where the lime bedding plane is horizontal the values are held; where it is turned on edge the values have leached down and the ore thus found is low grade. The material, since being thrown from the fissures into contact deposit, has undergone a change—from a sulphide in the fissure to a carbonate in the contact. This has been demonstrated by the workings on the C. H. C. contact, from which a great many thousand tons of carbonate ore were shipped a few years ago, and by the workings on the Logan fissure, whose ore has been largely a sulphide of iron and lead. Over on Dolores mountain, in the Enterprise, for instance, the ore bodies were found in fissure veins, contact deposits and vertical stringers, but the formation was less broken, the vein matter more in place, and the values were uniform near the surface, because the walls were intact, and the ore itself was a sulphide, with no carbonates, as is the case on Telescope.

Two groups on the northwest slope of Telescope mountain, known as the Wellington and Logan groups, comprising about eighty-five acres, cover most of the claims on the Logan fissure and part of the Leap Year fissure, as well as a large portion of the contact ground lying on the slope adjacent to these fissures. These groups are in control of David Swickhimer, either by ownership or under bond and long-time lease. Much work was done on the two groups several years ago in the shape of tunnels, drifts and shafts. Considerable new work is now in progress. On the west end of Logan group a tunnel, 700 feet long, cuts along by the side of the fissure and on the contact; from it a drift is being run eastward to cut the Leap Year fissure and to open the contact between the two. The Logan fissure is also opened on the Uncle Ned, near the crest, on the Avalanche and Argentine, on the southeast slope, and on the Blackhawk and Little Maggie, on Blackhawk mountain. The Mountain Spring tunnel cuts 940 feet into the Wellington group, connecting by an upraise with the old Wellington level, from which considerable ore has been shipped. This tunnel goes toward the Logan fissure, and if driven 1000 feet farther would cut the latter at 1000 feet depth. But, as this tunnel level is below the contact, the new Wellington tunnel is being driven higher up the slope to cut the fissure at 1250 feet from entrance and 750 feet depth. It is believed that this tunnel will open the Logan fissure in solid formation, and will cut through a known contact of ore. Mr. Swickhimer and associates are not only developing the two groups named on the northwest slope, but the Uncle Ned, near the summit, and the Argentine, on the southeast slope, which they own. Following the Logan fissure into the Blackhawk and Little Maggie workings, the ore becomes a sulphide, with some zinc and heavy lead values.

Summarizing as to Telescope hill, the contact ores above the horizontal bedding planes are high grade, carrying silver and lead; great areas of such ground remain undeveloped. But the fissures, especially on the northwest slope, which are opened only to a depth of 260 feet, have at this depth broken walls and low values in silver, lead and gold; but future work is to determine whether there are higher values at greater depth, where the walls and formation are solid.

On the northern section of Expectation mountain I went into the Sambo, which is developed by a 400-foot tunnel, a 250-foot drift and some stoping. Here is found a contact vein between a lime and sandstone wall above and a stratum of "short lime" below. The ore carries a sulphide of lead, with some zinc. Here the contact is much broken, showing evidence of that section through which the tunnel goes having slid downward; but, on going in on a tunnel at a higher elevation, a point is reached where the formation is regular and the contact in place. Here the contact dips to the north about 7 feet to the 100 feet.

The lower bench of Dolores mountain, sloping toward the river, is called Enterprise hill, being the location of the Enterprise mine, originally opened by David Swickhimer. The Group tunnel, located by Charles Newman after the Enterprise mine was opened on a bench higher up, undercuts the Enterprise contact, having upraises to it. This tunnel has been driven about 5000 feet from the entrance, connecting with over 30 miles of workings on the contact above it. Last year a concentrating mill was erected, just below the Enterprise dump, by the Colorado Milling & Concentrating Co., made up of Telluride and Pittsburg people. It was equipped with crushers, rolls, Huntington mills, gravity sizers and Wilfley tables. The sizers grade the ore for the different tables. The Huntingtons grind to about 30-mesh. The mill was built to run on a dump of about 750,000 tons, on ore from the old stopes and low-grade ore in place. The values in the dump are believed to run not lower than $4.75 per ton; that of the stopes, $4.75 to $7.50 per ton; the product is about one-third gold and two-thirds silver and lead. This company has a time lease on the dumps and stopes mentioned. The mill has run part of the season and will soon start up again. The concentrate product, resulting from reducing about thirty tons to one ton, carries 25% to 30% iron, 9% to 11% silica. This enormous dump is the refuse from eleven years operating, during which time nearly $10,000,000 were produced.

Farther southward on Enterprise bench of Dolores mountain are the Rico–Aspen, Newman group, Jumbo and other well-known mines. From a point up Silver creek the Scoutt tunnel, now in 2000 feet, is designed to cut under the same contact at greater depth than are the Enterprise or Rico–Aspen workings.

The zinc proposition is of special interest at Rico at this time, because of the possibility of zinc production becoming an industry here. Thomas Jones, representing George E. Nicholson, operator of zinc works at Iola, Kan., and Nevada, Mo., has been on the ground for some time and has secured a five-year lease on 230 acres on the south spur of Expectation mountain and twelve acres on Enterprise hill; and may negotiate for the Atlantic Cable group of fifteen claims, extending from Expectation range northeasterly. Mr. Jones has also acquired the old sampler and concentrator, on the railroad track, which he is equipping for a zinc concentrator. With this he hopes to be able to make a fairly clean separation of the zinc sulphides from the lead and iron. He will use crushers, rolls, jigs and tables. There are zinc ore bodies here, specimens of which run from 50% to 57% zinc; but the extent of such ore has not been fully determined. The Missouri zinc ores are a "black-jack," theoretically two-thirds zinc and one-third sulphur. But the zinc here consists of a brown zinc-blende, containing a good per cent of silica, and associated with chalcopyrites and lead, the crystallization of sulphur giving it the brown color; also is found here the "rosin-jack," a zinc ore, which is free from gangue and other material. Both these classes of zinc ores here are mechanically, not chemically, combined with lead, iron and other minerals, which makes possible a separation by concentration. In some special cases, however, the chemical combination does exist in Rico ores. The zinc ores at Leadville are chemically combined with iron and lead and are strictly a smelting proposition. In an open cut on the Atlantic Cable they ran through a cap rock of lime into a zinc sulphide, with crystals of galena; 200 feet north of this point a shaft was sunk 25 feet, getting into specular iron, with no zinc. Zinc ores were found also on the Argentine, up Silver creek; also, on the Shamrock, a quarter-mile west of the original open cut on Atlantic Cable. On the Silver Swan group, leased by Mr. Jones from J. J. Cohnan, there is a 1000-foot tunnel, with upraises on vertical veins to a contact, bearing a very pronounced character of zinc ore, associated with lead and chalcopyrites. Mr. Jones has just shipped fifty tons of Rico's typical zinc ore to his works at Nevada, Mo., on which to make a test run.

The Rico district has been very quiet for several years, but there are good indications of a revival of former activity. WASCOTT.

Rico, Sept. 15.

Filtration Instead of Distillation for Petroleum.

It has been known for years that, when lubricating oils or warm vaseline, and especially cylinder oils, are filtered through animal charcoal, and more recently through fuller's earth, the color is made much lighter. It is now well known also that this filtration changes the specific gravity and the corresponding viscosity of the oil, says David T. Day, of the U. S. Geological Survey, in an address at Paris before the Petroleum Congress, assembled at the Exposition.

"The fuller's earth used for this filtration is a very porous variety of clay, so porous that it adheres tightly to the tongue. Chemically, it is a clay very rich in silica and in combined water. There is great difference in appearance and in chemical composition between the fuller's earth from different localities. For example, there are two quite different varieties of fuller's earth from Reigate, Surrey, England, and both differ markedly in composition from the variety of fuller's earth found in Florida. This latter also is preferable as a filtering material for petroleum oils.

"These different varieties of fuller's earth shade into the other varieties of clay, and their filtering capacity likewise grades off, and we find that ordinary shales and clays show some filtering capacity, though perhaps not more than one per cent as great as with the best fuller's earth. Fine sandstones, however, show little or no filtering capacity.

"Naturally, the partial separation of the oils in crude petroleum by filtration, as I have shown it, offers good hope for complete separation by this means, and as such I humbly offer this method through this Congress to the investigating world, and wish to state that I believe, before the next winter is past, I will have effected entire separations.

"The first efforts will be guided by what we know we can effect by distillation, and small quantities of my filtrates will be tested until they show constant boiling points and other characteristics of simple chemical compounds. But even if only primary separations could be effected by this means of heavy (and easily decomposed) hydrocarbons from lighter ones, so that in distillation the latter might not be distilled by the former, a great advantage would have resulted. But I believe that we will effect complete separations.

"As to the practical value of this process, its great promise is as a scientific means of separating the mixtures of oils with which we now deal. Imagine the gain if we can thus define as a standard of quality for a given lubricating oil that it shall contain fixed percentages of definite hydrocarbons, instead of refining the oil by flashing point, density and viscosity. Further, when we know which of these fundamental hydrocarbons yield the most beneficial oils we can then regulate our processes of manufacture to secure the greatest yield of these constituents."

Underground Oil Tanks in Canada.

Canadian oil producers use for storing crude oil holes dug in the ground, thus described by J. D. Noble:

These underground tanks are circular in form and dug to any capacity required, the clay in the Canadian oil region being specially adapted for this purpose. There is 100 feet of tallow-waxy kind of blue clay to go through before the top rock is reached; a number of petrified cockle shells are found in this clay, which clay is perfectly impervious, and so compact that it will hold either oil or water when the hole is dug out without leaking a drop. Expert workmen trim down the walls with their spades until they become smooth and shining, and when the hole is dug out they commence at the bottom and ring it up to the top with solid wooden rings. These rings are formed of kants, which are pieces of Canadian pine lumber cut in the form of the segment of a circle, and shaped just to fit the circular wall of the tank; they are from 3 to 4 feet long, according to the size of the tank, 5 inches wide and 1 inch thick, and the joints are covered by the top piece as the workmen proceed to nail them together from the bottom and ring up the tank. This wooden lining is put in to prevent the possibility of any clay caving in. The tanks for holding crude oil are generally dug 30 feet in diameter and 60 feet deep, and hold about 8000 barrels in bulk of thirty-five imperial gallons to the barrel. It is only after sinking down about 20 feet that this peculiar formation of tallow-waxy kind of blue clay is found, the first 20 feet being a rich alluvial deposit formed from the dropping of the leaves of the trees for a long period of years. The blue clay is taken from the bottom of the tank, and puddled about 1 foot thick behind the wooden curb for the first 20 feet, thus forming a perfect water-tight tank, which is then covered by large timbers and 2-inch planks with a coating of gravel on top. Oil has been held in such tanks for ten years without leaking a drop, and there is no danger from lightning, which has caused so many disastrous fires from oil stored in large iron tanks.

The Canadian crude petroleum when pumped from the wells is of a dark green color, and the gravity is from 32° to 37° by the Beaume hydrometer, according to the locality in which it is pumped. It is worth at present 7s per barrel of thirty-five imperial gallons to the barrel, in bulk at the wells, and it costs 2s per barrel to produce.

There are no flowing wells in Canada; all the oil is produced by pumping. The crude oil when distilled contains 5% of benzine and 42% of illuminating oil.

After the illuminating oil is taken off, the heavy vapors are blown out of the still by an injection of steam and condensed and sold for gas or liquid fuel, and the balance of the still is petroleum tar, which is very rich in paraffine, and from which a large percentage of wax is obtained for making candles. It is also manufactured into lubricating oils of the very finest quality, and the residue makes a very superior fuel, being very rich in carbon.

The wells are 4½ inches in diameter and 475 feet deep. At a depth of 460 feet the oil-bearing rock is pierced, and at this point a nitro-glycerine torpedo is exploded to shatter the rock and allow the oil more freely to flow into the well.

Experiments Regarding the Influence of Silica on the Loss of Silver in Scorification.[*]

The fact that the loss of silver in the slag of the smelting process increases with the amount of silica in the furnace charge was probably the ground of a general opinion that the silver is present in the slag as a silicate. Dr. Iles, in his interesting experiments upon the slags of scorification, found in no instance any silicate of silver. These experiments, however, were made with pure crystals of $AgNO_3$—a circumstance which may have affected their results, since it is conceivable that an intimate mixture of metallic silver with silica might more strongly favor the formation of a silicate. Fusing at a low heat for three hours, and then allowing to cool, 6.8 grammes of $AgNO_3$ with 1.2 grammes of pure anhydrous SiO_2 (these proportions corresponding to the equation $2AgNO_3+SiO_2=Ag_2SiO_3+N_2O_2+O_3$), Dr. Iles obtained a bright brick-red slag, the color of which was due to Ag_2O_2.

The only other experiments of interest bearing upon this subject are the crucible assays reported by Mr. Furman, of which Nos. A1 and A2 have special interest. In these instances he assayed 108.15 and 102.75 milligrammes of silver with ½ A. T. of SiO_2, and found the losses to be 2.47% and 1.93%, respectively. These are small losses. With low-grade ores, Mr. Dewey found the loss higher, as was also the result in the experiments described below. Mr. Furman assayed also 116 milligrammes of silver with 7.5 grammes of SiO_2 and 7 grammes of FeS, and found the loss of silver to be 4.66%. This is smaller than the losses (5.2% and 5.3%) shown by Experiment No. 4, described below, in which SiO_2 and FeS_2 were ingredients. It would seem that, in an assay of silver with silica, the presence of a sulphide of iron tends to keep the loss of silver nearly constant.

In order to test the influence of silica in the scorification assay, the following experiments were made:

In these experiments pure ores (pyrite, zincblende, galena or stibnite), sulphur, silica and test lead—all free from silver—were mixed with filings of silver, 0.992 fine and free from iron. No borax glass was added, since it was desired to avoid, as far as possible, the introduction of factors which might affect the result. In all cases, with two exceptions, the temperature of scorification was between 900° and 1000° C. The cupellations were made with "feathers."

The influence of silica being the special object of inquiry, other conditions (such as temperature, amount of silver and amount of test lead) were kept as nearly constant as possible to facilitate the comparison of results.

The table below shows the quantities of each ingredient of the charge and the results obtained, other conditions of the experiment being stated in the following:

REMARKS.—All the assays were made in duplicate. In the column under "Silver," the amounts of silver actually weighed out are given. The following columns, for comparison only, give the average results.

Experiment No. 1.—In this case the "low heat" was just sufficient to melt the lead, and the smaller percentage of silver recovered was due to the long period of scorification, which permitted a larger quantity of silver to enter the slag. The "high heat" was a white heat, and the loss here was probably due to volatilization.

Experiment No. 2.—As was to be expected, these assays show increasing loss of silver with increase of silica.

Experiment No. 3.—Here the addition of 6 grammes of SiO_2 increased the loss of silver.

Experiment No. 4.—In this case the addition of SiO_2 increased the loss of silver; but variation of the ratio of SiO_2 to FeS_2 seems to have had no material effect in this respect.

TABLE OF SCORIFICATION ASSAYS.

EXPERIMENT, No.	Ore, Gms.	Test lead, Gms..	Silica, Gms....	Silver, Mgs....	Average silver recovered, Mgs.	Average recovery, %........
1. Lead.	....	50 low heat	......	50.05 49.97	48.99	98.75
	....	50 high h't	......	50.06 50.02	49.27	99.25
2. Silica.	....	50	2	50.46 50.10	48.89	98.00
	....	50	4	50.10 50.34	48.58	97.50
	...	50	6	50.14 50.24	48.23	96.85
	....	50	8	49.99 50.08	46.26	93.25
	....	50	10	50.10 50.11	44.84	90.25
3. Stibnite.	1.5	50	6	50.30 50.10	46.18	93.15
	1.5	50	......	50.00 50.20	48.23	97.00
4. Pyrite.	1.5	50	......	50.40 50.40	48.80	97.00
	1.5	50	6	50.00 50.00	46.95	94.70
	3	50	2	50.00 50.20	47.20	94.80
5. Blende.	2	50	......	50.10 49.94	47.75	96.20
	4	50	......	50.08 50.42	47.65	95.60
	1.5	50	6	50.30 50.05	44.45	89.30
	3	50	2	50.80 50.60	48.00	95.50
6. Galena.	2	48.25	......	49.98 50.04	48.76	98.30
	4	46.50	......	50.22 50.31	49.71	99.65
	6	44.75	......	50.09 50.37	48.40	97.20
	8	43	......	50.03 50.40	48.24	96.75
	10	41.25	......	50.20 50.03	49.12	98.80
	1.5	48.65	6	50.30 50.30	47.65	95.40
	3	47.35	2	50.20 50.90	49.80	99.30
7. Sulphur.	0.5	50	6	50.40 50.40	46.40	92.10
	1	50	6	50.50 50.30	47.35	94.70
	0.5	50	2	50.10 49.90	49.35	99.45
	1	50	2	50.60 50.90	49.18	97.25

Experiment No. 5.—The assays show that the addition of silica increases the loss of silver and that this loss is diminished by a decrease in silica and an increase in zincblende. The well-known effect of zincblende, per se, in augmenting the loss of silver was shown by additional assays (not reported in the table), in which still larger quantities (6, 8 and 10 grammes) of zincblende were present, with no silica. These assays yielded black, pasty slag and very brittle (and in the last instance, with 10 grammes of zincblende, very small) buttons, which could not be cupelled.

Experiment No. 6.—In these assays the amount of test lead added was so proportioned to the lead in the galena as to make 50 grammes as the total lead in the charge. With 4 and 10 grammes of galena the results were peculiar, the loss of silver being smaller than with 2 grammes of galena, while the assays with 6 and 8 grammes of galena showed proportionately larger losses of silver. The addition of 6 grammes of silica, 1.5 grammes of galena being present, was followed by increased loss of silver; but the combination of 3 grammes of galena with 2 grammes of silica resulted in the recovery of the largest percentage of silver, with one exception, in the whole galena series.

Experiment No. 7.—In these assays the increase of sulphur in the charge from 0.5 to 1 gramme seems to have reduced the loss of silver, as the increase of sulphides seemed to do in preceding experiments. But the reduction of silica from 6 grammes to 2 grammes increased, as in other cases, the proportion of silver recovered.

CONCLUSIONS.—The preceding experiments indicate that the behavior of the metallic sulphides in scorification with silica and silver is not uniform, but varies with the nature of the ore. Evidently more extended investigation would be necessary to determine the cause and law of this variation. These experiments, however, appear to warrant the following conclusions:

1. That in assays of pure silver and lead an increase in the amount of silica present increases the

---

[*] LESTER STRAUSS, Canadian meeting, August, 1900, American Institute of Mining Engineers.

loss of silver in the slag. This fact was already well known.

2. That in the presence of sulphides an excess of silica increases the silver loss, but that this loss is apparently diminished when sulphides are present with a relatively smaller amount of silica.

3. The experiments, though by no means conclusive, suggest that the same recovery of silver cannot be expected from different mixtures or ores of the same silver value.

Dr. Koenig, after observing that the student (operating with various type mixtures, each containing exactly 300 ounces of silver per ton) "finds that the loss of silver is not at all the same, but that this loss can vary from 3% to 16% with the best work possible," adds that an assay "made with clean sand, the 30 milligrammes of silver wrapped in lead foil, being placed on the top of the charge, sand and test lead, * * * gives the minimum loss." The experiments above reported and the results obtained by Messrs. Furman and Dewey seem to require a modification of this statement, since they indicate that the silver loss would be dependent upon the amount of silica present, as well as upon the other ingredients of the charge.

My thanks are due to Dr. E. H. Miller for friendly advice and assistance in the experiments above described.

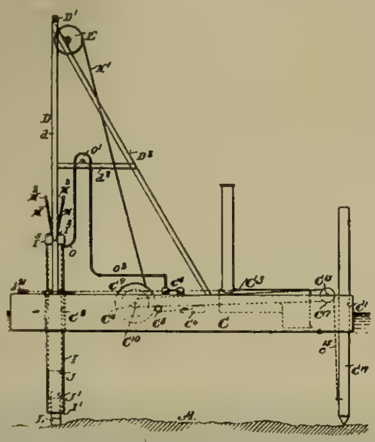
◆

Mining and Metallurgical Patents.

Patents Issued September 11, 1900.

Specially Reported for the MINING AND SCIENTIFIC PRESS.

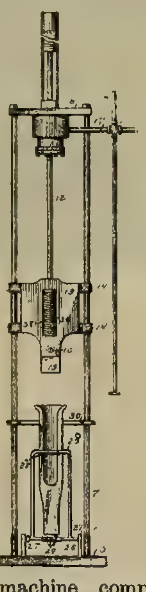
SUBAQUEOUS ROCK BREAKER.—No. 657,515; B. H. Coffey, Philadelphia, Pa.



Framing or derrick, as D D′, having guides, as D³, in combination with tubular caisson arranged to extend down into water beneath derrick, weight vertically movable in caisson and adapted to hold rock-breaking chisel, rod, as K, extending through stuffing-box in top of caisson adapted to connect with weight aforesaid to raise it, crosshead as K², moving in guides D³ and connected to top of rod K, cord connected to crosshead and leading over pulley on derrick to hoisting drum, means, as hook arms M M, for connecting top of caisson to crosshead K² and means, as clamp G, for holding caisson in depressed position.

◆

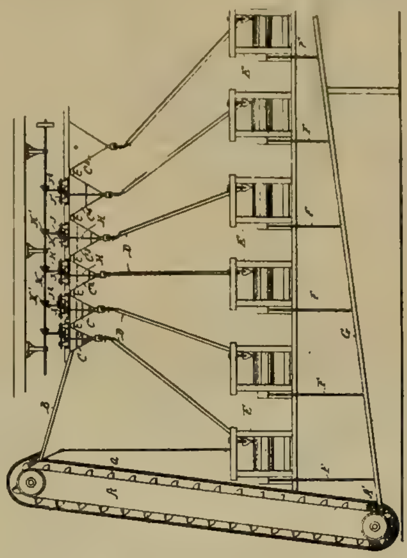
APPARATUS FOR REPAIRING DRILLS.—No. 657,519; P. L. Crossman, Joplin, Mo.



Steam swaging machine comprising uprights, crosshead slidably engaged with uprights, steam cylinder, piston for cylinder having rod slidably engaged with crosshead, cushion between end of rod and crosshead, base for uprights, ears upon base, rock shaft pivotally mounted in ears, drill holder mounted upon shaft comprising U-shaped bar attached at its ends to shaft having its end adjacent web bent laterally provided with crossbar connecting arms of U-shaped bar at bends to form rectangular inclosure, seat upon shaft for butt of drill, means for rocking shaft, stop bar upon uprights for contact by drill in frame to stop drill in operative relation to crosshead, having hammer engagement with drill in frame.

◆

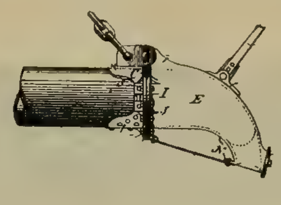
ORE CLASSIFYING APPARATUS.—No. 657,553; J. S. Loder, Ouray, Colo.



Apparatus for classifying ore pulp, combination of elevator for elevating pulp, conduit leading therefrom to first of series of V-shaped separating receptacles, each receptacle containing vertically adjustable shaft carrying revolving diaphragms for agitating and elevating lighter particles of receptacle, each provided with valved discharge opening at or near its bottom, conduit leading from lower end of each receptacle to one of series of concentrators, and conduit leading from upper end of each receptacle to receptacle next adjacent.

◆

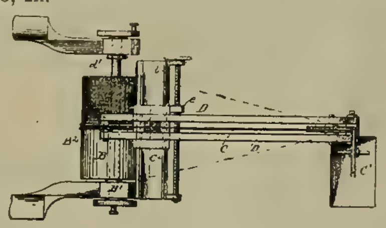
MOUTHPIECE OR DRAG FOR SUCTION PIPES FOR DREDGERS.—No. 657,568; A. W. Robinson, Milwaukee, Wis.



Combination of suction pipe, drag or mouthpiece, hinge connection between two at upper side of pipe, means upon side opposite hinge whereby mouthpiece will be held in operative position unless subjected to excessive strains.

◆

HOISTING APPARATUS.—No. 657,689; H. C. Behr, San Francisco, Cal., assignor to Fraser & Chalmers, Chicago, Ill.



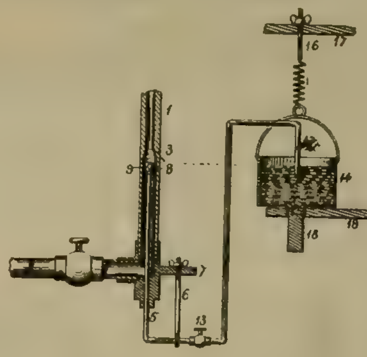
Combination with winding drum, of pit sheave, guide sheave located distance therefrom, rigid connection between sheaves, longitudinally movable device to which upper end of frame is flexibly connected, laterally movable carriage to which frame is pivotally connected at lower end, mechanism for causing carriage to traverse winding drum with laying on or off of rope or cable so that rope-leading edge of guide sheave mounted within frame will move within plane tangent to winding face of drum.

◆

PROCESS OF SEPARATING PRECIOUS METALS FROM THEIR ORES.—No. 657,181; H. De Raasloff, New York, N. Y.

Continuous process of treating ores of precious metals, consisting in mixing finely divided ore with suitable solvent for precious metals, inducing mixture to flow continuously from the back to point of admixture, while so flowing introducing liquid oxygen or liquefied air into mixture, then causing mixture to flow with sudden variations of velocity to agitate it, then separating solution from base earthy mineral matter, and sending it continuously through electro-depositing bath, where precious metal is deposited, thus in continuous ordered succession.

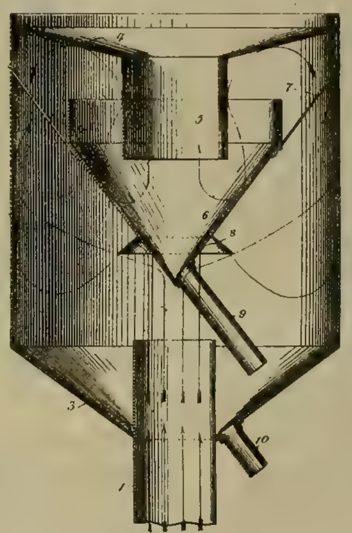
VAPORIZER FOR PETROLEUM ENGINES.—No. 657,739; G. Kiltz, Marengo, Ill.



In a gas engine, an air supply pipe having upper portion contracted, oil pipe located within air pipe supporting nozzle at upper end and located below contracted portion of air pipe, nozzle being in conical form having an end plate provided with series of perforations, air passageway extending obliquely through nozzle having outlet located about center of top of nozzle.

◆

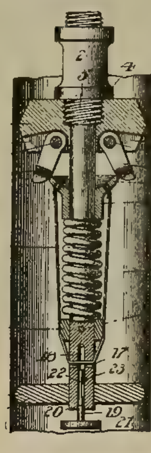
EXHAUST HEAD.—No. 657,748; S. M. Scott, New York, N. Y.



Exhaust head consisting of cylindrical metal shell 2 provided with cone-shaped bottom 3 and downwardly extending cone-shaped top 4; together with downwardly extending tube 5 secured to top, lower end tube extending into combined cylindrical cone-shaped deflector 6 secured to inner surface of shell 2 by arms 7, 7; in combination with reverse cone-shaped deflector 8 of slightly greater diameter than exhaust pipe 1 secured directly to lower end of combined cylindrical and cone-shaped deflector 6 in such manner that exhaust steam is caused to be thrown against entire inner surface of cylindrical metal shell 2 and its bottom and top 3, 4, and afterward deflected against inner surface of combined cylindrical and cone-shaped deflector 6, ultimately passing out through tube 5, drain pipes 9 and 10 being provided, former for conveying all the moisture from inner surface of deflector 6 and exterior surface of deflector below reverse deflector 8 upon its outer surface, latter for conveying all the condensed moisture from entire exhaust head.

◆

TOOL FOR PERFORATING PIPES.—No. 657,777; G. W. Kellogg, Bakersfield, Cal.



Perforator for pipes, comprising shank, head carried thereby, series of cutters carried by head, collar slidably mounted upon shank for forcing cutters into contact with pipe, spring for actuating collar, wire for restraining spring, and cutter for severing wire to release spring.

Volumetric Method for the Determination of Copper.

By Richard K. Meade.

The average analyst is often deterred from the use of a volumetric method by the necessity of making and standardizing a special solution. In many cases it takes nearly as much time to ascertain the strength of the required solution as it does to make the analysis itself, and the standardization and analysis together render the volumetric method frequently as slow, if not slower, and vastly more toublesome than the gravimetric determination.

Volumetric analysis, therefore, becomes more and more an ideal method of quantitative determination as it approaches the requirement of a single standard solution, capable of having its strength accurately determined by simple means, giving a clear, definite, clear end-reaction.

In iron and steel laboratories permanganate is fast coming to the front as a help to rapid analysis. Iron, phosphorus, manganese, sulphur (Payne's iodine solution is prepared by adding standard permanganate to potassium iodide), and calcium can all be quickly determined by the use of one standard solution. While it may never be possible to supplant other standard solutions by permanganate, still the sphere of its usefulness is a large one and is constantly enlarging.

A new method for the determination of copper by permanganate, which seems to possess many points over the old one of reduction by grape sugar, in general is as follows: The copper is brought into solution as a sulphate, either by dissolving it in sulphuric acid or evaporation of its solution with sulphuric acid. The greater part of the free acid is neutralized by ammonia, the solution warmed, sulphurous acid added until the solution smells strongly of the reagent, and then a slight excess of ammonium or potassium thiocyanate. The copper is immediately precipitated as cuprous thiocyanate. Stirring and warming renders the precipitate heavy and easily handled. The solution is filtered through asbestos, using the pump, and well washed. The precipitate and filter are thrown into the beaker in which the precipitation was made and heated with a solution of caustic soda or caustic potash. Double substitution takes place. Hydrated cuprous oxide and potassium or sodium thiocyanate result.

$$2CuSCN + 2KOH = Cu_2(OH)_2 + 2KSCN.$$

The oxide is filtered on asbestos and washed well with hot water. The precipitate and filter are again placed in the same beaker and an excess of ferric chloride or ferric sulphate (free from nitric acid, free chlorine or ferrous salts), together with a little dilute sulphuric acid, added. The copper oxide reduces a corresponding amount of iron from the ferric to the ferrous condition.

$$Cu_2O + Fe_2Cl_6 + 2HCl = 2CuCl_2 + 2FeCl_2 + H_2O.$$

The beaker is warmed and stirred until all the copper oxide is dissolved. The solution is then poured through a perforated platinum disc and the asbestos which stays behind upon it washed with water, to which has been added a little sulphuric acid and a little ferric chloride or sulphate. The solution is then titrated with permanganate. The iron equivalent to the permanganate used multiplied by 1.125 gives the weight of copper in the sample.

Instead of sulphurous acid, ammonium or sodium bisulphite may be used to reduce the copper. A solution of equal weights of sodium bisulphite and potassium thiocyanate answers well as a reagent for the precipitation of the metal. Since copper is the only metal precipitated by an alkaline thiocyanate from an acid solution, the presence of arsenic, antimony, bismuth, zinc and other materials which render the electrolytic, the cyanide and the iodine method inaccurate will not affect the results.

The caustic alkali solution, used to convert the cuprous thiocyanate into cuprous hydroxide, must not be too strong or some of the metal will go into solution, coloring the liquid blue. I have used about a half normal solution of caustic potash, made by dissolving twenty-eight grammes of the salt in a litre of water. Either ferric sulphate or ferric chloride may be used to dissolve the cuprous oxide. The former is probably the safest, but the latter appears to dissolve the precipitate the more readily of the two.

As a test of the accuracy of the method four grammes of pure electrolytic copper were dissolved in nitric acid and the solution evaporated with sulphuric acid until the nitric acid was expelled. The solution was cooled and diluted to one litre. The copper contained in fifty c.c. was then determined electrolytically with the following result:

	Gramme.
1	0.2003
2	0.2003
3	0.2000
4	0.1997
Average	0.2001

The copper in fifty c.c. was determined by the thiocyanate-permanganate method outlined above. The permanganate solution used was made by dissolving 5.02 grammes of pure crystallized potassium permanganate in water and diluting after standing twenty-four hours to 2 litres. Its strength was determined by titration against iron wire and against ferrous ammonium sulphate.

Against ferrous ammonium sulphate:

Gramme iron.
1. One c.c. = 0.004455
2. One c.c. = 0.004456

Against iron wire:

Gramme iron.
3. One c.c. = 0.004460
4. One c.c. = 0.004449

Average one c.c. = 0.004455

One c.c. = 0.004455 × 1.25 = 0.005012 gramme copper.

Below are the results on fifty c.c. of the copper solution containing 0.2001 gramme copper by the thiocyanate-permanganate method:

No.	Permanganate. c.c.	Copper. gramme.
1	39.6	0.1985
2	29.5	0.1980
3	39.6	0.1985
4	89.7	0.1990
5	40.0	0.2004
6	39.8	0.1995

In determination numbers 1, 5 and 6 ferric chloride was used to dissolve the cuprous oxide; in numbers 2, 3 and 4 ferric sulphate was used.

As a further and more practical test of the method, the copper in some samples of copper was carefully determined by the electrolytic and then by the thiocyanate-permanganate method. Below are the comparative results:

SAMPLE.	Weight of sample Gramme.	Permanganate... c.c.	Copper by thiocyanate-permanganate method.. Per ct.	Copper by electrolytic method... Per ct.
1—Chalcopyrite I	1.0	39.6	19.85	19.95
2— "	1.0	39.3	19.70	19.86
3—Chalcopyrite II	2.0	24.6	6.16	6.37
4— "	2.0	24.8	6.21	6.30
5—Malachite	1.0	72.2	36.19	36.10
6— "	1.0	72.2	36.19	36.15
7—Tetrahedrite	1.0	42.0	21.05	21.06
8— "	1.0	41.7	20.90	21.18

It will be seen by the above results that the method is accurate enough for ordinary commercial purposes. In spite of its three filtrations, the method is quite rapid. Not counting the time required for solution of the ore, duplicate analyses can be easily made in from a half to three-quarters of an hour.

In the writer's opinion the process is superior to both the iodine and the cyanide method. It requires the use of no rapidly changing solutions, but one which every analyst has on hand nearly all the time. The end-reaction is clear, distinct and familiar to all chemists. The method is applicable to any ore, matte or alloys. It is as rapid as the cyanide, except in certain cases favorable to the latter, and more rapid than the iodine method. Finally, not the least of its points of advantage is that it is more accurate than either of the two.

On the occasion of the recent celebration in San Francisco of the fiftieth anniversary of California's statehood 13,000 additional electric lights illuminated the principal streets.

Preparation of Roofing Slate.

In the last few years California has produced 23,450 squares slate. A square of slate is 100 square feet as laid on the roof. El Dorado and Shasta counties furnish the most of California slate, the demand for which is still limited. As population increases the demand for slate will be more commensurate with its merits. In some Eastern States the slate industry is a great one. From January 1 to August 23, 1900, Slatington and Walnutport, Pa., shipped 122,952 squares of slate. In Allentown, Pa., is published a trade journal styled Cement and State. To it we are indebted for the accompanying illustration depicting the preparation of roofing slate for the market. The illustration on this page represents the interior of a slate shanty on the bank, where roofing slate is split and squared ready for the market.

The large blocks are broken away from the strata or ledges in the quarry principally by blasting, and then worked away from their position and loaded upon small platforms, which are raised by means of a wire rope running along a stationary cable. This deposits it on the bank, either near the shanty or upon a truck, by means of which it can easily be transferred to that place.

Here it is dumped with many more of its kind, although it is not very good management to have too many blocks waiting to be cut, for if they are allowed to dry out, it is almost impossible to cut them up without a great deal of waste. To prevent this drying out, wet cloths are sometimes spread over the blocks, or they are wetted by sprinkling water over them. Three men are required to change the rough angular blocks of slate rock into the regular shapes of roofing slate. The first one "makes the blocks," that is, he makes a mental calculation as to what size of slate can be cut most advantageously from the rock before him. On this man's judgment depends the size of the waste heap, and consequently the size of the dividend at the end of the year. He must be able to judge rapidly and accurately the proper cuts to run across the stone.

To cut a large mass of stone, such as this is, at will, requires considerable skill. It is done in this way: The stone is laid on end and a groove cut across the edges of the laminæ, the same is repeated on the other side and a thin line chiseled out, connecting these two grooves. Sometimes while this last line is being cut, the stone separates, but frequently it must be stood on end and broken with blows from a hammer.

After these blocks have been formed, the slate splitter takes them, and by means of a thin wedge or chisel, which he inserts between the ends of the leaves, he splits them into pieces of the required thickness.

Preparing Roofing Slate for the Market.

After these blocks have been formed, the slate splitter takes them, and by means of a thin wedge or chisel, which he inserts between the ends of the leaves, he splits them into pieces of the required thickness.

To do this well requires experience, for if the slates run very uneven, as to thickness, they make poor roofing material. The pieces of slate are still irregular in shape and to put them into marketable condition they must be cut to size. This is done by the dresser. Before him stands what might be called a skeleton table, at one end of which is a knife operated by foot power. He first cuts a straight edge on the slate, then lays that edge along a line or pushes it against the back of the machine, which has been set for a certain size of slate and brings down the knife, thus forming two straight sides of the slate. The others are cut in the same way. After this the square slates are transferred to the shed on the bank and are ready for shipment.

The Colorimetric Assay of Copper.*

By J. D. Audley Smith, Clifton, Arizona.

Heine's "blue test" for copper, as described by the authorities generally, calls for a set of standard colors; and there has been some discussion concerning the relative superiority, for this purpose, of sulphate and nitrate solutions. The whole matter evidently hinges on the preservation of the standard colors in well-stoppered bottles. The apparatus described by G. L. Heath cannot be much improved, when very accurate readings are required.

The following method was devised for the purpose of doing away with preserved sets of standard colors, by making a fresh standard for each batch of assays. The solutions are prepared in the usual way, each ammoniacal solution being filtered into its separate bottle, and then filled up to the containing mark and thoroughly mixed. A similar color bottle, with an "S" etched upon it, to distinguish it from the other bottles, which are numbered to correspond with the samples, is kept to run the standard. About 150 c.c. of water is put into it, and then the amount of acid (sulphuric or nitric) present in each determination, followed by 30 c.c. of ammonia (s. g. 0.90), which should make the mixture strongly ammoniacal.

The liquid is now made up almost to the containing mark (200 c.c.), say within 1 c.c. The lowest assay is selected first and placed alongside the standard, which, at the beginning, contains no copper. A copper solution is then dropped into the standard from a burette; and after each addition the bottle is well shaken and compared with the assay sample. This operation is continued until the two shades match exactly, when the burette is read and the assay result is calculated. The assay next in order of depth of color is now taken and treated in the same way, and so on, until the batch is completed. It will be found that the volume of the deepest colors is from 1 to 2 c.c. less than the standard, which has increased by successive additions of copper solution. This is corrected by adding the necessary amount of water to the assay, just before the last one or two drops of copper solution are added to the standard.

DETAILS OF THE METHOD.

The copper solution contains 5 grammes c. p. copper per 2000 c.c., and is made by dissolving the metal in a small quantity of nitric acid and diluting, so that 1 c.c.=0.0025 gramme Cu.

It is convenient to have a syphon attachment, for filling the burette with this solution.

Tailings Assay. — One gramme is digested on a hot plate with from 3 to 5 c.c. of HNO_3 to 3 c.c. of HCl, and 5 c.c. of H_2SO_4. Rapid heating will soon decompose the mineral; and the treatment should be continued until the sulphur globules which form are quite yellow. Add about 30 c.c. of water; then an excess of ammonia water (s. g. 0.90). Mix thoroughly and filter hot, through a S. and S. folded filter No. 588 or a very rapid paper. Wash the iron precipitate twice with $\frac{1}{10}$ ammonia water; then dissolve off again into the original vessel with 5 c.c. of 1 to 1 H_2SO_4 and hot water. By lifting the filter and its contents out of the funnel, then opening it out and washing back the precipitate with a jet into the original vessel, the operation can be performed in less than a minute, and with very little water. The solution is now reprecipitated with ammonia, and the filtrate is combined with that obtained from the first precipitation. One final washing is enough ($\frac{1}{10}$ ammonia) for any material not running over 1.5% of copper.

Slag Assay.—One gramme is boiled in a dish with 15 c.c. of water; then 5 c.c. of HNO_3 is added along with 5 c.c. of 1 to 1 H_2SO_4. The digestion is carried on until the slag is thoroughly decomposed, and any sulphur globules are yellow. It is not necessary to dehydrate the silica; and as decomposition is immediate, there is rarely any delay at this point. The assay is now treated in the way as described above for the tailings assay; only, care should be taken to avoid using too large quantities of water in washing and transferring precipitates. A third precipitation of the iron has always resulted in a filtrate free from copper when working on blast furnace slags; but in analyzing high-grade slags, some copper may remain in the second precipitate.

The standard is prepared as already described, and the colors are carefully matched. When one gramme is taken, each c.c. of copper solution is equivalent to 0.25% of copper.

The following table shows the results of a batch of assays occurring in the daily work of a large copper plant, and illustrates what may be expected from the colorimetric assay in a busy office. The samples are varied, consisting of mill tailings, slags and lean ores. The results are not so close as those given by Mr. Heath in his paper; but he says that his electrolytic assay was made on the solution which he had used for his colometric assay. The electrolytic assays tabulated below are separate determinations on a separate weighing of the sample, the copper being precipitated from the acid solution of the ore without any previous separation of iron by ammonia.

COMPARATIVE RESULTS OF COLORIMETRIC AND ELECTROLYTIC ASSAYS.

No.	Colorimetric Assay.		Electrolytic.	Remarks.
1...	1.	1.02	1.06	Electrolytic deposit dissolved in HNO_3 and determined by KCN=1.04%.
	2.	1.00		
2...	1.	0.37	0.43	
	2.	0.42		
3...	1.	0.65	0.73	Electrolytic deposit by KCN =0.73%.
	2.	0.67		
4...		0.92	0.91	Electrolytic deposit by KCN =0.95%.
5...		1.15	1.13	Electrolytic deposit by KCN =1.14%.
6...		0.60	0.68	Electrolytic deposit dissolved in HNO_3 and determined colorimetrically=0.65%.
7...		1.35	1.44	Electrolytic deposit by color =1.40%.
8...		1.07	1.13	Electrolytic deposit by color =1.15%.
9...		0.99	1.04	Electrolytic deposit by color =1.00%.

Green tints generally result in a low reading. Organic matter is the principal cause; but considerable percentages of arsenic will also interfere, and produce tints which it is impossible to compare. Small percentages of arsenic have no effect.

The advantages of the above method over the usual method of using sets of standard colors are:

1. In a small office space is valuable, and a set of standard colors will take up room which may be used for something else.
2. An exact match is made with each assay.
3. The assays are read from a fresh standard, and not from a bottle which may have been made up months before.

It was found that Mr. G. L. Heath's bottle was expensive, and easily broken. A bottle which is inexpensive, stands the wear of the assay office of a works, and, at the same time, gives excellent results, is a square bottle, No. 5675 of Eimer & Amend's catalogue, 2 inches in diameter, and 4¾ inches high from bottom to neck, upon which any required markings for contained volumes can be readily etched, according to the desire of the assayer.

The results tabulated above were obtained with this bottle.

---

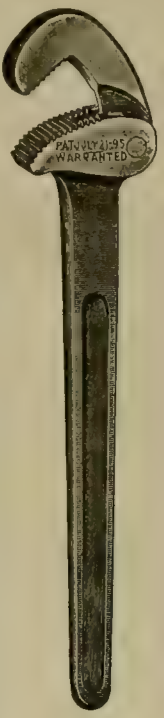
*Canadian Meeting, August, 1900, American Institute of Mining Engineers.

From the Sierra to the Sea.

The characteristic Sierra view caught in the accompanying photographic picture suggests the great mountain barrier along California's eastern border and the service of the Sierra in the arrest of eastward cloud movements from the Pacific and reception of the vast volumes of water in the deep snowfalls on the high altitudes. This water favors the forest growths of the mountains, which in turn conserve the water for the summer flow of the rivers. The picture of the rocky rift in the Sierra is of a scene in Tehama county, showing a stream-flow, which is employed in generation of electricity for transmission to the valley below for light and power, suggesting the new-found relation of the torrents of the Sierra Nevada to the industrial activity of the State. All the way from this northern point in Tehama county southward for 500 miles or more the falling waters of the mountains are being used for electric service, and the subtle current is conducted scores of miles to do work in valley and coast regions, a new phase of development, beginning to be appreciated and utilized. The water itself is a great agency in the development of the State, which has never yet been conserved and employed except in a small, fractional part of its possibility.

A Scene in the California Sierras—A Source of Light and Power.

An Effective Pipe Wrench.



Manufacturers and mechanics, having occasion to use the pipe wrench, are interested in a late development of that tool, as illustrated herewith. The Johnston pipe wrench is intended to do away with objectionable features of some other wrenches, such as slipping, crushing the pipe and getting out of repair. The pipe illustrated can not slip, for the greater the pressure on the lever the greater becomes the grip upon the pipe. This grip is effected in such a manner as to keep from crushing or denting the pipe, and the tool can not jam or wedge past. As soon as the lever arm is lifted, the jaw is automatically loosened and the wrench easily removed from the pipe. It needs no adjusting when fitting to a pipe, the movement of the lever alone causing the jaws to grip fast. There are but three parts—lever and head, movable jaw and pin. These are made of crucible steel, drop-forged, and are interchangeable. The manufacturer has agreed to replace, free of cost, any parts of these tools that break under fair usage.

This wrench is made in three sizes, having levers 12, 16 and 24 inches in length, respectively, and these will fit pipes or bars ranging from ⅛ inch to 2½ inches. The wrench is manufactured by Wm. B. Volger, 88 Chambers St., New York City. They may be obtained of the Mine & Smelter Supply Co. of Salt Lake City and Denver. They are adapted for mining work, and are in use in Arizona, Mexico, Pennsylvania and Alabama.

The big asphalt combine is known as the National Asphalt Co. of America; capital stock, $22,000,000. The company will take in all the Barber properties, the Asphalt Co. of America, the Pennsylvania Asphalt Co., the Gilson Asphaltum Co., which controls the Gilson Asphaltum Co. of St. Louis, owning mines in Utah, and the Gilsonite Roofing & Paving Co. of St. Louis. It will also combine the New Jersey-Mexican Asphaltum Co., which has two leases of asphalt properties near Tuxpan, Mexico; Manhattan Trap Rock Co., which owns lands and appurtenances at Upper Nyack, Rockland county, N. Y.; titles to three asphalt deposits on the east shore of Lake Maracaibo, in Venezuela, known as El Mene, Temblador and Laguinillas.

Constitutionally Affirmed.

To THE EDITOR:—On page 91 of your issue of July 28 you assert as follows:

> There is no law nor statutory provision in California or any other State against hydraulic mining. In California a decree of a court and injunctions under that decree have interfered with hydraulic mining operations, but Congress some years ago passed a law under which hydraulic mining may be carried on. That law, known as the Caminetti Act, has been declared to be constitutional, in a case where its constitutionality was attacked by a California hydraulic mining company at North Bloomfield, Cal.

Now, I would like to know when, where and by whom the "Caminetti Act" mentioned above was ever "declared to be constitutional," and would also like some information about the facts in the North Bloomfield case. S.

Sacramento, Cal., Aug. 31.

June 8, 1897, at Los Angeles, Cal., by Judge Ross of the U. S. District Court. The North Bloomfield Co. denied the constitutional right of the Act in question to apply to its workings: Judge Ross affirmed its constitutionality, and enjoined the mine.

The circumstances in detail were as follows:

The U. S. District Attorney, representing the Government, brought suit against the North Bloomfield G. M. Co., praying that a writ of injunction be issued, prohibiting the company from continuing its hydraulic mining operations at Humbug creek, a stream within the territory drained by the Sacramento and San Joaquin river system, Cal., as set forth in the Caminetti Act.

On June 8th, '97, Judge Ross granted the writ as sought for, in the U. S. District Court. In the complaint filed by the District Attorney, it was set forth that the mining company failed to file with the Debris Commission a petition for a writ to carry on hydraulic mining, and having failed to file such petition continued its operations of hydraulic mining. Further than this, the complainant alleged, proper provisions had not been taken for the impounding of debris, and that such debris as was washed down operated to impede navigation in the rivers, heretofore deemed navigable, by settling on the bottom and raising bars.

In reply the mining company denied the allegation that the debris from the plant impeded navigation, but insisted that such as escaped their impounding dam was of a flocculent nature and floated lightly on the water, being ultimately carried out to sea. With respect to the failure of the company to file a petition with the Debris Commission for a permit to carry on hydraulic mining, it was contended that inasmuch as no impediment to navigation was created as a result of the mining operation, therefore there was no necessity to file such a petition. Furthermore, the Bloomfield Company denied the right of Congress to place restrictions upon the hydraulic mining industry, such as established by the Caminetti law.

In his opinion Judge Ross reviewed the entire Act creating the Debris Commission, and, commenting upon it, said:

"From these provisions, and there is nothing in the Act to the contrary, it seems quite clear to me that its real intent and meaning is to prohibit and make unlawful any and all hydraulic mining in the territory drained by the Sacramento and San Joaquin river systems, in the State of California, directly or indirectly injuring the navigability of said river systems, or to the lands adjacent thereto; and to permit it in all cases where the work can be prosecuted without such injury to the navigability of the said river systems or to the land adjacent thereto.

"That in order to properly determine the facts upon which the legislative will is to act, a skillful commission is created, whose duty it is to ascertain and to determine what will, or will not, cause the prohibited injury, and to prescribe the character of the impounding works and the extent to which hydraulic mining in the territory described may be carried on without such injury.

"To give effect to this manifest purpose Congress in effect enacted that until the commission should find that such mining can be carried on without causing the prohibited injury all hydraulic mining within the territory drained by the Sacramento and San Joaquin river systems is unlawful; for by Sec. 9 it is in terms declared that any person or corporation owning mining ground in that territory, 'which it is desired to work by the hydraulic process, must file with said commission a verified petition setting forth such facts as will comply with the law and the rules prescribed by said commission.'"

Then followed a number of citations from various cases tending to show the power of Congress to determine what may or may not be obstructions to navigation. The case of the Brooklyn bridge was the most important one recalled by Judge Ross. In that instance it was positively held that only under certain specified conditions, such as would not blockade or interfere with traffic on the river, could the bridge be built. Therefore concluded Judge Ross:

"So here Congress has created a commission under the direction of the Secretary of War and the supervision of the Chief Engineers of the Army to ascertain and determine whether the various hydraulic mines within the territory drained by the San Joaquin and Sacramento river systems can be operated by means of impounding reservoirs and other works without injury to those navigable rivers; and, if so, the Acts of Congress permit them to be operated in such a prescribed way as will prevent any such injury.

"Until the matters of fact committed to the commission have been ascertained, and the extent and methods of the works so prescribed, the Act of Congress prohibits the operation of any mine by the hydraulic process within the territory drained by the San Joaquin and Sacramento river systems from which any debris matter flows into those waters.

"This, in my opinion, is the true construction of the Act, and to it, as thus construed, I see no constitutional objection. * * * A decree will be entered for complainant as prayed for."

The Black Range District, New Mexico.

Town of Chloride, Sierra Co., New Mexico, Foothills of Black Range.

The Black Range district is west of the terminus of the Magdalena branch of the railroad, and is in the foothills on the east side and near the north end of the Black Range. The formation is porphyritic, principally andesite, and occasionally belts of trachyte show themselves running parallel with the veins. Limestone occurs in isolated places.

Every foot of the lode from Wild Horse creek to Dry creek—8 miles—is marked by croppings. The vein is located the entire distance. The mineral belt is from 4 to 8 miles wide. The accompanying illustration of Chloride serves to give a general idea of the country.

New discoveries in the Black Range are attracting attention and the country is full of prospectors. F. L. Buchanan, Supt. El Dorado mine, Hillsboro, thinks that the ore is principally of a concentrating character, and that deep mining will be necessary to bring them into profitable operation. "I can show claims in the Black Range that are literally cut up with shallow shafts and open cuts from one end to the other. All of these openings and cuts show the vein plainly, and it is a wonder that the prospectors did not go down when the vein was once found, for the time and money scattered in useless surface work would have developed the vein and made a mine of the property. No man can hope to sell a mine for a fair price until he has shown what it contains at a depth of 100 feet from the surface. Every foot less decreases the price that can be obtained for the property, even if it is a proposition of more than ordinary merit. There are two lessons to be learned in the Black Range. One is that deep mining will seldom fail to find the values of very high grade, and the other is that nine-tenths of all the ores are concentrating ores. One can mine and concentrate three tons of ore for what it will cost to hand sort one ton to make it high-grade shipping ore. Hand sorting is an imperfect, slow and expensive method of concentration, which, with the improved machines now in use, can be done better, quicker and at from one-third to one-fourth the cost."

Men and supplies have been going in throughout all of 1900, and an extension of the branch line of railway is now projected.

A New Enterprise.

The Risdon Iron Works of San Francisco have recently purchased the property of the old Pacific Rolling Mill Co. in the Potrero, San Francisco. This property consists of some thirty-two acres of ground, immediately adjoining the Union Iron Works, and has a deep water frontage of over 1700 feet. Application has been made to the Board of State Harbor Commissioners for a site for a new dry dock. This dry dock will be 500 feet in length by 100 feet in width. New wharves are now in course of construction. Several new steel frame buildings are contemplated, and large orders covering the structural materials for the following buildings have recently been placed:

Machine shop—length, 308 feet; width, 100 feet. Total lift over main floor, 45 feet.

Boiler shop—length, 140 feet; width, 180 feet. Total lift over main floor, 40 feet.

Machine and ship blacksmith shop—length, 300 feet; width, 60 feet.

Foundry—length, 177 feet; width, 160 feet.

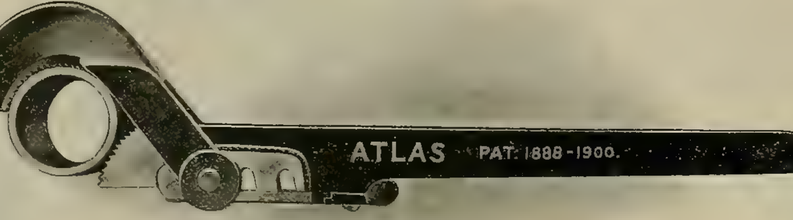
Ship joiner shop—length, 140 feet; width, 81 feet.

The machine shop will be equipped with four electric traveling cranes of the following capacities: One 50-ton, one 20-ton, one 15-ton and one 10-ton. Each crane will be of the most modern type and equipped with five-ton auxiliary hoists. The boiler-shop crane equipment will consist of one 60-ton, one 20-ton and one 10-ton electric traveling crane, each equipped with five-ton auxiliary hoists. The foundry crane equipment will consist of one 30-ton and one 20-ton electric traveling crane with five-ton auxiliary hoists. The ship blacksmith shop will be equipped with eight jib cranes of five and ten tons capacity each.

The machinery equipment throughout will consist only of the most modern tools. The entire plant, with the exception of the steam hammers in blacksmith shop, will be operated by electricity, and contracts have recently been placed with the Independent Electric Light & Power Co. of San Francisco to furnish power for this plant. Direct current will be used for the cranes and an alternating current for the machinery equipment. Separate motors will be installed in each department. The cost of electric power for operation of this plant for the first year will amount to over $30,000.

Risdon representatives are now in Washington preparing estimates for the new battleships for the United States Navy, and will be prepared to bid on at least two of the new vessels.

The Atlas Pipe Wrench.



The accompanying illustration is reproduced from a photograph of an 18-inch Atlas pipe wrench in operation on a 2-inch pipe, and demonstrates why it does not crush the pipe. From an examination of the illustration it will be readily seen that the teeth grip the pipe at an angle and the gripping point is in advance of the handle, showing that in screwing a pipe one pushes it ahead, and does not dig into the pipe and drag it as in some pipe wrenches; therefore it is not crushed. For the same reason the Atlas pipe wrench can not lock on the pipe as the gripping point; being in advance of the handle, it is impossible for it to lock.

The wrench is designed to be just as effective when fully extended as when used on the smaller size of pipe. The movable jaw, as represented in the illustration, is in slot marked No. 3 for the larger sizes; by shifting to slot marked No. 2 the wrench can be used on the medium sizes of pipe; and, shifted to slot marked No. 1, can be used on the smaller sizes. For examples, on the 18-inch wrench, slot No. 1 for ¼ to 1-inch pipe, slot No. 2 for 1¼ to 1½-inch pipe, slot No. 3 for 2-inch pipe. The movable jaw, as the illustration also shows, is not a screw jaw, and is designed to have no weak parts. There are no nuts on the wrench to jam and no delicate parts to get out of order or break. It is made of special wrench steel, drop-forged, every wrench tested. The 24-inch wrench will take ½-inch larger pipe than other wrenches, and 36-inch wrench 1-inch larger pipe. A set of four wrenches will handle all sizes from ⅛-inch wire to 4½-inch pipe. The 24-inch and 36-inch have inserted jaws in handle.

It is made by the Atlas Pipe Wrench Co., Flood Bldg., San Francisco; Eastern office, 121 Liberty St., New York.

MINING SUMMARY.

ARIZONA.

COCHISE COUNTY.

Laub City says in the Dos Cabezas Con. mines a blind ledge 60 feet wide runs 25% copper, $3.50 per ton silver and $2.50 per ton gold. Water is struck in the Casey mines. The scarcity of water has been a block to their development.

GRAHAM COUNTY.

A meeting of the shareholders of the Arizona Copper Co., Limited, was held in Edinburgh, Scotland, on the 4th inst., to hear a statement from Supt. Colquhoun. The chairman said the meeting was held in accordance with a promise made some time ago that they should have an opportunity of meeting Supt. Colquhoun while he was in that country. Supt. Colquhoun and other employes of the company at Clifton had purchased largely of the shares of the company, but were surprised that while they were successfully working and making lots of money for the shareholders, the latter were giving so much attention to litigation, which they in Arizona did not see was to be of any profit. After describing in detail the various mines and works at Clifton, Supt. Colquhoun said that during the past four years the development and increase of plant had revolutionized their business methods. He had solved the problem of making low-grade ores a valuable asset, and they had found they could make money from them. Their plant had been strained to the utmost, and had gone more and more out of date. During the present half year they had not been doing nearly as well as six months ago, and they did not do as well six months ago as the previous six months. They had been suffering from a tremendous congestion of business, but they had relieved the situation considerably. They should have to bear on the problem the best appliances that now could be had. The important thing was not now what it cost, but could they make copper when copper went back in price to its old value? They had no right to expect that they, copper men alone, should benefit by the prosperity which everyone enjoyed all over the world at the present time. Could they, when these hard times came again, from these 4% ores, make copper at as low a price as they did formerly? To that he answered, yes; provided they made the improvements in the works to which he was about to refer. They had decided to erect a 200-ton concentrating plant, and they would be able to raise their output to somewhat over 13,000 tons of copper per annum. They had decided to expend £150,000 in rebuilding their smelting plant, their concentrating plant, in increasing the capacity of their railway and their Bessemer plant, and so put them in a condition they required to be in to handle these low-grade ores. A vote of thanks was tendered Supt. Colquhoun for his services to the company.

MOJAVE COUNTY.

The property of Maguire Bros., 4 miles south of Kingman, is bought by Averel & Huntington of San Francisco.

The Tiptop and Salvador mining claims near El Dorado Canyon have been bonded to A. P. Johnson of Denver for $15,000.

YAVAPAI COUNTY.

Supt. L. A. Davies of the Reliance G. M. Co. will operate the old Aztec mine, one of the group which belonged to the late Sun Dance M. Co. The new company is developing the Silver Trail and Thorne and have men employed. The mill on that property is of thirty-five stamps.

YUMA COUNTY.

The King of Arizona mine has shipped to Tucson a bar of gold weighing 160 pounds, valued at $35,000.

CALIFORNIA.

BUTTE COUNTY.

Twenty men are laying pipe from the Cherokee Co.'s ditch to the Banner ditch.

Mercury: The Banner mine is disposing of all its electrical machinery except the lighting plant, and will operate by the direct application of water power. The motors are being shipped to San Francisco.

CALAVERAS COUNTY.

Near San Andreas the Lucky Boy or Waters mine is to be opened. The company will sink a shaft 6x11 feet and will erect machinery of sufficient capacity go down 1500 feet.

At the Ozark mine a two-compartment shaft is being sunk.

At the Oriole mine it is the intention to sink 600 feet.

G. S. Holmes, who, with C. Coram of Boston, bought the Calaveras group of mines for $75,000, is at the property to start the mill.

EL DORADO COUNTY.

At the Ribbon Rock mine the shaft is down over 200 feet. Three hundred feet of tunnel was run. The shaft will be sunk 500 feet.

A strike of gravel is reported in the west ledge at the Larkin mine. Sinking will be continued to a depth of 800 feet.

At the Cambrian mine, near Granite Hill, a new water power hoist is being built.

Development work is being done on the 200 and 300-foot levels at the Grand Victory.

KERN COUNTY.

The Mammoth mine of Kernville, owned by Mr. Russell of Los Angeles, who has a 10-stamp mill, is to have an increase to forty and a tramway, the machinery to be run by electric power.

Randsburg Miner: The Buckboard mine has had sixty tons of ore crushed at the Red Dog mill, which produced a gold brick worth $1000.——The California Borax Works will resume.

MADERA COUNTY.

The Mariposan says "the Gambetta mine at Grub Gulch has been closed down and the pumps pulled out."

MARIPOSA COUNTY.

M. C. Randolph, representing the Benvenuta M. Co., has a bond on the Virginia mine, Coulterville.

The Columbia Con. G. M. Co. has bought for $6000 the Lafayette, Eureka, Blackhorse and Alba claims, near Coulterville.

MONO COUNTY.

The Par Value M. Co. at the Arnot mine, Green Creek, on the 17th increased the capital stock to $72,000.

NEVADA COUNTY.

A new 10-stamp mill is being placed at the California mine, Graniteville.

Work has begun at the Franklin mine, Willow Valley.

A new 5-stamp mill will be put in at the Le Compton mine, Willow Valley. J. J. Ott, owner of the mine, will also put in hoisting works and pump. The shaft on the Le Compton is 300 feet deep. It will be sunk to a depth of 800 feet.

J. Bonney has run a 700-foot tunnel on the Rainbow mine, in God's Country, and found a shoot of ore 100 feet in length, average thickness 18 inches.

The Diana and Columbus mines, near the Maryland, are to have a new hoist and pump. The ledge runs parallel with the north line of the old Eureka mine.

Dana Harmon, Supt. Gaston Ridge quartz mine, will increase the number of stamps at the mill from twenty to thirty.

H. L. Body will have the new 20-stamp mill at the Cadmus mine running next week.

The Moore G. S. Co. of San Francisco has bonded 200 acres gravel ground at Scott's Flat.

The Hudson M. & M. Co. has levied an assessment of 2 cents per share, delinquent October 22.

PLACER COUNTY.

The Morning Star mine of Iowa Hill is again a dividend producer, a $3 dividend having been declared.

Sentinel: The Alameda quartz mine will raise the retaining dam 4 feet. The mine consists of a ledge from 50 to 100 feet in width. The surface of the ledge on the steep mountain is decomposed and is worked by a piping and sluicing process.

PLUMAS COUNTY.

W. P. Hammond is at Spanish Ranch boring to decide if dredgers would be profitable.

SAN BERNARDINO COUNTY.

(Special Correspondence).—The Bagdad mine, 7 miles south of Ludlow, has a high grade and apparently extensive ore body in the 200-foot level, which is being explored; C. Grant is Supt.

Ludlow, Sept. 18.

SAN DIEGO COUNTY.

Filings on 16,000 acres of oil land on the desert in the Carriso creek section have been recorded by Z. B. Stuart of San Bernardino—100 claims of 160 acres each, and all the notices signed by Stuart as locator.

SHASTA COUNTY.

The Mountain Copper Co. paid into the county treasury for 1899 $26,000. For the year 1900 the assessed valuation is $1,750,000, on which it will pay $35,000.

SISKIYOU COUNTY.

F. Beaudry of South Fork of Scott river says he wants at least fifty men to do the necessary improvement work on the properties recently purchased, to shape them for handling by the time the water season started. A ditch and flume will be built.

TEHAMA COUNTY.

Red Bluff reports that workmen on the Cone ranch have struck gold in Antelope valley.

TRINITY COUNTY.

U. G. Day, Supt. Enterprise M. Co., East Fork, says the ledge on the lower level of the Lone Jack mine has been struck by tunnel and is 3 feet in width. It will go $15 a ton.

The new tunnel of the Brown Bear mine at Deadwood will cut the ore body.

Near Dedrick, in the lowest level of the Globe mine, drifting on a 4-foot ledge goes on. The 5-stamp mill is running.

At the Ralston mine G. L. Bailey has fifteen men employed.

TULARE COUNTY.

C. C. Harker, president Western Carbonic Acid Gas Co., owner of the magnesite property east of Porterville, will put in a furnace for roasting the ore. The deposit is 90% pure. When roasted it makes an oxide of magnesia and gives off carbonic acid gas, which is liquefied, transferred to steel and shipped for carbonating mineral waters, refrigerating purposes, etc. The oxide of magnesia is used in the paper mills, after being treated with sulphur gas, making sulphide of magnesia, used, after being pulverized to a fine powder, to take out the resinous matter in the wood pulp used in the manufacture of paper. The oxide is also used for the manufacture of magnesia bricks. The company also uses it for making light carbonate of magnesia. A demand is made for it by the powder companies for their high-grade powder, it acting as an absorbent of the nitro-glycerine.

TUOLUMNE COUNTY.

The Dutch mine has electric power from the Tuolumne Co. to keep the compressor going. Drifting south on the 1000 level and north on the 1200 goes on. Sinking in the shaft below the 1200 level is resumed.

Near Stent the Santa Ysabel mine has been unwatered and will be kept so. Nothing else will be done until the rains come.

The Jumper mill is closed down owing to scarcity of water. Forty-five men were drafted in consequence. About fifty are still at work.

Near Columbia C. H. Knos has uncovered ore in the Riverside mine.

The new chlorination plant at the Shawmut mine is progressing.

Independent: At the App mine it is the intention to put in an additional forty stamps at the mill.——The Confidence mine and mill will be running next month.

VENTURA COUNTY.

The Union Oil Co. is drilling a well in Adams canyon, which "it intends to put down 4000 feet if necessary." It is starting with a 16-inch hole.

COLORADO.

CHAFFEE COUNTY.

Near Buena Vista the two tunnel enterprises projected are to cut the old Cornucopia on Mt. Princeton 1000 feet lower.

B. F. Morley is arranging to run a tunnel from a point near the Colorado & Southern Railroad to tap the Mary Murphy vein at greater depth.

In Turret district N. Esperson has been appointed Supt. Queen City, and will also have charge of the work on the Gold Bug. The Anaconda and Vivandiere will resume.

CLEAR CREEK COUNTY.

The Monarch M., M., T., T. & P. Co. has started its tunnel. Manager McClelland proposes to cut the Freeland vein, which will be reached in about 5000 feet, and, when encountered, will cut that vein at a depth of 2500 feet on the dip, from 1200 to 1400 feet deeper than at present.

EL PASO COUNTY.

The Portland G. M. Co. is surveying the site of the new Portland mill at Colorado City; on May 1, 1901, the plant will be in operation. The mill is to be entirely of steel; it is expected to permit a saving of $30,000 a month on treatment charges.

GILPIN COUNTY.

Register-Call: At Apex the management of the Sherman tunnel are putting on more men and new machinery.——During August there were shipped from the Blackhawk depot of the Colorado & Southern Railroad 301 cars of ore, aggregating 5568 tons, representing the shipments of smelting ore, tailings and concentrates, to Denver and other smelters, and crude ore to outside points for treatment. Compared with the previous month's shipments, August shows an increase of 1146 tons—a gain of 25%. The shipments for the first week of September were 80 cars, 1480 tons.

GUNNISON COUNTY.

The Forest Hill Con. M. Co. and the Canton & Pittsburg M. Co. are extensively operating mining property on Forest hill, Tin Cup district; E. Stitz, Supt. The two companies own thirty-one claims, over 300 acres.

A. H. Elftman says: "The ore in the Tourist vein carries sulphides of iron, copper and lead, carrying gold and silver, and usually associated with a quartz gangue. From the ore so far found in place and the abundant float it appears that there will be rich pay streaks, composed entirely of the sulphides, besides large bodies of quartz ore carrying these sulphides, more or less evenly distributed. This latter will form the low-grade or concentrating ore. From the ore on the dump and that taken from the bottom of the Tourist shaft it is shown that this ore is a good concentrating material, running about $10 per ton, according to assays made, and concentrates about ten tons of ore into one ton of concentrates."

HINSDALE COUNTY.

Thirteen miles above Lake City the Henson Creek Lead Mines Co. own six claims on Henson creek, and will erect necessary buildings and develop under the management of Supt. Adams.

OURAY COUNTY.

(Special Correspondence).—The Camp Bird mill of forty stamps, twenty Frue vanners and four Wilfley tables, which crushes an average of 138 tons of ore per day, has operated every day during the past year, with the exception of a close-down on Christmas and on the Fourth of July—both cases being purely a holiday affair. From 61% to 62% of the mill saving is effected by amalgamation, the balance being saved in the concentrates. It is figured that at least 90% of all the values in the ore is extracted by the two processes.

There are various devices about the mill which have been designed by those in charge, as the outgrowth of the requirements of everyday practice. One is the system of quick-traps below the plates for the purpose of arresting any amalgam which might otherwise escape. Another consists of gravity and hydraulic sizers by which the material passing from the plates is classified for the different concentrating tables. The vanners are ranged in two rows, the first taking the material from the plates through the system of sizers; the tailings from the first row are elevated to another system of sizers, or classifiers, from which they pass down to the second row of vanners. The entire concentrate product is elevated and carried to a separate building and there dumped into V-shaped bins, containing coils of steam pipe, connected with the boilers, and by this arrangement the concentrates are slowly dried, after which they are dropped down through chutes to the floor where they are sacked for shipment. It is pointed out that this method of drying avoids the loss which may take place when the concentrates are dried rapidly by fire heat, which is often sufficient to produce fumes and a loss therein.

For the purpose of effecting a saving of values in the concentrator tailings, a cyanide plant has been erected, which will doubtless be in operation within thirty days. In this plant there are virtually four floors. On the top floor are the solution storage and mixing tanks; on the third floor are the leaching tanks which first receive the pulp and wherein a weak solution of cyanide is applied; from these the material passes to tanks immediately beneath on the second floor, where it is subjected to the strong solution. From the last named tank the refuse is sluiced down to oblong tanks on the first floor, where we also find the zinc precipitating boxes. In the basement are the tanks into which are drawn the exhaust solution, and where it is brought up to the required strength for use again. Here is also the bullion furnace.

The tanks are all of steel, the main leaching tank being 22 feet diameter by 6 feet depth. The plant will have a capacity of 100 tons per day; 600 tons of material will be constantly in course of treatment through the plant. It is estimated by Supt. W. H. Coates that the concentrate tailings, resulting from present capacity of operating, will be equal to the capacity of the cyanide department, although there is a large tonnage of tailings impounded on the premises.

The main mill building is being extended to make room for forty additional stamps, twenty of which to be put in this fall and the others next spring. This will also require additional concentrators. At this mill I observe the use of a new stamp die, made in two sections, with a flange on lower section to hold the upper part in place. The design of the die is that the upper section may wear out and be replaced without replacing the entire piece. It is claimed that it works satisfactorily.

The 2-mile tramway line has forty-six buckets, and from the 11,500 feet altitude at the mine down to the mill is a descent of 1500 feet. The Camp Bird ores are a sulphide of iron, carrying gold values in the main, though much of the gold is in telluride form. The mill is operated by water power part of the season and then by steam power. The three compressors at the mine are run by an electric motor, driven by transmitted power from Ames, a distance of 28 miles. WASCOTT.

Camp Bird, Sept. 7.

(Special Correspondence).—The Silver Link mine, situate in Poughkeepsie gulch, four miles from Ouray, is being put in condition to produce by its owners and is in charge of F. O. Seabury. This property was considerable of a producer about ten years ago, yielding copper in a bornite and chalcopyrite ore. For several months past the work has been directed to cleaning out and retimbering the old workings and it is expected that the mine will be in position to ship copper ore within a few weeks.

Ouray, Sept. 7.

(Special Correspondence).—The Bachelor mine, near Ouray, is producing nearly 5000 tons of ore per month. The high-grade smelting ore, amounting to about 150 tons per month, runs from 180 to 200 ounces in silver, with small values in gold. The bulk of the output, classified as mill ore, averages about forty-five ounces silver. The highest grade milled runs about 100 ounces and the lowest about ten ounces silver. The mill, in charge of Supt. C. E. Fryberger, is strictly a concentrator and is an illustration of how the details of concentration are usually worked out according to the needs that develop as the ore handled is experimented with. In this case the ore passes through an 11x15 inch Dodge crusher, thence elevated to a storage bin, below which is an automatic device which feeds the ore to a revolving four-mesh screen, the coarse from the latter passing to a set of 14x27-inch four-mesh rolls; that which passes the screen goes to a set of 6x30-inch, twenty-mesh, high-speed rolls. The product from the twenty-mesh rolls is elevated to different sets of wet screens, the coarse screenings passing to three Bartlett tables; and the fine to two other Bartletts and one Cammett table. The tailings from the coarse tables are elevated to and reground by a set of 6x30-inch rolls, the product passing through a wet twenty-mesh screen and thence to the group of fine tables. The coarse concentrates carry about 30% lead, high values in silver; the fine carries about 10% lead and nearly the same proportion of silver as the coarse. The crude ore contains about 6% of zinc, a pretty thorough separation of which is made from the silver and lead by the tables, the zinc passing to the tailings. The final tailings from all the tables are then carried to hydraulic gravity sizers. by which the waste material passes down through the bottom; the slimes overflowing and running to canvas tables below. Over each set of canvas tables is a second hydraulic sizer which receives the slimes at the top and fresh water from below, which causes the slimes to overflow at the top though spouts and thence over the tables. The saving thus effected on slime tables amounts to considerable. It is estimated that the entire mill saving is about 80%. The concentrates contain a considerable amount of gray copper in connection with iron.

The ores from the Bachelor are brought out through a 700-foot crosscut tunnel, containing double track for ore cars, a pipe line for compressed air and a steam pipe from the boilers at the tunnel entrance to the large hoisting engine at the breast of the tunnel, where it taps the vein. At this point a 7x11-foot shaft sinks 300-feet by the side of the vein, there being drifts from the shaft on the vein at 100 and 200-foot stations. From the tunnel level an upraise connects with the third level 260 feet above, where there is 1300 feet of drifting on the vein; from the third level a 90-foot upraise connects with the second level, where there is also a large amount of drifting. The vein is pretty well stoped out between the second and third levels. Most of the present tonnage comes upon the tunnel level and the one above it, or the third.

The vein, which ranges from 8 inches to 8 feet wide, follows the trend of a great porphyry dyke. The formation is such as requires very little timbering. The shaft mentioned goes beyond water level and it requires a sinking pump. It is sunk on the line between the Bachelor and Khedive grounds. The tunnel mentioned belongs to the Khedive property. Geo. R. Hurlburt, who owns the Khedive, is president of the Bachelor Co.; so that the two mines, which endline with each other, work in harmony. The Khedive is at present doing development work. Tim Marrion is Supt. of the Bachelor mine.

The Caliope and Dexter groups are now owned by the Caliope-Dexter M. Co., of which C. H. Nix is manager and S. R. Hopkins secretary. The company is sinking a shaft at a point between the Caliope and Dexter veins, having already sunk 150 feet and are to sink 150 feet deeper. Crosscuts are being made from the shaft to the two veins. It is said the purpose is to build a tramway from the mine to the river and erect a mill at the latter place.

Ouray, Sept. 8. WASCOTT.

PITKIN COUNTY.

At Aspen unwatering goes on to recover the thirteenth level in the Mollie Gibson and the tenth level in the A. J. mine.

SAN JUAN COUNTY.

(Special Correspondence). — The Hercules Con. M. Co., under the management of Thos. H. Kane, is operating on the Silverton side of Sultan mountain, on a group of thirty-two claims. The workings consist of an upper tunnel which crosscuts the formation, and is now in 1700 feet. About 600 feet below it is a lower crosscut tunnel which penetrates the mountain a distance of 2400 feet. The two tunnels cut five parallel veins, which stand nearly vertical, and on which a large amount of drifting has been done, the upper and lower tunnel workings being connected. From the upper tunnel entrance a tramcar line, 1000 feet long, carries the ore down to the mill at the foot of the mountain. The ore passes through crushers and rolls, and from the latter are elevated to revolving screens, from which the different sizes pass to a system of jigs. About 65% of the values are saved in the jig product; the tailings from the jigs pass down through automatic feeders to four batteries of stamps, below which are amalgamating plates, the tailings flowing down to Wilfley tables. The mill is operated by two low-case Leffel water wheels, propelled by water from a 3400-foot flume from Mineral creek. The mill, which has a capacity of 120 tons, is just starting up. The ores consist of a copper and iron sulphide, carrying values in gold, silver and lead.

The Iowa mill, of which R. J. McCartney is superintendent, is handling 160 tons of ore per day, which is carried to the mill from the Iowa mine in Silver Lake basin, over a 1½-mile tramway. The ore goes through crushers and rolls, from which it is elevated to screens, passing from the latter to jigs of 2 to 8-mesh. The jig product contains about 70% of the values saved. The jig tailings are run through Huntington mills, thence over concentrators—five Wilfleys and one Cammett. A Chilian mill is being put in to do a work similar to that of the Huntingtons; also four new Cammett tables are to be put in. A system of hydraulic sizers, designed by Manager Watson of the Iowa, are to be put in use over the concentrators. The table tailings are carried to a system of canvas tables, which are in charge of N. H. Crane, who looks after this part of the product on a percentage of values saved. Supt. McCartney has designed and put into use a riffle attachment to the concentrators, which he believes effects an important saving. He is also using an automatic sampler for the table tailings and one of different design for the crude ore that passes the revolving screens—both of his own design. The Iowa concentrates are transported from the mill to the railroad track, a distance of 1 mile, where there are shipping bins. The Iowa mill is operated by steam. WASCOTT.

Silverton, Sept. 8.

(Special Correspondence).—The manager of the Silver Lake mines has commenced the construction of a new mill at the railroad, where the ore bins and lower terminal of the tramway line are located. This point is about 2½ miles from the mines and approximately 2000 feet lower. A branch tramway line has been erected from the mouth of the Unity tunnel, connecting with the central terminal on the main line, and is 4300 feet long, the highest tower on this branch being 107 feet high. This new line was constructed by Wm. Dusedau of New York. The Unity tunnel starts on the western slope of the mountain, proceeds easterly through the mountain, cutting about 400 feet under the main Silver Lake workings, with which it connects by an underground shaft. The tunnel is reported to be about 2 miles in length. No doubt all ore below the level of the old workings will be passed down to the Unity tunnel and thence down to the new mill, rather than hoisting it to the upper levels and sending it to the old mill. It is understood that the old mill, which is up in Silver Lake basin, will still be operated on certain ores even after the completion of the new mill.

A new steam power plant, belonging to the Silver Lake property, has been built on the Animas, which is designed to operate additional generators for electric power.

Silverton, Sept. 11.

(Special Correspondence).—The Elmyra M. & M. Co. are operating the Silver Ledge mine and mill, near Chattanooga, producing a lead and iron ore, of which they ship about one car per day.

Chattanooga, Sept. 12.

SAN MIGUEL COUNTY.

(Special Correspondence). — The Four Metals M. Co., composed of Boston, St. Louis and Pueblo parties, is operating the Palmyra mine, in Turkey Creek basin, between Telluride and Ophir. The holdings comprise about seventy acres and developments consist of a tunnel 1500 feet long, which goes in on the vein, with considerable amount of stoping above the tunnel level. The ore is a partially oxidized quartz, carrying gold, silver, copper and lead values, a considerable tonnage of which is exposed in the workings and piled up on the dump. For some time during the summer four cars of ore a week were shipped to the smelters, which, it is asserted, averaged $40 per ton. A tramway line is being erected from the mine to the foot of the mountain, where a mill will doubtless be erected next year.

Telluride, Sept. 12.

SUMMIT COUNTY.

T. Harris has raised the Risdon dredger recently sunk on the North American Co.'s property on the Swan, and it is in condition to run.

TELLER COUNTY.

The Modoc G. M. Co. will sink a 1000-foot shaft on the Ocean View claim.

At Cripple Creek the Independence Con. M. Co. will sink the main working shaft 300 feet, which will make the total depth 1050 feet.

It is expected that the work of sinking in the main shaft of the Golden Cycle will be completed about the first of the coming month unless the water should get worse. Quite a flow of water is coming and there is some apprehension concerning it.

The St. Patrick mine in Victor will begin operations next month in charge of J. McConneghy.

The Zenobia G. M. Co. has decided to sell the Zenobia claim for $100,000.

The La Bella Co. has in operation twenty-five electric hoists, and are supplying the air to operate the thirty-three air drills.

The shaft on the Gold Coin M. & L. Co. is down 1025 feet.

Work in the Moon-Anchor property on Bull hill is discontinued pending the special meeting of the stockholders on the 24th, when the proposition to increase the capitalization from $600,000 to $1,250,000 will be voted upon.

At Denver on the 18th a suit was filed by P. Rogers and others to enjoin the proposed sale of the Zenobia mine at Cripple Creek. The complaint alleges that W. S. Stratton has called a meeting to ratify the sale of the mine to W. C. Currie, agent for Stratton, for $100,000, when it is said to be worth $250,000.

IDAHO.

ELMORE COUNTY.

The properties at Atlanta belonging to the Atlanta G. & S. Con. Mines have been transferred to a company represented by J. C. Johnson of Lincoln, Neb., to be known as the Golden Age M. Co., capital $3,000,000. The present works will be cleared out and retimbered and the mill overhauled and remodeled.

LINCOLN COUNTY.

At Minidoka the Yale Dredge Co. has been operating the bars of Snake river for five years, and has decided to put in a larger plant, worked on the suction principle, the gold-bearing sand and gravel being drawn up to a system of sluice boxes on the dredge. The gold in the bars of Snake river is very fine and light, but settles in the gravel within a few feet of the surface, and is hard to save. A system of burlaps connected with the sluices, however, has worked well, and ground that pays 10 cents to the cubic yard can be profitably worked.

OWYHEE COUNTY.

For the Snake river electric power plant of the Trade Dollar Con. M. Co., the line to the Trade Dollar is completed; three sub-stations will be built — one at Dewey, one at the Black Jack and one at the Trade Dollar—all of structural steel, asbestos lined, and fireproof. In these sub-stations will be located the step-down transformers, which will reduce the voltage from 20,000 (the voltage over the main line) to the voltage of the motors. Work on the dam at Snake river is progressing, and it is expected that the plant will be in working order by 1901.

SHOSHONE COUNTY.

A. Burch, Supt. Bunker Hill & Sullivan M. Co., at Wardner, says the property is maintaining its usual large output and paying dividends regularly. The long tunnel being run from a point near the concentrator to tap the ore bodies of the mine is progressing.

The Clark tunnel, at Sunset, reports 8 feet of galena in the tunnel.

Near Weippe, in the Pierce river district, a quartz discovery is reported carrying high values in gold and silver.

At Wallace the crosscut tunnel on the Headlight is in 175 feet.

Near Burke, Hale & Brower of Butte, Mont., have bonded the Treasure Vault, on Nine Mile, for $50,000—10% down, 40% in six months, the balance in one year. Assays go 60% lead, thirty-four ounces silver.

The Standard M. Co. is putting in a new air compressor and electric plant. The compressor will have a capacity of fifty drills. The new electric plant will furnish power to haul the ore out of the half-mile tunnel. The mine is putting out 500 tons of ore daily. Dummy cars and the overhead trolley will be used.

Murray reports copper ore in the Goldback shaft on the Butte Placer. It is estimated the rock will go 40% copper.

WASHINGTON COUNTY.

The tunnel on the Decorah mine, in the Seven Devils, has cut the vein by diamond drill and tunnel.

MICHIGAN.

HOUGHTON COUNTY.

At the Calumet & Hecla the shaft has six compartments, each of which is as large as an ordinary shaft, one for the ladderways and the sixth for the wires and pipes which are necessary for the telephones, light, power, water and compressed air. The remarkable feature of this great mine is that the course of the vein is so undeviating that the engineers can plan work ahead for thousands of feet with the absolute certainty that the actual workings will agree with the plans. As a result the underground workings are laid out with mathematical accuracy. The great pumps that hoist thousands of gallons of water every hour are operated interchangeably by compressed air and electricity. There are 300 power drills constantly in operation, each of them doing the work of six men, operated by compressed air, and these are kept at work night and day. Every drift is constantly under the eye of the engineer in his office on the surface, and the result of every shot is known as soon as the smoke clears away. Every ton of ore hoisted is automatically registered in the office, and the condition of the entire mine at any given moment is but a matter of a few minutes' calculation and a few inquiries by telephone. The air supply of the mine is good; blowing engines send it down to the bottom of the shaft, where it is caught by fans and carried through pipes into the headings of the drifts.

The News Bureau says: "Osceola is laying the foundations for the addition to its new mill. This addition will contain four stamps, each capable of crushing over 500 tons of amygdaloid rock daily."

MONTANA.

DEER LODGE COUNTY.

At Anaconda the Amalgamated Copper Co.'s new smelting plant is building. The concentrator structure will be 646x433 feet, the roaster building 330x98 feet, the converter 352x180 feet, the reverberatory 518x183 feet, the blast furnace 181x82 feet, the smelter power plant 515x34 feet. In one end will be located the plant's machine shops. These are the main buildings. Besides there will be dust chambers 40x200 feet for the converter, roaster and blast furnaces; a clay building 32x150 feet adjoining the converter building, where the converters will receive their clay lining; three storage bins for the blast furnace, each 28x300 feet, and minor structures.

NEVADA.

ESMERALDA COUNTY.

At Silver Peak nothing is known of the rumor that John W. Mackay had purchased the Blair group of mines. Two million dollars is the price locally placed on the property, which is equipped with a 30-stamp mill, old style.

Supt. S. R. Wasson at Silver Peak says that on the 1st of October mining and milling will resume.

WHITE PINE COUNTY.

The Pilot Knob group of copper mines, West Camp, 7 miles west of Ely, is reported bonded by agents of W. A. Clark.

NEW MEXICO.

SOCORRO COUNTY

The Cooney mill, Mogollon district, which had been shut down several months to half time on account of a shortage of water, is again running, there being now sufficient water to keep the plant going at its full capacity. The mine is expected to show a production of $20,000 during September.

OREGON.

BAKER COUNTY.

Manager Esselstyn of the North American M. Co.'s copper mine at Burkemont says: "We are going into the ground five ways at once. Of course, the only way we can see into the ground is to dig into it by candle light."

Manager C. H. Thompson of the Bunker Hill mine, Cable Cove district, says that in the lower level of the Bunker Hill is a body of high-grade ore.

J. T. Grayson, who bonded the Baby McKee group in Cable Cove, has thirty men employed on a 5000-foot tunnel which is expected to cut the ledge.

F. Brile, Supt. Badger mine, Susanville district, south of Sumpter, has men developing the leads on the group being explored.

C. Whitaker, manager Baisley-Elkhorn properties, north of Baker, says the recent strike in the shaft of the Baisley-Elkhorn is larger than at first supposed.

JOSEPHINE COUNTY.

Near Grant's Pass W. T. Cope has bonded the Golconda mine on Williams creek for $12,000.

The Hammersley mining property has been bonded by H. Phillips.

SOUTH DAKOTA.

LAWRENCE COUNTY.

Following is the annual report of the Supt. Homestake M. Co.:

J. B. Haggin, Esq., Pres. Homestake M. Co., San Francisco, Cal.—During the fiscal year just closed operations at the works were attended with little or no delay. Repairs, made necessary by the ordinary wear and tear to the plant at large, have been well kept up, while the company's shops for taking care of its machinery have been greatly enlarged and much improved.

By consolidation, there has been acquired the Highland mine, with its 130-stamp mill and very fine hoist; the Black Hills & Fort Pierre Railroad, used for hauling wood, coal, mining timbers, etc., to the works; and the water, water rights, flumes, ditches, etc., of the Black Hills Canal & Water Co., while, by purchase, a considerable area of adjoining ground has been added to the property of the company. The important, extensive and expensive betterments to the property, which have been under construction for some months past, will soon be finished, when the increase of the company's net revenue to follow will begin—I mean the cyanide plant with a capacity of 1200 tons daily to treat the tailings from the mills and a water system to increase the present deficient supply.

The Ellison hoist has been sunk from the 500 to the 600 level, the B. & M. shaft from the 800 to the 1000 level, the Golden Prospect shaft from the 500 to the 600 level and the Golden Star shaft from the 900 to the 1100 level. The ore development at the greater depths attained are very encouraging, and insure a long life to the mine.

For details of bullion produced, ore crushed, etc., see report accompanying this. T. J. Grier, Supt.

Bullion Account.

Proceeds bars 1130 to 1256 per bullion statement herewith.	$3,573,226 01
Proceeds concentrates........	75,056 23
Proceeds siliceous ore........	10,342 23
Exchange gold..............	174 15
Total......................	$3,658,798 62

Expenditures.

Dividends....................	$1,175,000 00
Labor and salaries...........	1,299,296 11
Coal and coke................	224,617 53
Wood.........................	130,412 00
Water........................	280,844 00

The company had five mills in operation last year. The work done by each mill and the expenses charged to it are shown as follows:

Mill.	Mill costs.	Tons milled.	Per ton.
Homestake.......	$199,118	266,740	$0.75
Golden Star.......	205,266	265,565	0.77
Deadwood Terra..	154,490	171,695	0.90
Highland..........	26,180	31,625	0.83
Amicus............	128,582	155,960	0.82
Totals.........	$713,636	891,585	$0.80

UTAH.

JUAB COUNTY.

The Centennial-Eureka is to have a smelter.

SUMMIT COUNTY.

Record: During August the Silver King mill turned out concentrates to the amount of 1,456,180 pounds.

TOOELE COUNTY.

The Con. Mercur G. M. Co. during August earned $186,446.46, expenses $86,785.24, net profits $96,661.24—about 10 cents per share upon the capital stock of the company. The cost of mining 30,485 tons during the month was $1.46; cost of milling, $1.36; total, $2.82 per ton for prospecting new ground, extracting and milling the ore.

WASHINGTON.

FERRY COUNTY.

The Mountain Lion Co. has given a 90-day bond on the property to A. E. Palmer of Spokane.

STEVENS COUNTY.

At Flat Creek mining camp, Colville Indian Reserve, the Examiner M. Co. has a new steam hoist. F. A. Russell, manager, Ryan P. O.

The law of 1892 allowed any one to go upon the Colville reservation and prospect for minerals. Consequently a man can go into the land office and swear that he has been over each and every legal subdivision of a quarter section and he can make application for a homestead. If he does this within one minute after 12 o'clock noon on October 10, or any time thereafter, the register will take the application. It is not necessary that the settler should go over the land after the hour of opening. But the President's proclamation warning "sooners" against making settlement prior to the hour of opening will be observed, and in cases of contest the difference between a filing upon land and a settlement upon the same will be gone into, the first man showing actual settlement established after the opening hour winning out in the contest.

WYOMING.

CARBON COUNTY.

At Battle Lake the Ferris Haggerty is putting in a new hoisting plant, a No. 40 hoister and an additional 80 H. P. boiler, together with three No. 3½ Leyner drills. They expect to keep sixty ore wagons on the road to Wolcott, hauling high-grade ore. The vein maintains its average width of 21 feet, running 40% copper. There was a strike among the shaft men last week and fifty men were discharged.

FOREIGN.

BRITISH COLUMBIA.

Rossland reports that the Molly Gibson mine, Supt. Carmichael, is employing twenty men. The tramway is to be completed by October 15th, and the property will then commence regular shipments. The management figures on shipping 500 tons per month, and will have seventy-five men at work. A mill site has been cleared at the mine, and application made for a grant. The company will build a mill next spring.

According to the report of Supt. R. R. Hedley, the cost per ton of ore of smelting to matte for the year ending September 30, 1899, Hall Mines smelter, was reduced from $3.66 in the previous year to $2.96, as follows: Flux, $0.196; fuel, $1.445; labor, $1.32. The matte averaged 45% copper, 290 ozs. silver, 0.77 oz. gold per ton. The silver loss amounted to 42,838 ozs., the total amount charged being 532,837 ozs. The ore averaged 2.49% copper; the yield was 2.34%, 90,000 pounds of copper being lost in the slags. One of the reverberatory furnaces was lengthened and repaired. It was found that the brick bottom was extremely thin, in places but 2.5 inches of the original 9 inches remaining. After twenty days' work smelting base metallics, with poor results, it was deemed advisable to tear out this bottom, finding therein, after careful sampling, about twenty-five tons of copper, 20,000 ozs. silver and 400 ozs. of gold.

Manager E. N. Fell of the Athabasca mine reports for August a run of 30 days, 14 hours; tons crushed, 430; bullion recovered, $12,525; concentrates, $4875; total, $17,400. Value of bullion recovered per ton of ore crushed, $29.13; value of concentrates recovered per ton of ore crushed, $11.33; total values recovered per ton of ore crushed, $40.46.

The Kaslo & Slocan railway brought 1000 tons of ore to Kaslo during August: 547 tons from the Whitewater, 210 tons from the Payne, 104 tons from the Rambler-Cariboo, and 42 tons from the American Boy.

Lardeau reports that the recent shipment of twenty tons of Triune ore netted the lessees $5376.84, about $268.84 per ton; value per ton $249.26 silver, $11.88 gold, $29.49 lead; aggregate gross value $290.63; freight and treatment from mine to smelter, $47 per ton; cost $12 per ton to mine it; deducting amount and freight from gross returns per ton leave a profit of $231.70 per ton.

The concentrator at the Ivanhoe mine, near Sandon, will commence operations Sept. 30th; capacity 150 tons per day. The Minnesota Silver Co. owns the property.

J. Cobledick, manager Cobledick gold dredge on the Fraser, near Lytton, reports that the dredge is in operation every hour of the twenty-four, the men working three shifts; each twenty-four hours 1500 cubic yards of gravel are taken from the bottom of the stream and passed over the treating tables.

The management of the Tamarac mine, near Ymir, will next summer erect a mill and construct a tramway 5800 feet long.

At Kaslo the Ruth No. 2 is to start work again.

Montreal asserts that by April, 1901, the Knob Hill, Old Ironsides, Gray Eagle and the Granby Con. will be consolidated into one company, with a capital of $20,000,000. A refinery is to be built at Grand Forks and the smelter capacity increased.

Cranbrook reports August ore shipments from the North Star and Sullivan amounted to 5,320,000 pounds (2660 tons, 120 carloads). Adding 1900 tons of high-grade concentrates from the St. Eugene, at Moyies, gives 4650 tons silver-lead ore from the three mines within 20 miles of Cranbrook.

Five miles from Nelson the Hall M. & S. Co. will install at the Silver King extensive machinery. The machinery is to be used for a steam boiler, 85 H. P., double-drum hoisting engine, large pumps and complete hoisting outfit. Seventy-five men are at work on the mine, cleaning up the property. The company will repair and operate the aerial tramway from the mine to the smelter.

At Camp McKinney the Minnehaha G. M. Co. of Toronto has been absorbed by the Sailor Con. M. & M. Co. Work will be resumed on the Sailor. The capital stock is to be increased from $1,250,000 to $2,000,000; the shareholders in the Minnehaha will receive one share in the Sailor for two held in the Minnehaha, which is capitalized at $1,000,000. W. C. Fox of Toronto is expected to arrange for the resumption of work.

At Princeton the Princess May has been bonded for $35,000 to G. R. Lock, in the interests of English capitalists. On a crosscut of 65 feet an average assay of 5% copper is obtained.

At Grand Forks, talking of operations of Boundary mines, S. H. C. Miner, Pres. Granby S. Co., says: "We have kept clear of the markets, not attempting to protect our shares. We have 10,000,000 tons of ore in sight that can be treated. I informed our smelter Supt., Mr. Hodges, a year ago, that we must mine, ship and treat $5 ore at a profit. Reasonable handling charges when fully equipped, little economies here and there and other factors will accomplish this. We expect to install an 80-drill plant in the near future, and will be in position within fifteen months to treat 2000 tons of ore per day at Grand Forks. I expect these figures will be doubled later on and to see us operating a duplicate 2000-ton smelter in Grand Forks. The Michigan mines, operating their own refineries, turn out finished copper at a cost of 6 cents per pound. We have not yet worked out a portion of the treatment problem. We must erect our own refinery. Copper matte, after treatment in New York, nets about 10½ cents per pound here. We purpose to have this New York rakeoff, and the only way it can be done is by erecting our own refinery and refining our own matte."

MEXICO.

At Torreon the Valardena M. & S. Co. operate five shafts on carbonate deposits, worked by a system of pillars, taking out good ore and leaving poor ore as pillars. The output is about 250 tons per day, which the smelter converts into base bullion, shipped and refined in Omaha. They have also a matte smelter, in which they are smelting copper ores from a copper deposit in San Lorenzo, and from which they are turning out a matte containing 50% copper, smelting approximately ten tons to one. Lime for the smelter is secured close at hand, iron from Durango, silica from San Lorenzo. C. Wilhelmi is general manager, M. Dahlgren mining superintendent, Wm. Daly smelter superintendent. Wages for miners range from 75 cents to $1.50, Mexican, per eight-hour day; laborers 75 cents, Mexican.

The output of silver and lead in the Parral district was $4,000,000 value last year. There are fifteen mines in operation. The output of ore in the Parral district is 20,000 tons a month. Labor is cheap. Mexican miners who are good workmen are paid $1 a day of their own money. "Boss" Shepherd is still operating in Chihuahua, and is driving a 3-mile tunnel.

RUSSIA.

Vice Consul General Hanauer says: There are but four works in the Ural region of Russia where gold is obtained by means of chemical process. The former gold mines, having given out, are not worked any more. While the world's annual gold production has increased 16.3% during the last decade, that of Russia has remained as before, amounting to about 2400 poods (86,668 pounds) yearly. But platinum, of which the Ural mountains furnish 95% of all the world's supply, has increased both in quantity and value. The amount of this metal produced in the Ural region in 1899 was 13,242 pounds, as against but 6365 pounds in 1890.

THE KLONDIKE.

According to the latest information from the Gold Commissioner at Dawson, royalty will be paid this season on $16,000,000. Reports from Stewart river, 200 miles distant, has caused another exodus to that river.

Wages on the hillside claims at Dawson have been reduced to $4 per day and board for underground miners and $3.50 per day and board for top men. A few individual owners are still paying the old scale of $5 per day and board, or 80 cents per hour. About 1200 men are affected. They claim the wages paid are not in proportion to other expenses and talk of organizing a miners' union to enforce the old rate.

Personal.

C. H. Cutting is Supt. Troy, Arizona, Copper Co.

W. S. Keyes has returned from Rossland, B. C., to San Francisco.

J. J. Morris is the new Supt. of the Mt. Hood-Sunrise Co., Rawhide, Cal.

Hennen Jennings is in Colorado in the interest of his London associates.

Luther Wagoner has returned to San Francisco from Mariposa county, Cal.

W. McG. Logan is Supt. Old Home Con. mine, Blue Tent, Nevada county, Cal.

L. S. McClure of San Diego, Cal., is visiting his mining property at Neihart, Mont.

F. L. Van Orden succeeds F. G. Collins as Supt. Wyandotte M. Co., Houghton, Mich.

C. J. Schuster, Supt. Grizzly Ridge, Nevada county, Cal., mine, is in San Francisco.

J. W. Young, vice-president firm of Fraser & Chalmers, is visiting Grand Forks, B. C.

C. B. Van Nostrand of New York is visiting his mining property in Custer county, Idaho.

G. McM. Ross, Supt. Ophir and Mexican mines, has returned to the Comstock from San Francisco.

Bernard MacDonald, manager Le Roi mine, Rossland, B. C., has returned from Nome, Alaska.

J. H. McKenzie, Supt. Mariposa grant, has returned from the Alameda mine, Tuolumne county, Cal.

Jno. A. Chestnut will be Supt. of the work of the Hite Cove M. Co., Hite Cove, Mariposa county, Cal.

J. B. Parks is now superintending the operations of the Pacific Dredging Co. on the American river, Cal.

G. B. McAuley, managing director Cariboo Co., has returned from England to Camp McKinney, B. C.

W. W. Byrne of the Giant Powder Co., San Francisco, is locating a third magazine at Grand Forks, B. C.

G. W. Kimble of Placerville, Cal., is in Grant's Pass, Or., investigating mining property for San Francisco men.

Thos. J. Hurley, vice-president New York Exploration Co., is visiting the company's property at Guanajuato, Mexico.

J. F. Parks, Supt. the Kennedy and South Eureka mines, has returned to Amador county, Cal., from San Francisco.

Jno. Quinn has gone from Park City, Utah, to Sonora, Mexico, to the Montezuma C. M. Co., to superintend driving a tunnel 6000 feet.

F. Zeitler, vice-president California State Miners' Association, has returned to Nevada county, Cal., from San Francisco.

The venerable J. LeConte, professor of geology in the University of California, has gone to Europe on a year's leave of absence.

Irving E. Bush, a Los Angeles, Cal., mining engineer, has returned from Cape Nome, Alaska, where he had been operating a beach mining plant.

W. C. Ralston, president California Miners' Association, has been nominated for the Assembly by the Calaveras county, Cal., Republican Convention.

V. V. Clark, late Supt. cyanide department Cochiti G. M. Co., Albemarle, New Mexico, goes to Alamos, Sonora, Mexico, as general manager for the Higueras M. & M. Co.

Books Received.

Missouri Geological Survey, No. 13, 1900, quarto, 250 pages. This work may attract attention among geologists because of the extraordinary nature of its contents. Its author, the State Geologist of Missouri, seems to have thought that his ideas about things mundane and spiritual were important enough to be published at public expense, and there accordingly appears a jumble of stuff that might read all right at the close of the eighteenth century, but sounds somewhat archaic in these sunset months of the nineteenth century. One paragraph—the third on page 23—is quoted: "In the glorious interior of our blessed Motor, the Sun, dwells the Vicegerent of the true God. That his celestial realm is the logical rendezvous for the spritual product of the Earth, is shown by the fact that the first essential element of organic life is paid out by the Sun. And inasmuch as that productive energy cannot persist without a facility of renewal, the ultimate synthetic product of Earth, the Spiritual energy evolved by Afterthought, has no other logical destination than the serene and equable interior of our Sun." That kind of thing may be what Missouri wants, but it sounds funny in a report signed by a State Geologist and issued by the State.

Commercial Paragraphs.

THE E. P. Allis Co. of Milwaukee, Wis., has an order, through its Denver officer for a 100-ton copper smelting plant for the Boston & Wyoming Smelting Co., to be erected at Grand Encampment, Wyo.

THE Oregon Railway & Navigation Co. has published an excellent sketch of the gold fields of eastern Oregon, by P. Donan, the matter, in the form of a folder, being accompanied by an attractive map of the Baker City and Sumpter section.

J. GEO. LEYNER, Denver, Colo., recently shipped a compound air compressor and several Leyner drills to Lake City, Colo., for the Scantic G. M. & M. Co., who have a tunnel proposition. Mr. Leyner also reports the sale of a compressor and four air drills to the Blaine Mining & Exploration Co., at Ridgeway, Colo., on whose property a tunnel is to be driven.

THE M. C. Bullock Manufacturing Co., Chicago, Ill., has shipped a large mine ventilator to West Virginia, a hoisting plant to the Black Hills, another to Spring Valley, a Willans engine to the Massachusetts State farm, a large diamond drill equipment to Washington, and has orders for a hoist for the Mesabe Range, a large diamond drill and outfit for the Balkan States, a mine ventilator for West Virginia and a diamond drill for Missouri.

Recently Declared Mining Dividends.

Isabella G. M. Co., Colorado, 1 cent per share, $33,750..........Sept. 22
Helena & Livingston S. & R. Co., Montana, 15 cents per share, $90,000..........Sept. 25
Morning Star M. Co., California, $3 per share..........Sept. 20
La Fortuna M. Co., Arizona, 5 cents per share..........Sept. 22
Con. Nighthawk and Nightingale Co., Colorado, $180,000..........Sept. 17
Yukon Crude Oil Co., Cal., 2 cents per share..........Sept. 20
Home Oil Co., Cal., 10 cents per share..........Sept. 20
Buffalo Hump M. Co., Idaho, 1%..Oct. 1
Gwin M. Co., California, $5000....Sept. 19

Obituary.

A. M. ESLER, a prominent pioneer miner, who did much to develop the Cœur d'Alenes, died suddenly on the 10th inst. at Altyn, 50 miles northwest of Blackfoot, Mont. He built the first smelter in Montana at Argenta in 1866, and was intimately connected with the mineral development of that State and Idaho.

List of U. S. Patents for Pacific Coast Inventors.

REPORTED BY DEWEY, STRONG & CO.,
PIONEER PATENT SOLICITORS
FOR PACIFIC COAST.

FOR THE WEEK ENDING SEPT. 11, 1900.

657,689.—HOISTING APPARATUS—H. C. Behr, S. F.
657,586.—CIPHER CODE—E. F. Cassell, Seattle, Wash.
657,587.—CIPHER CODE—E. F. Cassell, Seattle, Wash.
657,590.—ROTARY ENGINE—E. E. Couture, Gualala, Cal.
657,692.—RAISIN CLEANER—H. Eastwood, Fresno, Cal.
657,697.—HAND GRIP—Getz & Westall, S. F.
657,599.—COPY HOLDER—G. F. Heiss, Everett, Wash.
657,700.—HARVESTER—B. Holt, Stockton, Cal.
657,738—CARBURETOR—H. L. Jessen, Watsonville, Cal.
657,777.—PIPE PERFORATOR—G. W. Kellogg, Bakersfield, Cal.
657,605.—COATED METAL PIPE—W. Lacy, Los Angeles, Cal.
657,827.—METAL LATH—W. McCall, S.F.
657,706.—WATER-CLOSED TANK—A. W. McGahan, Los Gatos, Cal.
657,885.—LOCK AND LATCH—M. C. Patrick, Seattle, Wash.
657,802.—CURB MOLD—C. A. Watson, Riverside, Cal.
657,719.—GATE—C. H. Williams, S. F.
657,845.—PNEUMATIC TIRE—J. M. Wolbrecht, Los Angeles, Cal.
33,183.—DESIGN—F. E. Libenow, Spokane, Wash.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

BALING PRESS.—No. 657,287. Sept. 4, 1900. C. J. Johnson, Paso Robles, Cal. This invention relates to that class of baling presses known as "horizontal continuous presses." The object is to provide a means by which the opening and closing of the doors, and the various operations of the machine are performed mechanically, and hand labor is reduced. It consists of a frame having the press-box mounted at one end, a revoluble cam-carrying disk at the opposite end, a follower and a rebounding plunger beam having a slotted extension from one end adapted to guide said beam in its movements, said beam actuated by the cams so that the follower is reciprocated within the box. There is an extension through which the compressed material is forced to form the bale, this extension having a movable top plate and screws by which the outer end of the plate is adjusted to regulate the size of the discharge opening and determine the amount of compression of the baled material. The material is charged into the press through a top and a side door so hinged as to open outwardly from each other and by means of oscillating shafts, rocker arms and a rotable disk, with means engaging these arms, the doors are automatically opened and closed, being retained in their closed position by spring-pressed latch bolts.

LUBRICATOR.—No. 657,219. Sept. 4, 1900. Byron Jackson, San Francisco, Cal. This invention relates to an apparatus by which bearings of any description are constantly and automatically lubricated. A flange or collar is secured to a revoluble shaft and formed with a cup having a rounded interior and one end opened, a second cup surrounding the shaft has a bearing formed rigid therewith and entering the opening end of the first named cup, but without contacting therewith. This bearing has a passage through it, and an annular loose cover for the second cup through which the shaft passes. A bent tube has its open end lying close to the inner wall of the first-named cup so that the revolution causes the oil to be taken up by this tube, carried from one cup into the other, whence it is allowed to pass into the bearing around the shaft.

AUTOMATIC ADJUSTMENT FOR HARVESTER REELS.—No. 657,229. Sept. 4, 1900. S. M. Warder, Winters, Cal. This invention relates to a means for adjusting the reels of harvesters, headers and the like apparatus so that the reel will always be in the proper position to sweep the grain toward the sickle whether the straw be short or long. It consists of means carried by the header portion of the harvesting apparatus by which the sickle bar is raised or depressed, a reel adapted to sweep the grain toward the sickle bar, reel timbers to the front ends of which the reel shaft is journaled, links supporting said reel timbers at the rear and at points intermediate between the reel and front end of the bars in such a manner that the bars carrying the reel frame are tilted about their pivot points so as to move the reel frame upward and forward, or downward and backward in unison with the movements of the header frame.

CARBURETERS FOR EXPLOSIVE ENGINES.—No. 657,738. Sept. 11, 1900. Henry L. Jessen, Watsonville, Cal. This invention relates to improvements in explosive engines and generators by which the gas or vapor used in such engines is produced, and it is intended particularly to provide for a constant and complete vaporization of a hydrocarbon liquid, a mixture of air with the vapor thus produced to make it explosive, and a means for regulating the flow by which it is supplied only when the engine is in operation. The invention comprises in an explosive engine, a horizontally journaled revoluble generator, with means for advancing the liquid therethrough, and means for heating the same, an open pipe connection between the discharge end of the generator and the inlet valve of the engine whereby a vacuum is produced in the generator by the movement of the engine piston, a pipe and trap connection between the opposite end of the cylinder and the supply tank whereby the hydrocarbon liquid is drawn into the generator when the engine piston produces a vacuum and the supply is cut off when the inlet valve of the engine has not opened or the engine is at rest.

RAISIN CLEANER AND CAP STEMMER.—No. 657,692. Sept. 11, 1900. Harry Eastwood, Fresno, Cal. This invention relates to an apparatus designed for cleaning raisins and for performing work known as "cap-stemming." It comprises revoluble drums having partially inclosing segmental fenders, flexible spring-pressed aprons capable of elastic yield at any point and between which and the drums fruit is caused to pass, means for delivering the fruit into said space near the upper part of the drum, a tailboard or screen over which the fruit is passed from the drums, and an air-forcing blast mechanism by which the refuse is separated from the fruit.

METAL LATH ATTACHMENT AND SUPPORT.—No. 657,827. Sept. 11, 1900. Wm. McCall, San Francisco, Cal. This invention relates to a means for securing and supporting metal lathing, such as is employed in the construction of fireproof and other buildings. It comprises a supporting base formed of plates or strips of sheet metal having slits cut upon the sides to form tongues with one end remaining attached to the strip. These strips extend over the lower flanges of the I-beams, and have one or both edges turned at right angles with the vertical depth of the strips, and transverse connections having ends passed through the strips and locked thereto by twisting or bending.

TRAVELING HARVESTER.—No. 657,700, Sept. 11, 1900. Benjamin Holt, Stockton, Cal. The object of this invention is to enable a traveling harvester and thresher to be used on side hills and maintain the frame of the thresher and cleaner in an approximately horizontal position by raising the wheels on one side and lowering the wheels on the other side with relation to the thresher frame, so that while the wheels travel in different horizontal planes upon the inclined surface of the ground, the threshing machine frame will be maintained in the desired position. In conjunction with these movable wheels there are mechanisms by which the up and down movement of the wheels effected simultaneously. It comprises a main frame with supplemental frames in which the bearing wheels are journaled upon opposite sides of the machine. A rack bar is guided and slidable transversely with relation to the main frame, with a mechanism by which the rack bar is movable in either direction. Chains connected with the bar extend outwardly in opposite directions and there are guide pulleys around which the chains pass, standards carried by the wheel frames to which the outer ends of the chains are connected, anti-frictional rollers or slides carried by the movable wheel frames, and fixed guides against which they are movable.

Latest Market Reports.

SAN FRANCISCO, Sept. 20, 1900.

SILVER—Per oz., Troy: London, 28¾d (standard ounce, 925 fine); New York, bar silver, 62⅝c (1000 fine); San Francisco, 62¼c; Mexican dollars, 50½c.

COPPER.—New York: Lake, 1 to 3 casks, 17.00 cash; carload lots, 16.87½; Electrolytic, 1 to 3 casks, 16.87½; carload lots, 1675.; Casting, 1 to 3 casks, 16.87½; carload lots, 16.70. San Francisco: 18. Mill copper plates, 20c; bars, 22@23c.

August exports of copper from this country were 31,012,800 pounds, compared with 24,460,800 pounds in August, 1899; total exports of copper from the United States from Jan. 1 to Sept. 1, this year, amounted to 259,297,920 pounds, against 166,969,600 pounds for the corresponding months of last year.

LEAD.—New York, $4.37½; Salt Lake City, $4.25; St. Louis, $4.32½; San Francisco $5.00, carload lots; 5¼c 1000 to 4000 lbs.; pipe 6¾, sheet 7½, bar 6c; pig, $4.70 @5.10. London, soft Spanish, £17 15s; English, £18.

SPELTER.—New York, $4.15; St. Louis, $4.00; San Francisco, ton lots, 5½c; 100-lb lots, 5¾c.

ANTIMONY.—New York, Cookson's, 10½c; Hallett's, 9½c; San Francisco, 1000-lb lots, 12c; 300 to 500 lbs., 13@14c; 100-lb lots, 15@18c.

IRON.—Pittsburg, Bessemer pig, $15; gray forge, $14.00; San Francisco, bar, per lb., 2.50c in small quantities.

Comparison of latest prices shows foundry pig No. 2, Philadelphia, declined from $15.75 to $15.50; foundry pig No. 2, local Chicago, declined from $15.50 to $15; Lake Superior charcoal, Chicago, declined from $19 to $18.50; steel billets, Pittsburg, declined from $17.50 to $17; steel billets, Philadelphia, declined from $20 to $19.50; steel rails, heavy Eastern mill, declined from $35 to $30. Old iron rails, Philadelphia, advanced from $14 to $14.50; refined iron bars, Philadelphia, declined from $1.30 to $1.25.

STEEL.—Bessemer billets, Pittsburg, $17.50; sheet bars, $22.50; San Francisco, bar, 7c to 12c per lb.

TIN.—New York, pig, $31.75; San Francisco, ton lots, 32c; 1000 lbs., 32½c; 500 lbs., 33c; less, 34c; bar tin, ℔ lb, 37½c.

QUICKSILVER.—New York, $51.00; large lots: London, £9 2s 6d; San Francisco, local, $49.00 ℔ flask of 76½ lbs.; Export, $46.00.

NICKEL.—New York, 50@60c ℔ lb.

MAGNESIUM.—New York, $3.00 ℔ lb.; San Francisco, $4.00.

ZINC.—San Francisco, 5½c; slab, 6c; bar, 7¾c.

SOLDER.—Half-and-half, 100-lb. lots, 20½c; San Francisco, Plumbers', 100-lb. lots, 17¼c.

BABBITT METAL.—San Francisco, No. 1, 10c.

ASSAY LITHARGE.—San Francisco, 10c ℔ lb, small lots.

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 30c to 35c.

PHOSPHORUS.—F. o. b. New York or Philadelphia, 45@50c ℔ lb.

TUNGSTEN.—New York, ℔ lb., 95c; San Francisco, $1.15.

FERRO-TUNGSTEN.—New York, 37%, 35c; San Francisco, 65c (60%).

FERRO-MANGANESE.—Pittsburg, 80%, domestic, $85, large lots.

PLATINUM.—San Francisco, crude, $17 ℔ oz.; New York, $18.25; manufactured, $19.50@22.00.

POWDER.—F. o. b. San Francisco: No. 1. 70% nitro-glycerine, per lb., in carload lots, 15¼c; less than one ton, 17¼c. No. 1*, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1** 50%, carload lots, 11¾c; less than one ton, 13¾c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9½c; less than one ton, 11½c. No. 2** 30% carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9, in lots not less than 1000.

FUSE.—Triple tape, $3.60 per 1000 feet; double tape, $3.00; single tape, $2.65; Hemp, $2.10; Cement No. 2, $3.00; Cement No. 1, $2.65, in lots of 3000 feet and up.

CANDLES.—Granite 6s, 16 oz., 40s., 12½c ℔ set; 14 oz., 40s., 11½c.

CHEMICALS.—Cyanide of potassium, 98%-99%, jobbing, 32½@34½c ℔ lb.; carloads, 31@32c; in 10-lb. tins, 40c; sulphuric acid, 66% B, 2c ℔ lb.; soda ash, $1.60 ℔ 100 lbs. 58%; hyposulphite of soda, 2¾@3c ℔ lb.; blue vitriol, 5½@6c ℔ lb.; borax, concentrated, 7@8c ℔ lb.; chlorate of potash, 12@13c; roll sulphur, 6c; alum, $1.90@2.00; flour sulphur, French, 2¼@2½c; California refined, 1¾@2c; nitric acid, in carboys, 8c ℔ lb.; caustic soda, in drums, 3@4c ℔ lb.; Cal. s. soda, bbls., $1.00; sks, 95c ℔ 100 lbs.; chloride of lime, spot, $2.50@2.60; nitrate of potash, in kegs, 8c; caustic potash, 10c in 40-lb. tins.

OILS.—Linseed, pure, boiled, bbl., 75c; cs., 80c; raw, bbl., 73c; cs., 78c. Deodorized Stove Gasoline, bulk, 15c; do., cs., 21c; 86° Gasoline, bulk, 21c; do., cs., 27c; 63° Naphtha or Benzine, deodorized, in bulk, per gal., 14c; do., in cs., 20c; Lard Oil, Extra Winter Strained, bbl., 70c; cs., 75c; No. 1 bbl., 50c; cs., 55c; Neatsfoot Oil, coopers' bbls., 60c; extra bbls., 65c; cs., 60c; No. 1 bbl., 52½c; cs., 57½c.

COAL.—San Francisco, coast, yard prices: Wellington, $9; Seattle, $7.00; Coos Bay, $5.50; Southfield, $9.00. Cargo lots, Eastern and foreign: Wallsend, $8.00; Brymbo, $7.50; Pennsylvania, hd., $14.00; Scotch, $8; Cumberland, $12; Cannel, $9.50; Welsh Anthracite, $12.00; Rock Springs, $8.50; Colorado Anthracite, $14.50. Coke, $16 per ton in bulk; $18 in sacks.

San Francisco Stock Board Sales.

SAN FRANCISCO, Sept. 20, 1900.

9:30 A. M. SESSION.

300 Chollar	20c	100 Mexican	27c
50 C. C. & V.	$1 15	500 Ophir	45c
100 G. & C.	34c	200 Utah	05c
200	33c		

2:30 P. M. SESSION.

100 C. C. & V.	$1 15	200 Overman	11c
300 Chollar	21c	200 Union	17c
300 Crown P't.	13c	100 G. & C.	34c

Good Wire Cloth.

Are you perfectly satisfied with the wire cloth you are now using? Does it wear as long as you think it should and do the work to your entire satisfaction? There are other makes of wire cloth upon the market, but this is the only one that can always be depended upon.

The "Perfect" double-crimped, steel mining cloth, manufactured by the Ludlow-Saylor Wire Co., Fourth and Elm Sts., St. Louis, Mo., will do your work to your entire satisfaction. The steel wire cloth manufactured by this company has withstood the severest tests for years, and other makes are constantly being discarded and the "Perfect" adopted. This company also manufacture a very convenient and reliable steel candlestick, which miners say can not be equalled. To see it is to appreciate its worth. *

WANTED.

A Rich Placer proposition, adapted to working by Railroad Steam Shovel, or Dry Land Excavator. Description, with price and terms, to receive attention must be accompanied by reliable reports and references.

Address: **EDWARD N. BREITUNG,**
MARQUETTE, MICH.

Quicksilver

—FOR SALE BY—
The Eureka Company,
OF SAN FRANCISCO.
ROOM 1, - - 320 SANSOME STREET,
SAN FRANCISCO.

SITUATIONS WANTED.

WANTED.—SITUATION BY A COMPETENT and experienced millman on concentrators or battery frame. Highest references. Address L. W , 509 Kearny street, room 2, first floor, San Francisco, Cal.

MINING ENGINEER (technical training), twenty years' experience as surveyor, assayer, superintendent and manager of mines and mills; business qualifications; linguist; at present general manager mining and milling proposition in Mexico; desires to make a change on account of health; best references. Address S. O., Mining and Scientific Press.

WANTED.—A SITUATION AS MANAGER OF A gold quartz mine in Colorado or California; understand assaying and chlorination; salary, one-half in mining stock and one-half in cash, $200 per month. Reference as to ability: L. X. Smith, manager of Gillett Gold Extraction Co. Address L.W. THIELE, Altman, Colorado.

WANTED SITUATION

AS MILLMAN, FOREMAN, OR ASSISTANT.

Have had eight years' experience with one of the largest mining companies in Idaho, in pan amalgamation, cyaniding and refining of bullion. Ability to do assaying. Refer to De Lamar Mining Co., De Lamar, Idaho. Address W. H., this office.

WANTED.

INFORMATION WANTED

regarding whereabouts of John R. Williams, about 70 years old. Last heard of as Supt. of a mine in Copper's Hill, Vermont, in 1866. Has an adopted son about 32 years old. Supposed to be placer mining in the West, possibly California. $25.00 reward at Deseret News Office, Salt Lake City, Utah.

WANTED.—A COMPETENT AND RELIABLE man to take charge of a gold quartz mine and stamp mill in Sinaloa, Mexico. Must understand assaying and have business qualifications. References as to ability and honesty required. Address C. L. Merry, Pres. H G. M. Co., Kansas City, Mo.

WANTED.

Experienced Promoter and Stock Operators

to handle the sale of stock for an oil company. State previous experience.

For particulars, address
C. J. TALLON,
308 Market Street,........San Francisco, Cal.

Experienced Coal Miners

can secure **steady employment** either on **contract** or by **day's work** at the **TESLA COAL MINES, Tesla, Alameda County, California.** Good wages guaranteed, also good board. Good climate, and also good accommodations and houses for families.

For further particulars, please apply to the Superintendent at the Mines, or to the Company at 328 Montgomery St., San Francisco, Cal.

REFRACTORY ORES WANTED.

1000 TONS or more which will assay $75.00 Gold per ton and over, delivered free of charge at San Francisco, Cal. Correspondence solicited.

C. J. TALLON,
308 MARKET STREET, SAN FRANCISCO, CAL.

DELINQUENT SALE NOTICE.

EUREKA CONSOLIDATED DRIFT MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Placer County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 26) levied on the 9th day of August, 1900, the several amounts set opposite the names of the respective shareholders, as follows:

Name.	No. Cert.	No. Shares.	Amt.
Geo. W. Carpenter................	143	200	$2 00
Geo. W. Carpenter................	218	33	33
Guy C. Earl..................	73	800	8 00
Guy C. Earl........................	161	320	3 20

And in accordance with law, and an order from the Board of Directors, made on the 8th day of September, 1900, so many shares of each parcel of such stock as may be necessary, will be sold at public auction at the office of the company, room 31, No. 214 Pine street, San Francisco, California, on TUESDAY, the 9th day of October, 1900, at the hour of 1 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of the sale.

GEO. W DIXON, Secretary.

Office—Room 31, No. 214 Pine street, San Francisco, California.

WE BUY very rich Ores, Dental Scraps, Tellurium Ores, Mill Wastes, Jewelers' Sweeps, Gold Retorts, Old Iron Retorts, Base Amalgam, Quicksilver, Amalgamated Plates, Gold and Silver, Old Slags.

A. M. DONALDSON & CO.,
ASSAYERS AND WASTE PRODUCT SMELTERS,
1661 Larimer St., Denver, Colo.
Donaldson's Assayers' Slag Hammer { 1 lb......$1.10
1 lb. 3 oz. $1.25

Quicksilver

For Sale in Lots to Suit.

REDINGTON & COMPANY, Wholesale Druggists, 23-25-27 Second Street, San Francisco.

FOR SALE.

A COLLECTION OF OVER 400 MINERAL specimens for sale. A bargain. Some beautiful agates, crystals, petrefactions, silver, copper and cinnabar ores, etc., etc., with or without cabinet. E. E. PERLEY, 622 Turk St., San Francisco.

FOR SALE.—A MAMMOTH GOLD MINE OF free milling ore. Never before offered for sale. A rare opportunity for large capitalists or a strong syndicate. Apply to E. J. FRASER (sole agent for owners), 522 Parrott Building, S. F., Cal.

FOR SALE.

Lease and Bond, Eighteen Months, Easy Terms, Copper Property, New Mexico.

High grade ore with good gold values. Accessible. Plenty wood and water. Strong vein. Three shafts. Will pay from start. Adjoins large producing mine. **H. B. RUNKLE, El Paso, Texas**

FOR SALE OR LEASE.

San Bartola Group of Mines,

PACIFIC COAST, TEPIC, MEXICO.

Three big old mines forming group, with any amount of gold, low grade, in sight. Timber and water power close to the mines. Reports and maps sent on application. Address to LIC. ELIAS GALINDO, P. O. Box 26, Tepic, Mexico.

FOR SALE.

WROUGHT IRON PIPE.

150,000 Feet Second-Hand, Refitted Pipe. New Thread and Couplings.

THE S. H. SUPPLY CO.
WRITE FOR CATALOGUE OF MINING MACHINERY AND SUPPLIES.
22nd and Larimer Sts., DENVER, COLO.

FOR SALE.

Hoisting Outfit.

Webster, Camp & Lane 13½″x15″, double cylinder, double drum Hoist. Drums 66″ diameter, good for 800 feet. Two boilers 60″ diameter by 16′ long, with stack and fixtures complete.

One Cameron Sinking Pump, 4″ suction, 3″ discharge.

One Deane Feed Pump; two injectors, one for each boiler; pipe fittings and connections.

This plant is new, having been in service less than three months. Immediate shipment from Deadwood, S. D.

For price and particulars, address

WILLIS SHAW, Machinery,
Chicago, Ill.

CHAS. F. POTTER & CO., MINES AND STOCKS.

FISCAL AGENTS FOR THE
COPPER CROWN OF ARIZONA MINING CO.
425 First Ave. North,
MINNEAPOLIS, MINN.

References: Hennepin County Savings Bank, Bradstreet's Mercantile Agency, R. G. Dun & Co.

N. B.—Copper Crown of Arizona Mining Co. own a rich property near the Black Diamond, in the Dragoons, Cochise county, Arizona. We will be pleased to send "investors" full information as to ore and assays. A limited amount of $1 shares for sale at $50 per 1000, $500 per 10,000 shares.

THE CALIFORNIA DEBRIS COMMISSION, HAVING received applications to mine by the hydraulic process from W. W. Treat and John H. Thomas, in the Good Hope Mine, near Eclipse, Plumas Co., to deposit tailings in Onion Valley Creek; from the Bader Gold Mining Co., in the Bader Gold Mine, near Magalia, Butte Co., to deposit tailings in Little Butte Creek; from the Ralston Divide Gold Mining Co., in the Lynchburg Mine, near Virner, Placer Co., to deposit tailings in Long Canyon; and from G. H. Lewis et al., in the Snake Gulch Gravel Mine, near Vallicita, Calaveras Co., to deposit tailings in Snake Gulch gives notice that a meeting will be held at Room 59, Flood Building, San Francisco, Cal., Sept. 24, 1900, at 1:30 P. M.

MILL PLANS.

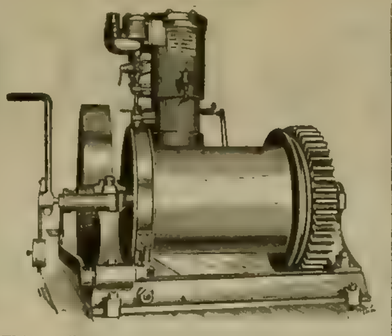
Cyanide, Concentration, Smelting, Sampling
F D. BAKER, Mech. Eng., DENVER

SPECIAL MEETING.

A Special Meeting of the Stockholders of the Electric Placer Mining Co. will be held at the office of the company Room 202 Hearst Bldg., San Francisco, Cal, on Saturday, Sept. 29 h. 1900, at 3 o'clock P. M.

A. R VINING, Secretary.

FRED C. MILES,
CISCO, PLACER CO., CAL.
COPPER AND GOLD PROSPECTS.
A GOING GOLD PROPERTY.



This cut illustrates our 4 H. P. to 8 H. P. **HOISTING PLANT.**

Larger sizes built to suit the demands of our customers.

It is strong and exceedingly simple and durable, being entirely under the control of the operator, by the use of a single hand lever for hoisting, while the lowering is governed by a foot lever and brake.

No better device has been designed for this purpose. For prices and further information address the builders.

Oriental Gas Engine Co., 227 Folsom St., S. F.

The State Ore Sampling Co.

DENVER, COLO.

We buy Gold, Silver, Lead, Copper, Bismuth, Uranium, Wolframite, Cobalt, Molybdenite and Antimony Ores. We have modern sampling mills, also test ore for the new processes of ore reduction.

Our long experience in the market enables us to obtain the highest prices for all marketable ores. Write for our "Reference Book." Send analysis of your ore for prices and information.

BAILY & MONNIG, Managers.

BENJAMIN T. LLOYD, STOCKS, BONDS AND MINES.

Have immediate customers for well-developed Gold and Copper Properties.
P. O. Box 608, **SALT LAKE CITY, UTAH.**

Cross Oil Filters

Have been selected for the complete equipment of the Elgin National Watch Co. of Elgin, Ill., one of the most important plants of this character in this country.

Our filters are their own best salesmen and we are satisfied to send them anywhere on approval, subject to our guarantee that they will save 50 per cent of oil bills.

Are you interested ·

THE BURT MFG. CO.,
Akron, Ohio, U. S. A.
Largest Mfrs. of Oil Filters in the World.

We also manufacture the
BURT EXHAUST HEAD.

12 H.P. $500
C.O. Bartlett & Co.
CLEVELAND,
OHIO.

WEST COAST OF MEXICO.

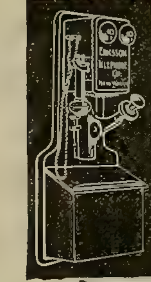
WÖHLER, BARTNING Suc's, Mazatlan (Sinaloa), Mex.

Bankers, Importers, Exporters and Commission Merchants.

Representatives and Agents of the principal Mining Companies in the State of Sinaloa and the dependencies of the Pacific coast in the States of Durango, Chihuahua, Sonora, Lower California and Jalisco.

ORE BUYERS AND EXPORTERS. - MINING SUPPLIES.

ERICSSON SWEDISH TELEPHONES



Seem to possess almost human intelligence. They respond to every requirement in a smooth, positive fashion that shows what a perfect telephone can do. Besides this they have unequalled strength and durability. Their reputation as *"STANDARD OF THE WORLD"* is built on merit. Is the best too good for you?

ERICSSON TELEPHONE CO. *296 BROADWAY NEW YORK.*

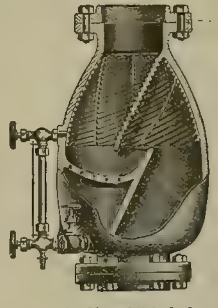
Fuel Economy is An Important Item,

but the waste in steam delivery is a still more serious matter. We not only make a saving for you in fuel, but insure you delivery of steam free from moisture.

The Austin Separator

does this because it's built on a practical and scientific basis. IT FULFILLS ITS MISSION.

Shipped to any point in the United States on 30 days' trial.



Vertical. Sizes 1½ to 12 in.

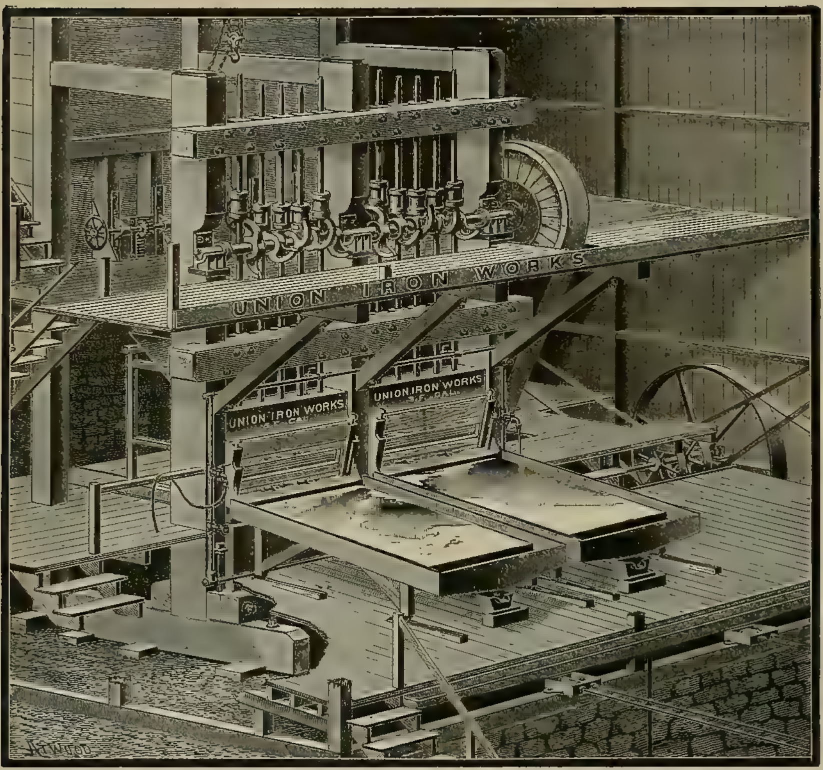
AUSTIN SEPARATOR CO.,
27 W. Woodbridge St.,
Detroit, Mich., U. S. A.

UNION IRON WORKS,

★ ★ 222 Market Street, San Francisco, Cal. ★ ★

BUILD THIS

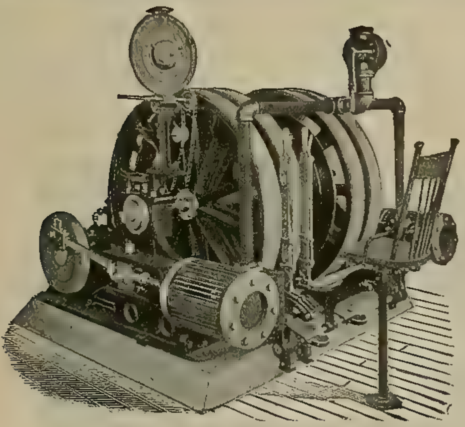
MODERN TEN-STAMP BATTERY.



Copyrighted.

The illustration shows the details of a modern 10-stamp battery of the back-knee type, driven by belt and tightener from a shaft located upon the battery frame sills below the mortars and plainly illustrates not only the battery and its various parts, but also shows the ore-bin gate, feeders, copper apron plates and water piping, all in their relative positions.

SEND FOR CATALOGUE No. 5.



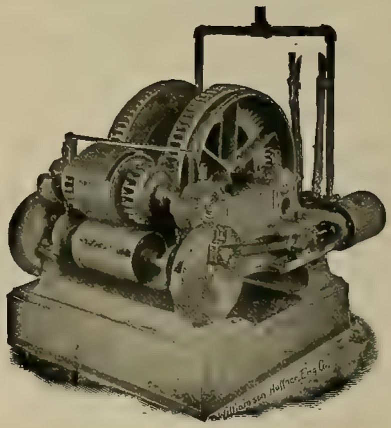
BOLTHOFF'S HOISTING ENGINES

ARE POPULAR

Wherever Used

AND

Used Everywhere.

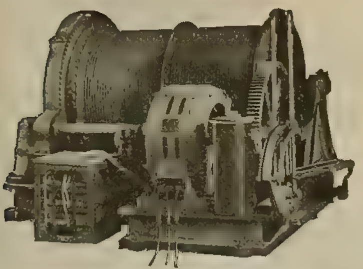


SEND FOR OUR SPECIAL HOISTING MACHINERY CATALOGUE.

The Hendrie & Bolthoff M'f'g & Supply Co.

No. 37. DENVER, - - - - - - COLORADO.

General Electric Company's



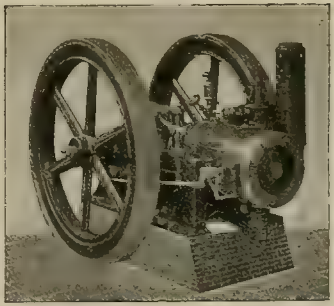
Single Drum Hoist Direct Connected to GE Induction Motor.

Electric Mine Hoists

can be readily shifted to any part of the mine without expense or delay, and can be controlled by an operator placed in the most advantageous position.

General Office: Schenectady, N. Y.

San Francisco Office: Claus Spreckels Bldg. Denver Office: Kittredge Building.

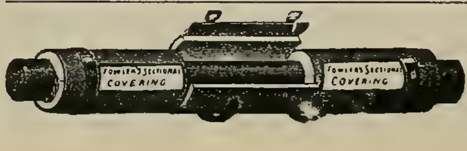


WE CAN SHOW YOU A

HERCULES Gasoline Engine

Running on less than ⅛-gallon of fuel per H. P. hour, with a speed regulation of 2½%.

JOHN WIGMORE & SONS CO.,
117-123 S. LOS ANGELES ST.,
LOS ANGELES, CAL.

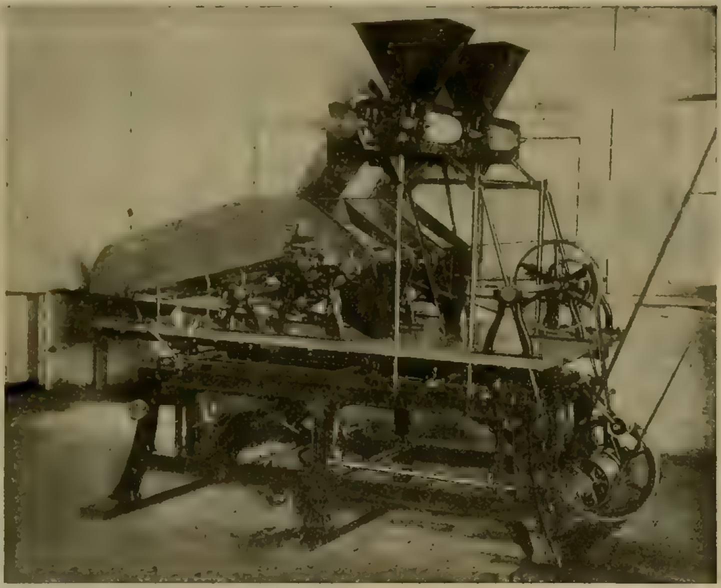


FOWLER'S AIR SPACE and Asbestos Sectional Covering.
As a Non-Conductor, Unequaled.
Special Rates for Steam Boilers and Drums.
G. C. Fowler, 656-58 Howard St., S. F.

CROWN GOLD MILLING CO.

Manufacturers of the "CROWN" CONCENTRATOR and CROWN ORE SIZER. A dry process of sizing and concentrating ore, sand or gravel. Designed to accord fully with the laws of specific gravity, and especially adapted to refractory ore or localities where there is no water.

The chief claims for the Crown Concentrator are that it occupies less floor space and has nearly four times the capacity of any wet concentrator; that it will concentrate ores containing base and refractory metals that ordinarily slime and carry off values; that it effects a saving of values far above the ordinary methods of concentration.



We have, now in operation, a complete plant for crushing, sizing and concentrating ores by the

Crown Dry Milling Process.

Mine owners desiring tests made can forward us, freight prepaid, not less than 1000 lbs. nor more than 4000 lbs. of sample, for which a charge of $20 will be made. (This amount includes assaying, etc.)

Ores for which this process is adapted and of which consignments are solicited are any concentratable ores, pulps, tailings, or sands, carrying sufficient values, whether they have heretofore been profitably concentrated or not.

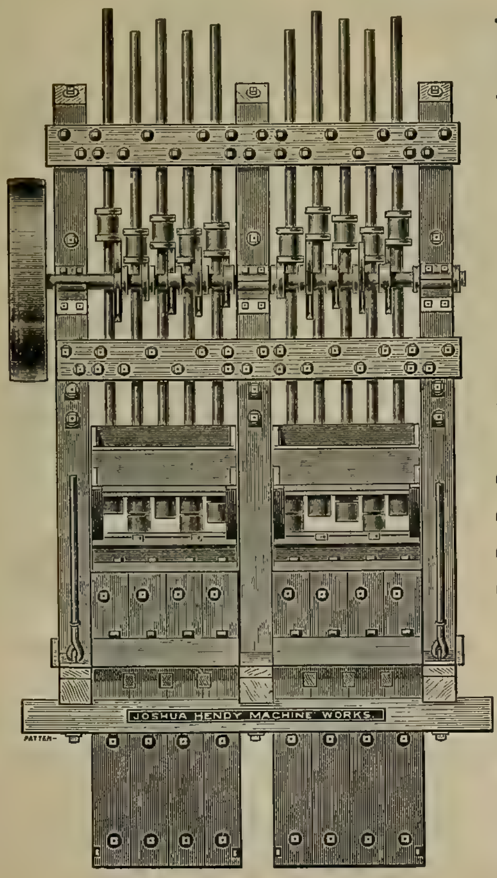
* * *

Office,..............................**230 Post St.**
Works,..................**23 Stevenson St.**
SAN FRANCISCO, CAL.

Joshua Hendy Machine Works,

San Francisco, Cal.

Office and Salesroom....................................**38 to 44 Fremont Street.**
Works................................**Cors. Bay, Kearny and Francisco Streets.**



10-STAMP BATTERY.

MINING AND MILLING MACHINERY.

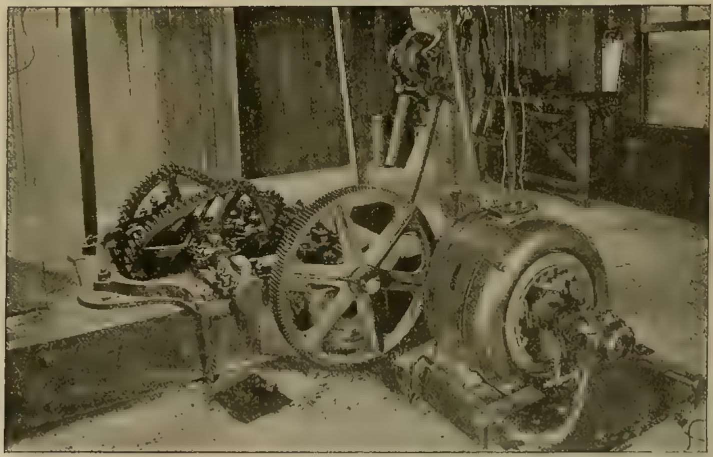
Stamp Mills;

- "Hercules" Ore Crushers;
- "Challenge" Ore Feeders;
- "Triumph" Ore Concentrators;
- "Hendy-Norbom" Ore Concentrators;
- "Triple Discharge" Two Stamp Mills;
- Hydraulic Mining Machinery;
- Hoisting, Pumping and Irrigating Plants;
- Boilers, Engines and Pumps;
- Tangential Impact Water Wheels.

THE

Fulton Pump

can be driven by any kind of Motive Power, but is usually sent from the factory fitted with a Friction Clutch Pulley to be driven by belt.

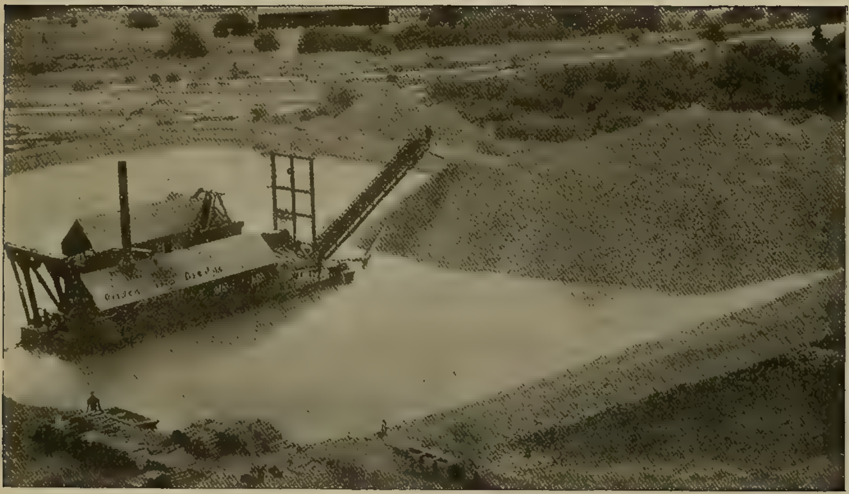


The above cut shows a No. 3 FULTON PUMP driven by Electric Motor direct connected.

MANUFACTURED AND SOLD BY...

A. T. AMES, Galt, Cal.

RISDON IRON WORKS,



SAN FRANCISCO, CALIFORNIA.

Cable: "Risdon's." Code: A. B. C. & Leiber's.

MANUFACTURERS OF

Gold Dredging Machinery

And COMPLETE EQUIPMENT for Placer Mines

OUR SPECIALTY.

We build **GOLD DREDGES COMPLETE IN RUNNING ORDER** to handle 2500 cubic yards per day at a cost of 3 cents per cubic yard.

We excavate 50 feet below water, 20 feet above water and handle boulders up to one ton weight.

Send for Dredging Catalogue No. 17.

—WE ALSO BUILD—

All kinds of Mining, Milling, Concentrating, Pumping, Air Compressing, Hydraulic, Water Wheel and Hoisting Machinery.

EVANS HYDRAULIC GRAVEL ELEVATORS.

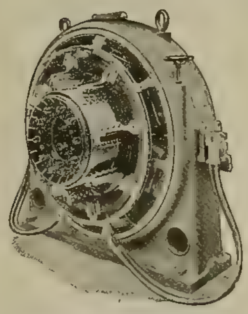
We publish sixteen catalogues. Write for one in the line you are interested in.

All sizes of Steel Water Pipe for City and Town Supply, Placer, Hydraulic and Quartz Mining. Cut, punched and rolled to be riveted at destination or made up complete.

We make a specialty of all kinds of Heavy Sheet Iron and Steel Work. Plans and Estimates furnished.

Westinghouse

Engine Type Generators



100 K. W. Westinghouse Engine Type Generator.

Fixed Commutation Point. Perfect Ventilation. Lowest Temperature.

Laminated Poles of Special Design
Eliminate Distortion and Shifting of Field.

Westinghouse Electric
& Manufacturing Co.

Pittsburg, Pa.

The name
Westinghouse
is a guarantee.

All Principal Cities
in U. S. and Canada.

65j

THE HALLIDIE ROPEWAY

For Transporting Ore, Fuel, Earth, Sugar Cane, etc., by Wire Ropes.

SIMPLE, ECONOMICAL, PRACTICAL, DURABLE.

LOADS MECHANICALLY. DUMPS AUTOMATICALLY.

WIRE TRAMWAYS (Single and Double Rope Systems),

Cableways, Transmission by Wire Ropes,
Incline Planes, Cable Grips,
Logging by Cables, Automatic Loaders,

PLOWING, SCRAPING AND TRANSPORTING by Wire Ropes,

DESIGNED, SUPPLIED AND ERECTED. Estimates Furnished.

Improved GRIP PULLEY.

Patents Nos. 483,442; 610,353.

EFFECTIVE, SIMPLE, AUTOMATIC.

Saves Wear on Wire Rope and Cable.

Send for Illustrated Pamphlet.

Correspondence Solicited.

CALIFORNIA WIRE WORKS, - 9 Fremont St., San Francisco, Cal.

THE CAL. ANTI-CALORIC COMPANY,

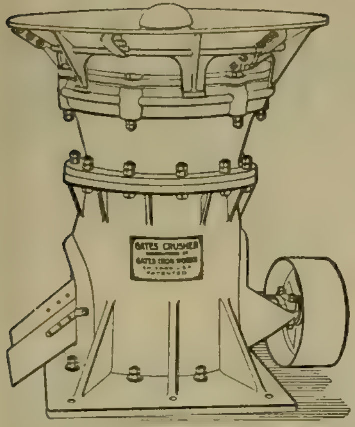
Tel. Main 5752. Office, 217-219 Mission St., San Francisco, Cal.

Sole Manufacturers of CAL ANTI-CALORIC SECTIONAL COVERINGS AND BLOCKS FOR BOILERS PLASTIC (dry) for Steam Domes, Etc Sole Agents for the Boston Asbestos Paper Co. Asbestos Goods of All Kinds. Send for Information. Factory, Potrero.

Dewey, Strong & Co., Patent Agents.

330 Market St., San Francisco, Cal.

CATES IRON WORKS.



The Original GYRATORY BREAKER.

It is ADJUSTABLE, and INDESTRUCTIBLE.

THERE ARE 4,000 OF THEM IN USE.

The South African Mines Have Purchased 200.

. . We build a FINE CRUSHER that is a wonder. . We know how to design this class of machinery. . . . There are others who think they know how to make a Gyratory Crusher; they are simply poor imitators of The Only Great Gates Rock and Ore Breaker. .

Address for Catalogue No. 1, Dept. UU, 650 Elston Ave., CHICAGO.

Finlayson {Patent Aerial} {WIRE ROPE} TRAMWAY

FOR TRANSPORTATION OF ORE, COAL, DIRT, TIMBER, ETC.

Perfect Grip Clip,
Absolutely Safe,
Loads Automatically,
Unloads Automatically,
Operated by One Man,
Cost of Maintenance Low,
Capacity Largest Obtainable.

ALSO SOLE MANUFACTURERS
PATENT FLATTENED STRAND

[TRADE MARK REGISTERED.]
—AND—

Wire Rope

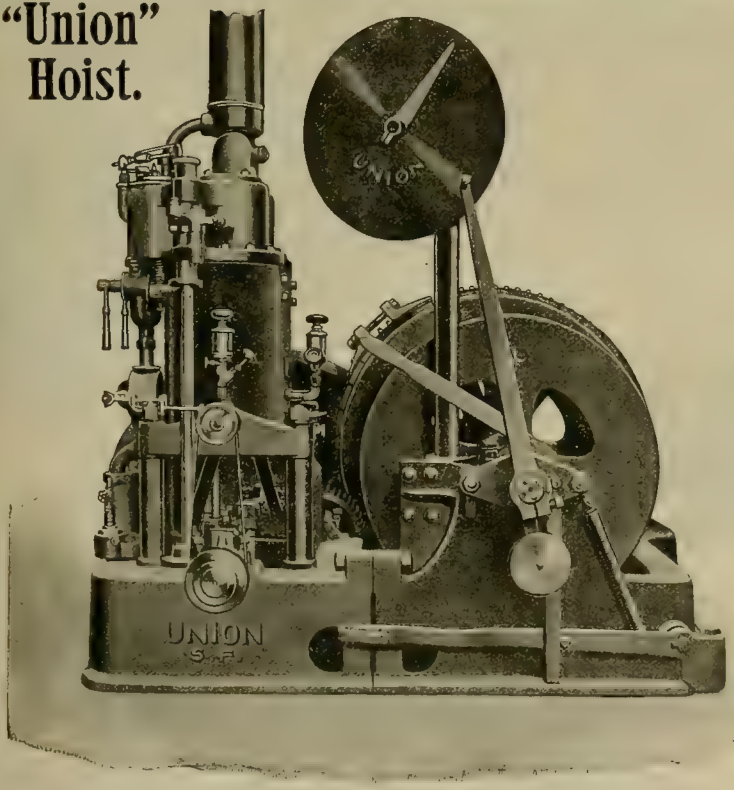
OF EVERY DESCRIPTION.

MANILLA, SISAL, BLOCKS, ETC.

A. LESCHEN & SONS ROPE CO.,

Home Office: 920-922 North Main St., ST. LOUIS, MO. Branch Office: 47-49 South Canal St., CHICAGO, ILL.

"Union" Hoist.



The above illustrates the 25 H. P. double cylinder, single drum "Union" hoist, with all the latest improvements.

THE UNION GAS ENGINE CO.

—BUILD THE—

"Union" Gas Engines,

Which use either MANUFACTURED or NATURAL GAS, ORDINARY STOVE GASOLINE (NAPHTHA or BENZINE), DISTILLATE or KEROSENE.

STATIONARY ENGINES for All Kinds of Work in Sizes from 3 to 300 h. p in actual use.
"UNION" COMBINED HOISTS in Sizes from 2 to 130 h. p. in actual use.
"UNION" COMBINED COMPRESSORS—20, 30, 40 h. p.
HOISTS and COMPRESSORS Can Be Built in Larger Sizes to Order.
"UNION" MARINE ENGINES, 4 to 200 h. p., of Single, Double and Four-Cylinder Types.
FIFTEEN YEARS' EXPERIENCE Building Gas and Oil Engines.
"UNION" ENGINES Are In Use All Over the United States.
"UNION" ENGINES Are Simple, Durable and Economical.

Office, 248 First Street. Works, Corner First and Clementina Streets. SAN FRANCISCO, CAL.

SHOES and DIES

of **SUPERIOR** quality and at prices 20 to 30% lower than any other maker.

FURNISHED BY

ARTHUR KOPPEL,
66 Broad St., N. Y. City.
Write for Particulars.

MINING CARS of every description.

PORTABLE RAILWAYS,
Rolling Stock, Railway Outfits for Mines of every description.
Export Work a specialty.

ARTHUR KOPPEL,
66 Broad St., N. Y. City.
Send for Catalogue and Estimates.

Pacific Coast Agents, BAKER & HAMILTON, SAN FRANCISCO and SACRAMENTO.

STEEL RAILS, TRACK FIXTURES,

PRODUCT PENNSYLVANIA STEEL COMPANY.

BAR, SHEET AND BOILER STEEL,

STRUCTURAL MATERIAL,

Cold Rolled Shafting.

GEORGE W. GIBBS COMPANY,
33-39 Fremont Street, 38-40 Beale Street,
CORRESPONDENCE SOLICITED. SAN FRANCISCO, CAL.

California Vigorit Powder Co.

—Manufacturers of—

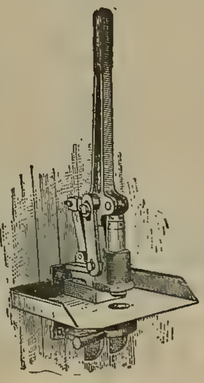
Dynamite High Explosives and "Vigorit Low" Blasting Powder.

OFFICE: 208 CALIFORNIA STREET,
SAN FRANCISCO, CAL.

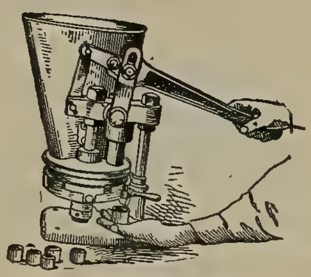
WORKS: POINT ISABEL,
CONTRA COSTA CO., CAL.

ONE OF OUR MANY SPECIALTIES FOR ASSAYERS.

The Calkins Cupel Machine.



WALL PATTERN.
In position for filling mold.



THE AUTOMATIC.
Showing finished cupel being expelled.

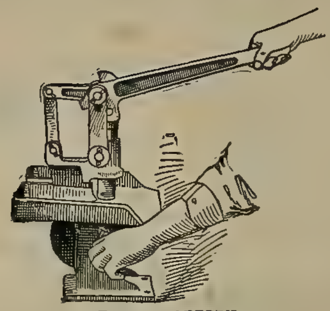


TABLE PATTERN.
Showing position of lever when greatest compression is obtained.

To Assayers:

With these machines perfect cupels can be made by anyone with great ease and rapidity.
They are the greatest labor-saving machine of the Assayer that can be had.
Compact, easily operated, can't get out of order, everlasting.

WRITE FOR OUR NEW, DESCRIPTIVE PAMPHLET IN WHICH ALL OUR SPECIALTIES ARE FULLY DESCRIBED.

F. W. BRAUN & CO.,
Manufacturers of Modern Appliances for Assayers,
LOS ANGELES, CAL.

ADAMANTINE SHOES AND DIES.

CHROME CAST STEEL.

CANDA Improved Self-Locking CAMS.

TAPPETS, BOSSES, ROLL SHELLS AND CRUSHER PLATES.

These castings are extensively used in all the mining States and Territories of North and South America. Guaranteed to prove better and cheaper than any others. Orders solicited subject to the above conditions. When ordering, send sketch with exact dimensions. Send for Illustrated Circular.

Manufactured by **CHROME STEEL WORKS**, Brooklyn, N. Y.

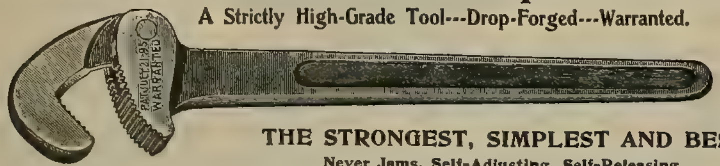
H. D. & H. W. MORRIS,
AGENTS,
Room 194 Crocker Building, San Francisco, Cal.

Canda Cam.

OUR 24-INCH WRENCH IS ESPECIALLY ADAPTED FOR MINE WORK.

The Johnston Patented Pipe Wrench.

A Strictly High-Grade Tool---Drop-Forged---Warranted.



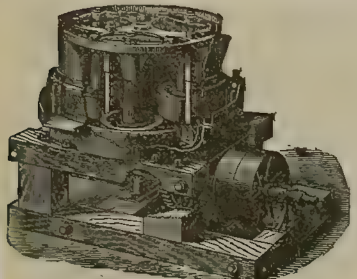
THE STRONGEST, SIMPLEST AND BEST.
Never Jams, Self-Adjusting, Self-Releasing.

MADE IN 3 SIZES:

	10 in.	16 in.	24 in.
Pipe	⅛ to 1 in.	¼ to 1½ in.	½ to 2½ in.
List	$2.25	$3.00	$6.00

WM. B. VOLGER,
SOLE MANUFACTURER,
88 Chambers St., NEW YORK.

Agencies: THE MINE & SMELTER SUPPLY CO., Denver and Salt Lake City.



Centrifugal Roller Quartz Mill.

F. A. HUNTINGTON,
—Manufacturer of—
CENTRIFUGAL
Roller Quartz Mills.
CONCENTRATORS and ORE CRUSHERS.
Mining Machinery of Every Description.
Steam Engines, Shingle Machines.
Room 1, 3d Floor, Mills Building,
SAN FRANCISCO, CAL.

TANKS!

LUMBER AND HOUSE FINISH.
TANKS FOR WATER, WINE OR OIL.

Jig Frames, Jig Screens, Zinc Boxes,
and Tanks of Every Description for Mining Purposes.

WRITE FOR ESTIMATES ON YOUR WANTS.

C. A. HOOPER & CO., Agents,
204 Front Street, San Francisco, Cal.

THE EXCELSIOR REDWOOD CO.,
FOURTH AND CHANNEL STREETS,
SAN FRANCISCO, CAL.

MINING HOISTS.
Engines, Boilers,
Saw Mills, Hoe Saws,
Mill Supplies.

TATUM & BOWEN,
34-36 Fremont Street, San Francisco, Cal.
29-35 First Street, Portland, Or.

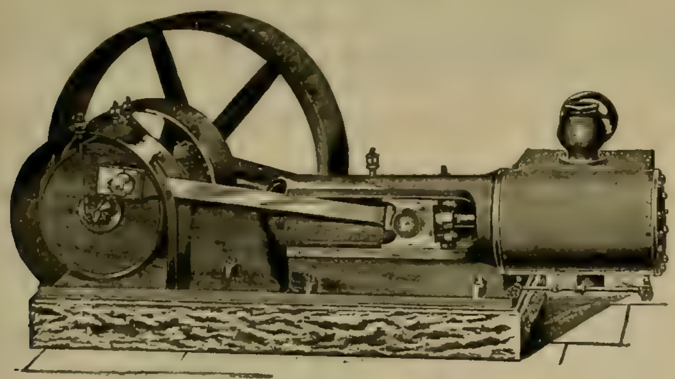
AARON'S ASSAYING, PART I.

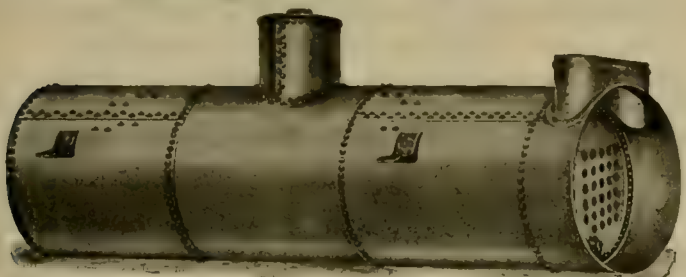
FOURTH EDITION.

Revised, Rewritten, New, Improved.

This practical treatise on assaying has long been the favorite among practical men. The new edition, just out, is up to date. Price $1, postpaid anywhere.

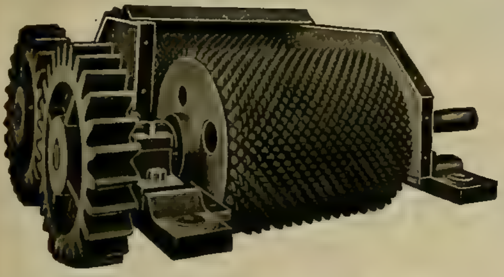
Book Dept., Mining and Scientific Press,
330 MARKET ST., SAN FRANCISCO, CAL.





ENGINES, BOILERS,
UP-TO-DATE MACHINERY.
WRITE US FOR PARTICULARS.
THE COMPRESSED AIR MACHINERY CO., 11-13 First St., San Francisco, Cal.

LINK-BELT ELEVATORS —AND— CONVEYORS.



BREAKER ROLLS,
PICKING TABLES,
MALLEABLE IRON BUCKETS,
SHAFTING, PULLEYS,
GEARING, CLUTCHES, Etc.
Catalogue Upon Application.
LINK-BELT MACHINERY CO.,
Engineers, Founders, Machinists,
CHICAGO, U. S. A.
DENVER, 1328 17th St.,
A. E. LINDROOTH, Manager.

ROBINS BELT CONVEYORS
HANDLE
ORE, GRAVEL, TAILINGS, DREDGINGS.

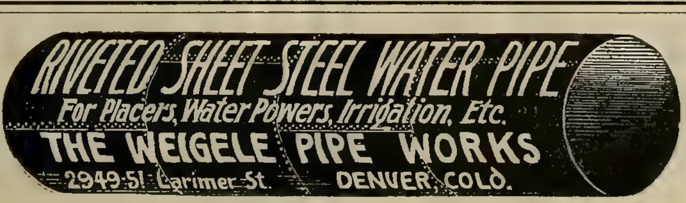
Cut shows belt conveyor carrying 1200 tons per hour of rock and gravel from dredger on Danube river.

ROBINS CONVEYING BELT CO.,
Park Row Building, NEW YORK.

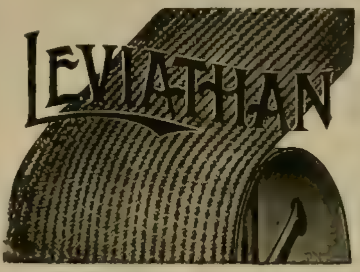
THE BUCYRUS COMPANY,
DESIGNERS AND BUILDERS OF
DREDGES, STEAM SHOVELS, EXCAVATING MACHINERY,
WRECKING CARS, LOCOMOTIVE CRANES, PILE DRIVERS,
CENTRIFUGAL PUMPS, WITH SIMPLE, COMPOUND OR TRIPLE EXPANSION ENGINES,
MACHINERY FOR PLACER MINING.
SOUTH MILWAUKEE, WISCONSIN.

T.P. GW.P. J.P. E.P.
PENNINGTON
TRADE MARK
SAN FRANCISCO, CAL.

OUR SPECIALTIES ARE:
Hammered Steel Shoes and Dies,
Cam, Crank and Steamboat Shafts,
Rock-Breaker Plates,
Connecting Rods, Well-Boring Tools,
General Blacksmithing.
Correspondence Solicited, and Circulars Mailed Upon Request.
GEO. W. PENNINGTON & SONS,
218 and 220 Folsom St.,............San Francisco, Cal.


RIVETED SHEET STEEL WATER PIPE
For Placers, Water Powers, Irrigation, Etc.
THE WEIGELE PIPE WORKS
2949-51 Larimer St. DENVER, COLO.

The "Stop for Repairs"
to Mining Machinery,

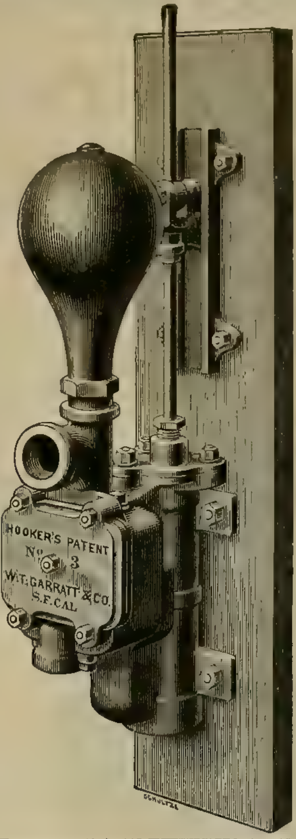


Especially if it is a conveying plant, is a considerable item of expense. Many of these expensive pauses are made to repair or adjust faulty belting. To economize in this respect, use the

LEVIATHAN
CONVEYOR BELT.

It is not only adapted to the heaviest service, but will run under any conditions in underground, drippings, extreme heat or cold.

IT WILL OUTLIVE ANY OTHER BELTING.
MAIN BELTING COMPANY,
1225-41 Carpenter Street, Philadelphia.
55-57 Market St., Chicago. 120 Pearl St., Boston.
SEND FOR PRICE LISTS AND SAMPLE.


HOOKER'S PATENT
No 3
W. T. GARRATT & CO.
S. F. CAL.

A GOOD MINING PUMP.

The Hooker Double Acting Pump.
Well Built, Simple, Durable, Efficient.
All Working Parts Easy of Access.
Duplicate Parts in Stock.
We furnish these pumps with suction pipes, hose and strainers complete. Estimates on application.
Can furnish up to number three with double brake for hand power.
Just the pump for a small mine.
Larger sizes, larger capacities.
Send for our catalogue on pumps.

W. T. GARRATT & CO.,
Cor. Fremont and Natoma Sts.,
SAN FRANCISCO, CAL.

Trommel Screens
THE ROBERT AITCHISON PERFORATED METAL CO.
305 to 305 DEARBORN ST. CHICAGO, ILL.

GENERAL PHOTO-ENGRAVING CO.
[SUCCESSORS TO DEWEY ENGRAVING CO.]
FINE ZINCOGRAPHS, HALF-TONES, AND DESIGNING.
ENGRAVINGS OF MACHINERY OUR SPECIALTY.
SEND FOR SAMPLES AND PRICES. NO. 536 CLAY STREET,
TELEPHONE BLACK 1466. SAN FRANCISCO, CAL

Aaron's Assaying, PARTS II and III.
THIRD EDITION—REVISED AND REWRITTEN.

The Third Edition of Parts II and III of this great work on assaying is now ready; new type; new illustrations; new matter; better than ever; reduced in price to $1.50 postpaid to any part of America. The practical character of this book has made it the favorite everywhere in the mining world among men who want such a manual on assaying.

Address Book Dept. Mining and Scientific Press,
330 MARKET ST., SAN FRANCISCO, CAL.

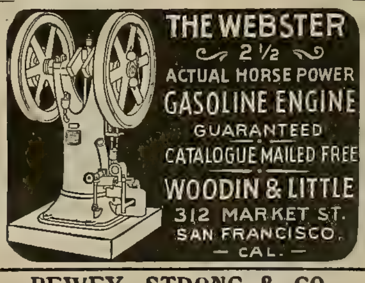
HEALD'S
BUSINESS COLLEGE.
34 Post Street, - - - San Francisco.

MINING AND CIVIL ENGINEERING DEPARTMENT: Mathematics, Draughting, Strength of Material, Chemistry, Assaying, Blow-Pipe Analysis, Geology, Mineralogy, Surveying, etc., under the direction of Prof. O. H. Packer, an engineer of national reputation.

ELECTRICAL DEPARTMENT: Theory and Practice; Construction,

BUSINESS: Bookkeeping, Shorthand, Typing, Modern Languages, etc.

Twenty teachers; individual instruction; can enter at any time; Catalogue and Journal free.



DEWEY, STRONG & CO.,
PATENT AGENTS, 330 Market St., S. F., Cal.

THE RAND DRILL COMPANY,

PIONEERS IN ROCK DRILLING AND AIR COMPRESSING MACHINERY,

100 BROADWAY, NEW YORK,

Has been awarded

THREE GOLD MEDALS

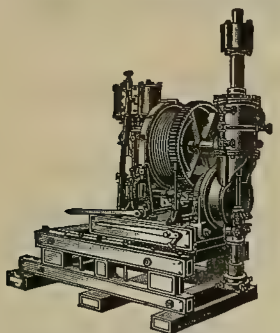
at the

PARIS EXPOSITION

for

AIR COMPRESSORS AND ROCK DRILLS.

SULLIVAN



"N" Drill, capacity 2000 ft.
Cable Address, Diamond, Chicago.
Codes: A. B. C., 4th Edition.
Postal Directory.
Western Union.
Liebers.

Diamond Core Drills

FOR PROSPECTING. Catalogue 29.

The most extensive line of sizes and styles ever offered.

CONTRACTORS FOR PROSPECTING WITH DIAMOND DRILL.

ROCK DRILLS

FOR MINING. Catalogue 30.

Superior valve and ratchet motions. The highest possible grade.

Send for Our New Catalogues.

Sullivan Machinery Co.,

New York. Pittsburg. Claremont, N. H.

Main Office, **CHICAGO**....................54 to 60 N. CLINTON ST.
Western Office, **DENVER**..................332 SEVENTEENTH ST.
Pacific Agency, **SAN FRANCISCO, HENSHAW, BULKLEY & CO.**

CANTON STEEL COMPANY,

—— Manufacturers of ——

CANTON DRILL STEEL.

UNEQUALED FOR TOUGHNESS AND ROCK-CUTTING QUALITIES. WRITE FOR 1900 STEEL LIST, CONTAINING ENDORSEMENTS AND USEFUL INFORMATION.

Works: CANTON, OHIO. Branch Warehouse: DENVER, COLO.

Established 1837.

I. C. Yawger,

Successor to VICTOR BISHOP & CO.

IMPORTER OF CARBONS FOR DIAMOND DRILLS.

21 Maiden Lane, - NEW YORK.

DIAMOND DRILLS

FOR PROSPECTING.
AMERICAN DIAMOND ROCK DRILL CO.
120 LIBERTY ST N.Y.

THEODOR LEXOW, 14 JOHN STREET, N.Y.
......Importer of......

CARBONS

(BLACK DIAMONDS)

For DIAMOND DRILLS and all Mechanical Purposes.

HENRY DEMMERT.

Globe Engineering Company,

(INCORPORATED.)

STIRLING WATER-TUBE BOILERS.

Unequaled for Mines and Mills.
Easily Transported. Quickly Cleaned.

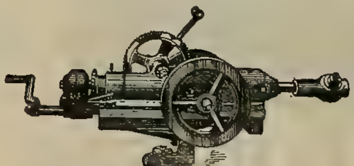
EXETER HOISTING ENGINES; CORLISS, SLIDE VALVE AND AUTOMATIC CUT-OFF ENGINES; BOILERS; STEAM PUMPS; SINKING PUMPS; HIGH DUTY PUMPING ENGINES; AIR COMPRESSORS; FEED WATER HEATERS AND PURIFIERS; JET AND SURFACE CONDENSERS; WALKER'S METALLIC PISTON ROD PACKING; LOCKE DAMPER REGULATORS; REFRIGERATING MACHINERY.

STEEL MILLS, ROCK AND SHAFT HOUSES.
OTTO AERIAL ROPEWAYS,

COMPLETE DESIGNS for STEAM PLANTS for MINES and MILLS.

GLOBE ENGINEERING COMPANY,
Mechanical, Civil and Mining Engineers, 509 Mission St., San Francisco, Cal.

THE JACKSON HAND POWER ROCK DRILL.



Works in Any Rock, in Any Position.

Write for Circulars and References.

THE JACKSON DRILL & M'F'G CO.,
1756 Larimer Street, DENVER, COLO.

Sole Licensees for all Foreign Countries and Eastern United States: THORNTON N. MOTLEY COMPANY (INC.), 43 John St., New York.

AGENTS: CHAS. B. BOOTHE & CO., 126 SO. LOS ANGELES ST., LOS ANGELES, CAL.

FIRTH'S DRILL STEEL.

USE THE BEST.

Has no equal in Hard Rock Drilling.

ABNER DOBLE COMPANY, GEN. AGTS.,
FREMONT AND HOWARD STS, SAN FRANCISCO.

Sold by Seattle Hardware Co., Seattle, Wash.

TO SECURE GOOD RESULTS BUY

JESSOP'S STEEL

FOR TOOLS, MINING DRILLS, ETC.

Chief American Office,
91 John St., New York, N. Y.

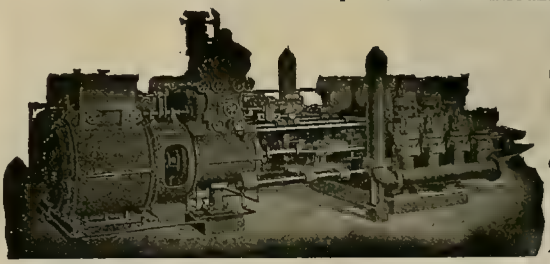
Wm. Jessop & Sons, Ltd.
Manufactory, Sheffield, England.

I. WILLARD BEAM, Agent,
29 MAIN STREET,
SAN FRANCISCO, CAL.

The Best MINE PUMPS in the World.

COMPOUND CONDENSING AND TRIPLE EXPANSION STATION PUMPS.

We carry in our Denver store a stock of Improved Pattern Sinkers and Duplex Station Pumps, with duplicate parts for repairs.



Write for Catalogue and Estimates.

Jeanesville Iron Works Co.,
JEANESVILLE, PA.

Western Office,
Columbia Hotel Building,
1328 17th St.
Denver, Colo.
Telephone 2298 A.
A. MIDDLEBROOK, Manager.

TELEPHONE MAIN 5303

Union Photo-Engraving Co.

DESIGNING
HALF-TONES
ZINC ETCHING

523 MARKET ST
SAN FRANCISCO, CAL.

BULLOCK DIAMOND DRILLS

If you are interested in prospecting send for our new Diamond Drill Catalogue (No. 33).

BULLOCK MINING MACHINERY

PORTABLE HOISTS—Send for our new Catalogue (No. 40). CHAMPION MINE VENTILATORS—Send for our new Catalogue (No. 35).
HOISTING AND HAULAGE PLANTS, ORE CARS, SKIPS, CAGES, ETC., ETC.

PARKE & LACY CO., Agent,
21 & 23 Fremont St., San Francisco, Cal.

M. C. BULLOCK MFG. CO.,
1172 West Lake St., Chicago, Ill., U. S. A.

WHO BUILD THE BEST STAMP MILL?

FRASER & CHALMERS,

CHICAGO, ILL., U. S. A.
AND LONDON, ENGLAND.

See those wires--how they interlock? Note the smooth surface also. No displacement of wires in any event. Gives much greater service than other cables, and adds correspondingly to the life of the rolling stock.

—THE PATENT—

Locked-Coil Track Cable

is Used only on the Patent

BLEICHERT WIRE ROPE TRAMWAY,

and Others Manufactured by

THE TRENTON IRON COMPANY, Trenton, N. J.

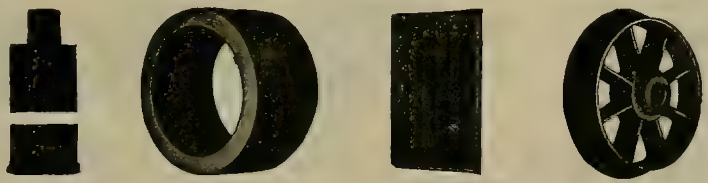
ENGINEERS AND CONTRACTORS,

And Sole Licensees in North America for the Bleichert System. Also, Wire Rope Equipments for Surface and Underground Haulage, Transmission of Power, Etc. Illustrated Book Upon Application.

For Particulars, Address, **NEWTON M. BELL, Agent, 308 Market Street, San Francisco.**

☞ A full stock of the Trenton Iron Co.'s Wire Ropes, made from "SPECIAL" Crucible and Plough Steel, carried in San Francisco.

HARD



TOUGH

TAYLOR IRON AND STEEL COMPANY,

HIGH BRIDGE, NEW JERSEY, U. S. A.

Sole Licensees in America under the HADFIELD System and Patents for **MANGANESE STEEL,**

Best Metal Known for Roll Shells, Stamp Shoes and Dies, Crusher Plates and Side Liners, Toggles and Toggle Bearings, Gyratory Cones and Concaves, or Liners, Mine Car Wheels, Coal Crushing Rolls, Etc.

PACIFIC COAST PARTIES INTERESTED PLEASE ADDRESS PARKE & LACY CO., SAN FRANCISCO, CAL.

WRITE FOR INFORMATION AND PRICES.

Established 1865. **NOTICE TO GOLD MINERS.** Incorporated 1890.

Silver-Plated Copper Amalgamated Plates

FOR SAVING GOLD

IN QUARTZ, GRAVEL OR BEACH MINING. MADE OF BEST SOFT LAKE SUPERIOR COPPER.

AT REDUCED PRICES.

Our Plates are guaranteed, and by actual experience are proved, the best in weight of Silver and durability. Old Mining plates replated, bought, or gold separated. THOUSANDS OF ORDERS FILLED.

SAN FRANCISCO NOVELTY AND PLATING WORKS,

☞ SEND FOR CIRCULARS. Telephone Main 976. 68, 70, 72, 74 and 76 FIRST STREET, COR. MISSION, SAN FRANCISCO, CAL.

QUARTZ SCREENS

A specialty. Round, slot or burred slot holes. Genuine Russia Iron, Homogeneous Steel, Cast Steel or American planished Iron, Zinc, Copper or Brass Screens for all purposes. CALIFORNIA PERFORATING SCREEN CO., 145 and 147 Beale St., S. F.

Mining Screens

A SPECIALTY.

Diagonal Slot,
Straight "
Burred "
Round Holes.

In American planished or Russian iron or steel for all purposes. GEO. WIMMER, 312 Iowa Street, San Francisco. Telephone Mint 1382.

—EASTERN PRICES BEATEN.—

SAN FRANCISCO Pioneer Screen Works,

JOHN W. QUICK, Prop.

Improved Facilities! Finest Work! Lowest Prices!

Perforated Sheet Metals, Steel, Russia Iron, American Planish, Zinc, Copper and Brass Screens for All Uses.

MINING SCREENS A SPECIALTY.

221 and 223 First Street, San Francisco, Cal.

For Best Satisfaction and Lowest Prices

—IN—

PERFORATED METALS

—AND—

MINING SCREENS

PLACE YOUR ORDERS WITH

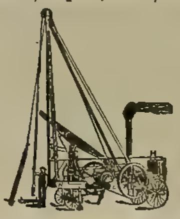
Fraser & Chalmers,

CHICAGO, ILL., U. S. A.

SEND FOR SAMPLES, MENTIONING THIS PAPER.

A BORE HOLE

is the cheapest, quickest, most direct, and most effective way to test lands for minerals, oil, gas, salt, sulphur, borax, water, etc.



THE STAR DRILLING MACHINES

excel for these uses. They will drill a hole through anything to any depth from 250 to 2500 feet The only machines made that are absolutely without annoying springs. They are simple, powerful and efficient. Easy to handle at work or on the road. Used in every State and Territory and in many foreign countries.

We also make full line of drill tool-bits, reamers, sand pumps, spuds, etc., etc. Write for illustrated free catalogue.

Star Drilling Machine Co.,

Akron, Ohio.

AMERICAN AND FOREIGN
TRADE MARKS
SCIENTIFIC PRESS PATENTS PATENT AGENCY
CAVEATS
DEWEY, STRONG & CO. 330 MARKET ST.

MINING, MILLING and SMELTING MACHINERY.

LEYNER AIR DRILLS,
AIR COMPRESSORS,

POWER, PUMPING & BLOWING ENGINES.
MILWAUKEE, WIS., U.S.A.
THE EDWARD P. ALLIS COMPANY.
FLOUR MILL, SAW MILL AND MINING MACH'Y.

ROASTING FURNACES,
STAMP MILLS,
and ORE CRUSHERS.

REYNOLDS CORLISS ENGINES.

CATALOGUES UPON APPLICATION

P&B Building Paper..

A perfect insulation for cold storage houses and refrigerators.
Unequaled in residence construction.
A protecion against heat, cold, dampness, dust, draught and vermin.
Demand it of your dealer — you need it in your buildings.
Paraffine Paint Co— 116 Battery, San Francisco

SCREENING MACHINERY FOR ALL PURPOSES.

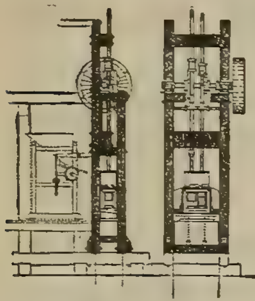
VIBRATORY, SHAKING, REVOLVING, STATIONARY AND MECHANICAL HAND SCREENS FOR ALL MATERIALS.

SCREENS SPECIALLY ....ADAPTED FOR.......... MINING PURPOSES.

COMPLETE PLANTS ERECTED.

SEND FOR DESCRIPTIVE MATTER.

WESTERN MACHINERY & SUPPLY CO., Engineers and General Machinists,
161 La Salle Street, CHICAGO.



MODERN MINING MACHINERY.

QUARTZ MILLS of any capacity,
IN UNITS OF TWO AND FIVE STAMPS.

Acme Amalgamators for CAPE NOME
and other placer mining. Successfully applied to quartz mills in addition to or displacing plates.

SUCCESSFUL GRAVEL MILL RECENTLY IMPROVED.

Special Gold Dredging Pumps and Machinery. Concentrators, Feeders, Rock Breakers and Power Plants.

Largest manufacturers of Irrigation and Reclamation Pumps in the United States.

Catalogues: No. 20, Pumps; No. 22, Cape Nome; No. 25, Mining.

KROGH MANUFACTURING CO.,
9-17 Stevenson St. and 134-136 Main St., SAN FRANCISCO, CAL.

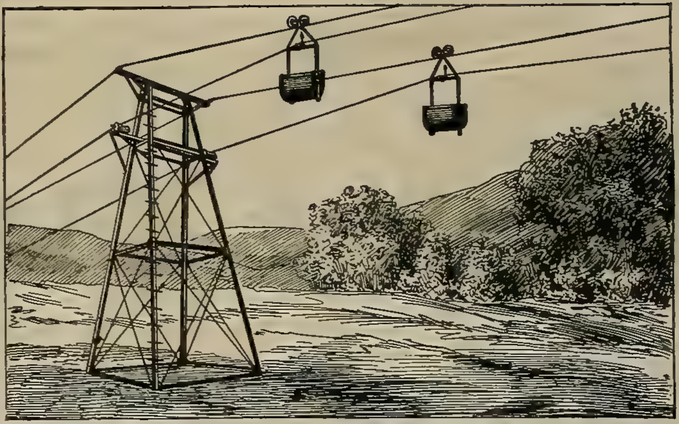
SULPHURIC ACID

MANUFACTURED BY
THE WESTERN CHEMICAL CO.
DENVER, COLO.

For Chlorination, Refining and other processes. Also Muriatic and Nitric Acids, Blue Vitriol, Copperas Commercial and C. P. Our chemically pure Acids and Ammonia are guaranteed perfect.

VULCAN DOUBLE ROPE TRAMWAYS.

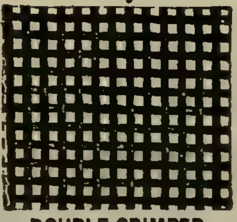
VULCAN ROPEWAYS (SINGLE ROPE SYSTEM).
AUTOMATIC LOADING AND DUMPING APPLIANCES



AND OTHER ROPE HAULAGE SYSTEMS.

SEND FOR CATALOGUE.

Vulcan Iron Works, Manufacturers of Mining Machinery, SAN FRANCISCO, CALIFORNIA.



"The Perfect" USE "THE PERFECT"
Double Crimped Mining Cloth,
MANUFACTURED BY
THE LUDLOW-SAYLOR WIRE CO.,
ST. LOUIS, MO.

DOUBLE CRIMPED STEEL MINING CLOTH

MINERS' STEEL CANDLESTICKS.

TRADE MARK.
(M'ARTHUR-FORREST PROCESS.)

CYANIDE PROCESS.

The MacArthur-Forrest Cyanide Process is the Best

For the Treatment of Refractory and Low Grade Gold and Silver Ores and Tailings. We are the Originators of the Cyanide Treatment, and have kept up with the times in all Improvements in Cyanide Methods.

Successful Plants in Operation in all Western Mining States.

Samples Assayed and Fully Reported Upon. Properties Examined Designs Furnished. For Terms and Particulars, Address

The Gold and Silver Extraction Co. of America, Ltd.
GEO. A. ANDERSON, General Manager,
208-210 McPhee Building, Denver, Colo.
Testing Works: 1716 Blake Street, Denver, Colo.
ALMARIN B. PAUL, Agent, 27 Crocker Building, San Francisco, Cal.

"PNEUMATIC" CYANIDE PROCESS.

(Patented in U. S., So. African Republic, New Zealand, Victoria, New So. Wales, So. Australia.)

WILL DO IN 7 HOURS WHAT REQUIRES FROM 2 TO 6 DAYS BY OLDER METHODS.
SEND FOR PAMPHLET.
THE PNEUMATIC CYANIDE PROCESS CO., 306 Boston Bldg., Denver, Colo.

Are You Confronted With a Difficult Ore-Separating Problem?

THE WETHERILL MAGNETIC SEPARATING PROCESS
may prove the solution. Apply to Wetherill Separating Company, 52 Broadway, N. Y.

ANY BOOK

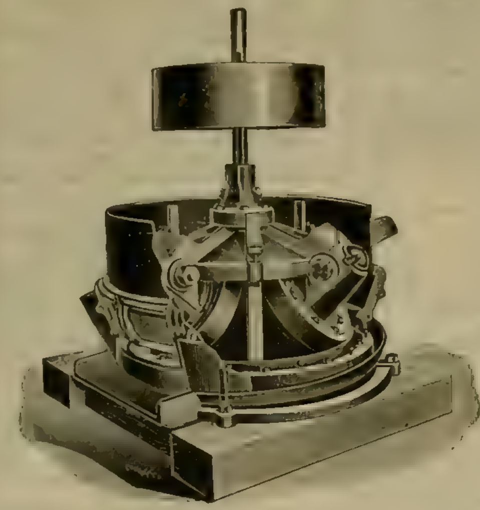
ON ANY SUBJECT Connected with Mining, Metallurgical, Mechanical or Industrial Interests,

WILL BE SENT ANYWHERE, POSTPAID,

AT PUBLISHER'S PRICES.

SEND FOR CATALOGUE OF LINE DESIRED.

ADDRESS BOOK DEPT. MINING AND SCIENTIFIC PRESS,
NO. 330 MARKET STREET, SAN FRANCISCO, CAL.

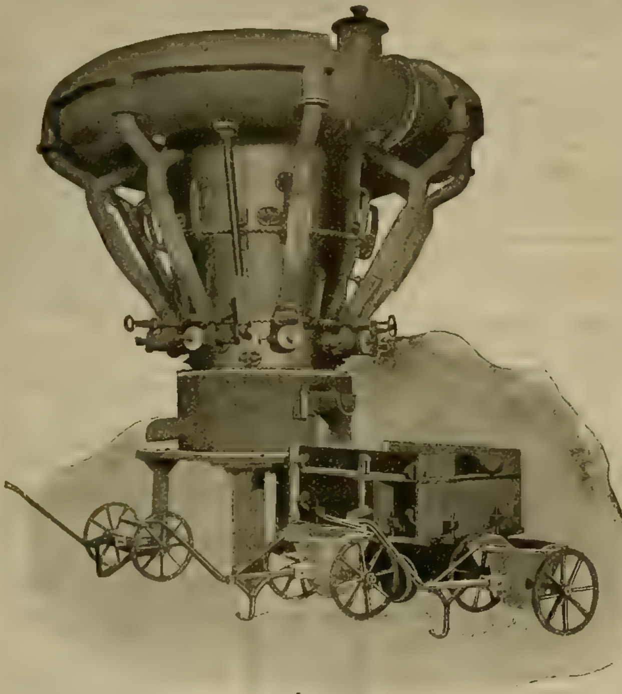


THE GRIFFIN
THREE ROLLER
ORE MILL.

The Griffin Three Roller Ore Mill is a simply constructed Mill, suitable for working all kinds of ores that require uniformly fine crushing by the wet process. This Mill is a modification of the well-known Chilian Mill, but the rollers run upon a crushing ring or die, which is inclined inwardly at an angle of about 30 degrees, the rollers themselves also being inclined to the central shaft of the Mill, thus utilizing the centrifugal force, as well as the weight of the rollers themselves as a crushing agent. The Griffin Three Roller Ore Mill is therefore a Mill of great strength, and has few wearing parts. We construct these Mills with extreme care, using only the best of raw materials, which are most carefully worked by men who are specialists as mill builders. We sell the Griffin Ore Mill on its determined merits, and will gladly supply full information regarding it to any one.

SEND FOR FREE ILLUSTRATED AND DESCRIPTIVE CATALOGUE TO

Bradley Pulverizer Co., Boston, Mass.



THE COPPER FURNACE

Here illustrated has OUR PATENT

WATER VAPORIZING ATTACHMENT.

Experience has proven this to be the best of all methods for applying water for the cooling of jackets. It has the further great advantage of using only about one-eighth the usual amount of water needed for that purpose, and all jackets are kept at the same temperature.

We Manufacture Smelting Furnaces and Equipments

FOR THE TREATMENT OF

GOLD, SILVER, LEAD, COPPER and NICKEL ORES.

of any desired tonnage capacity above forty tons per day, and put them into successful operation under guarantee. Write for catalogue showing different styles of furnaces.

We also design, manufacture and erect Smelter Sulphide Mills for crushing and sampling ores. We are the originators of the Narrow Face, Large Diameter, High Speed Crushing Rolls. A full description of our Crushing Machinery is given in a special catalogue, which will be sent on application.

THE COLORADO IRON WORKS CO.

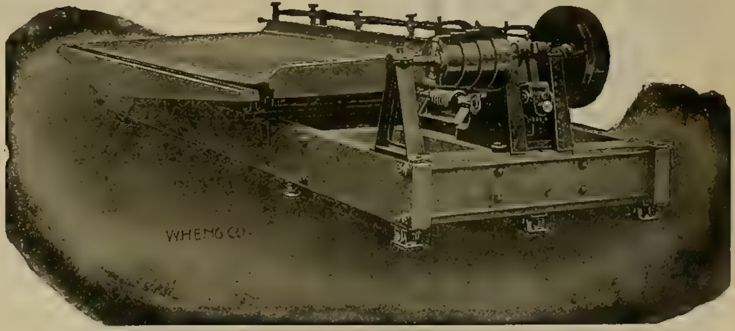
ESTABLISHED 1860. DENVER, COLO., U. S. A.

THE : CAMMETT : CONCENTRATOR.

Designed with some Regard for the Laws of Concentration.

From **The Denver Evening Post**, July 15th, 1900.

* * * "Now about concentrating tables. Here's a fellow who says there's nothing equal to the Wilfley, and I am trying to convince him that old man Woodbury over in California makes the finest table in the world." "No, sir," said his comrade, "you're way off. I've tried the CAMMETT too thoroughly to believe there's anything made to equal it."



Manufactured Under U. S. Patent No. 632,892; Dated Sept. 12, 1899.

Denver Engineering Works,---Shepard & Searing,---Sole Manufacturers,
30th and Blake Streets, - - - - DENVER, COLORADO.

CHAS. C. MOORE & CO.,

——ENGINEERS AND DEALERS IN——
MAGNOLIA ANTI-FRICTION METAL,
HAMILTON CORLISS ENGINES, N. Y. SAFETY AUTOMATIC ENGINES,
BABCOCK & WILCOX BOILERS, McINTOSH & SEYMOUR ENGINES,
GREEN'S ECONOMIZERS, HOPPES LIVE STEAM PURIFIERS,
WHEELER CONDENSERS, BARNARD-WHEELER COOLING TOWERS,
EDMISTON FEED WATER FILTERS, BUNDY STEAM TRAPS,
SNOW STEAM PUMPS, QUIMBY SCREW PUMPS,
GOUBERT FEED WATER HEATERS, STRATTON STEAM SEPARATORS,
SPENCER DAMPER REGULATORS, HYATT ROLLER BEARINGS.

Contracts for Installation of Power Plants,
Any Capacity.

SEND FOR CATALOGUES AND FULL INFORMATION.

32 FIRST STREET, SAN FRANCISCO, CAL.

SEATTLE BRANCH.............313 FIRST AVE. SOUTH.
LOS ANGELES BRANCH........103 SOUTH BROADWAY.

PROFESSIONAL CARDS.

R. H. POSTLETHWAITE, M.I.E.E.
Hydraulic Mining Engineer.
River Dredging for Gold a Specialty.
1315 Leavenworth St........San Francisco, Cal.

THEO. F. VAN WAGENEN, E. M.
Consulting Mining and Hydraulic Engineer.
1508 Fillmore St., DENVER, COLO.

D. B. HUNTLEY,
Mining Engineer and Metallurgist,
De Lamar, Owyhee Co., Idaho.

BERNARD MACDONALD,
Consulting Mining Engineer.
General Manager British America Corporation, Ltd., Rossland, B. C.

A. F. WUENSCH, M. E.
Inspection and Valuation of Mines.
Ref. D. H. Moffat, Pres. 1st Nat'l Bank, Denver.
827 Equitable Bldg..................Denver, Colo.

Established 1879.
CHAS. B. GIBSON,
Chemist, Metallurgist and Mining Engineer,
81 CLARK ST., CHICAGO, ILL.

W. C. WYNKOOP, M. E.
Woodbury (Cochiti District),
New Mexico.
Economic Geology and Mine Examinations.

WM. VAN SLOOTEN,
Consulting Mining Engineer and Metallurgist.
Cable address: "Yadoplata."
35 WALL STREET............ ....NEW YORK, N. Y.

E. H. BENJAMIN, Mining Engineer.
A. M. HUNT, Mechanical & Hydraulic Engineer.
WYNN MEREDITH, Electrical Engineer.
C. L. CORY, Electrical & Mechanical Engineer.
EXPERT EXAMINATIONS. ADVISORY REPORTS.
CONSTRUCTION SUPERVISION.
331 Pine Street,...........San Francisco, Cal.
Telephone Main 1870. Cable Address "Edben."

DANIEL G. JEWETT.
Specialty: The Mining and Smelting of Copper or Lead Ores.
General Manager of Boston G. M. & M. Co., Venture G. M. & M. Co., The Boston Tunnel.
P. O. BOX 5, GUFFEY, PARK CO., COLO.

ABBOT A. HANKS,
CHEMIST AND ASSAYER.
Successor to Henry G. Hanks, est. 1866. The supervision of sampling of ores shipped to San Francisco a specialty.
—531—
California Street,
San Francisco.

RICHARD A. PEREZ, E. M.
Assayer and Analytical Chemist,
120 North Main St., - Los Angeles, Cal.

S. W. TYLER,
Mining and Metallurgical Engineer,
6 Windsor Hotel Block.
Cable: Retyl, Denver. DENVER, COLORADO.

The SPOKANE BUREAU OF MINING,
N. E. LINSLEY, Manager.
SPOKANE, : : WASHINGTON.
Consulting Mining and Milling Engineer.
Will Examine and Report on Mines.

FRANK C. MANDELL,
MINING ENGINEER,
U. S. Deputy Mineral Surveyor for Idaho and Oregon.
Mine Examinations, Surveys and Reports.
HAILEY, IDAHO.

CLARENCE HERSEY,
Assayer and Chemist,
(Established 1879.) LEADVILLE, COLO.
Gold, Silver and Lead..................$1.00.
Any two of above 75c; any one of above 50c.
Copper analysis.................................$1.00.
Platinum, Nickel or Tin, each..............$5.00.
Twenty-one years successful experience in the mining metropolis of Colorado.
Write for mailing envelopes and price list.

ALMARIN B. PAUL, M. E.,
ROOM 27, CROCKER BUILDING, SAN FRANCISCO.
Will act as AGENT for the sale of RELIABLE Mining Property. SPECIAL AGENT FOR
MacArthur-Forrest Cyanide Process
for California north of and including Mono, Madera and Merced counties; also for State of Nevada. Will act as agent for Eastern parties owning mining interests in California.

F. H. HARVEY,
GALT, CAL.,
Mining and Metallurgical Work in All Branches.
Assays, Chemical Analysis of Ores and experiments on rebellious ores for treatment by cyanide or other processes. Surveys and reports upon mining properties.

Simonds & Wainwright,
Mining Engineers,
Assayers and Chemists,
159 Front Street,
NEW YORK.

HUDSON H. NICHOLSON,
Consulting Mining Engineer,
Rooms 216 and 217, Boston Building,
DENVER, COLO., U. S. A.
Cable address: Aichen, Denver.
Expert examinations of and advisory reports on mining propositions.
Specialty: The chemical treatment of ores

DAVIDGE & DAVIDGE, Attorneys and Counsellors at Law, Corcoran Building, Washington, D. C. Practice in the Supreme Court of the United States, the Court of Claims, the Courts of the District of Columbia, and the General Land Office. Western Union Code.

W. J. ADAMS, E. M.,
Mining Engineer and Metallurgist.
Graduate of Columbia School of Mines.
Author of "Hints on Amalgamation," etc., etc.
ROOM 14, 434 CALIFORNIA STREET,
SAN FRANCISCO, CAL.

EDWARD L. HAFF,
MINING ENGINEER,
U. S. DEPUTY MINERAL SURVEYOR.
Mine Examinations and Reports.
National Annex Block,
P. O. Box 21. CRIPPLE CREEK, COLO.

RALPH E. STEVENS,
ATTORNEY AND COUNSELOR,
43-44 Jacobson Building, DENVER, COLO.
Special attention to examination of titles. Corporation, commercial, mining law. Collections receive prompt attention. Notary in office. Refers to Denver representative of Mining and Scientific Press.

ERNEST H. SIMONDS,
Late Instructor in Assaying, University of California.
ASSAYS AND ANALYSES.
LABORATORY TESTS OF ORES.
Special Attention Given to the Instruction of Students.
521 Sacramento St., Cor. Leidesdorff, S. F., Cal.

School of Practical Mining, Civil,
Mechanical and Electrical Engineering.
Surveying, Architecture, Drawing, Assaying, Cyanide Process and Metallurgy.
933 Market St., S. F., Cal. OPEN ALL YEAR.
A. VAN DER NAILLEN, President
Assaying of Ores, $25; Bullion and Chlorination Assay, $25; Blowpipe Assay, $10. Full course of Assaying, $50. Established 1864.
☞ Send for Circular.

T. D. KYLE & CO,
Assayers and Chemists.
Mill Tests of all kinds. Cyanide, Amalgamation and Concentration a specialty. Mail orders given prompt attention.
106 E. Fifth St., Leadville, Colo.

LOUIS FALKENAU,
STATE ASSAY OFFICE,
538 Sacramento St., below Montgomery.
Analysis of Ores, Metals, Soils, Waters, Industrial Products, Foods, Medicines, etc., etc.
Court Experting in all branches of Chemical Technology. Working Tests of Ores and Investigation of Metallurgical and Manufacturing Processes. Consultations on all questions of applied chemistry. Instructions given in assaying and all branches of chemistry.

FRED H. BROWN,
Electrical Mining Expert.
Inventor of the Electro-Geodetic Mineral Locator. Patented March 20, 1900.

Will electrically survey mines and lands for mineral; furnish charts showing run of ore, extensions, pay streaks, and their approximate depth from surface.

References include scientific men, and miners for whom we have located rich mines.

Address, 1025 West 7th St.,
LOS ANGELES, CAL.

R. J. WALTER,
1452 Blake St., DENVER, COLO.
Mining Engineer and Metallurgist.
Reports on mining properties.
Assay office and chemical laboratory. Established in Colorado 1879.

SAM'L A. RANK,
MINING ENGINEER,
U. S. DEPUTY MINERAL SURVEYOR.
Mine Examinations and Reports.
514 Cooper Building,
DENVER.........................COLORADO.

HOWARD E. BURTON,
ASSAYER and CHEMIST,
111 E. Fourth St., LEADVILLE, COLO.
Specimen prices: Gold, 50c; Gold and Silver, 75c; Gold, Silver and Lead, $1.00; Silver or Lead, 35c; Copper or Zinc, $1.00.
Mailing envelopes sent to any address.

MINERS' ASSAY OFFICE.
(JNO. HARRIGAN)
10 Stevenson Street, - San Francisco, Cal.
Telephone Clay 972.
Assaying, Analyses, Sampling, Grinding and Pulverizing of all kinds.
Practical Working Tests of Ore by all Processes. Mining Machinery Bought and Sold. Check Assays. Instructions given in Assaying. All Work Guaranteed. Mines Examined, Sampled and Reported on by M. P. BOAG, M. E. and Cyanide Expert.

J. W. RICHARDS,
(Late of Aspen, Colo.)
ASSAYER AND CHEMIST. 1754 Champa Street, DENVER, COLO.
Ore Shippers' Agent. Write for Terms.

JAMES ANGUS SNEDAKER,
Mining Engineer,
721-722 Equitable Building, Denver, Colo., U. S. A.

Samples by Mail or Express Will Receive Prompt Attention.
ALBERT I. GOODELL,
ASSAYER AND CHEMIST,
1430 Stout Street......................DENVER, COLO.

RELIABLE ASSAYS.

Gold...............	$ .50	Gold and Silver....	$ .75
Lead	.50	Gold, silver, copper	1 50

Samples by mail receive prompt attention.
Rich Ores and Bullion Bought.
OGDEN ASSAY CO.,
1429-16th St., Denver, Colo.

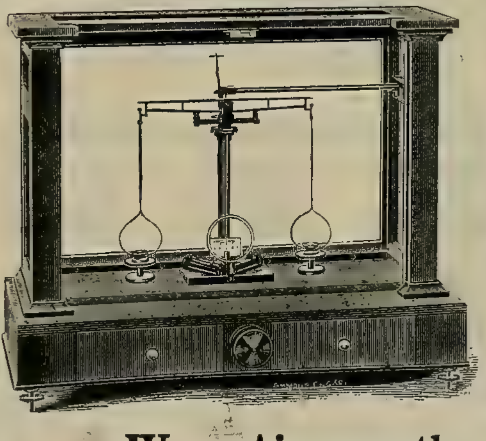
Independent Assay Office.
ESTABLISHED 1888.
D. W. Reckhart, E. M., Proprietor.
Agent for Ore Shippers.
Assays and Chemical Analysis.
Mines Examined and Reported Upon.
BULLION WORK A SPECIALTY.
P. O. Box 88. Office and Laboratory:
Cor. SAN FRANCISCO & CHIHUAHUA Sts.
EL PASO, TEXAS.

HENRY E. WOOD,
ASSAYER,
1734 Arapahoe St., DENVER, COLO.
Ore Tested in Carload Lots.
Write for Circular.

CHAS. BUTTERS & CO., Limited.
E. S. LEAVER, Manager.
Ore Testing Works,
Chemical and Metallurgical Laboratory,
Assay Office,
DOOLY BLOCK, - SALT LAKE CITY, UTAH.

Telephone, MAIN 5104.
Cable Address, LUCKWARD.
ESTABLISHED 1869.
A. H. WARD.
C. A. LUCKHARDT CO.,
NEVADA METALLURGICAL WORKS,
71 & 73 STEVENSON STREET, - - - - SAN FRANCISCO, CAL.
Assaying, Analyses, Sampling.
PRACTICAL WORKING TESTS OF ORE BY ALL PROCESSES.
STAMP MILL AND CONCENTRATOR IN OPERATION ON PREMISES.

Thomas Price & Son,
Assay Office, Sampling Works
And Chemical Laboratory.
526 Sacramento Street, San Francisco, Cal.



No. 045 Button Balance.
Sensibility 1-50 Milligramme.

This balance was designed with a view to furnishing an accurate and reliable balance for silver button and moderately accurate gold button work.

It has all the latest improvements and is an up-to-date balance in every particular.

If you anticipate buying and want a good balance at a moderate price, write us for particulars; you will be surprised to find how cheaply this balance can be purchased.

For complete description of this and other balances write for catalogue A to

Wm. Ainsworth & Sons,
(Successors to WM. AINSWORTH.)
Denver, Colorado, U. S. A.

F. W. Braun & Co., Los Angeles, Cal., Agents for balances and the Brunton Patent Pocket Transit.
John Taylor & Co., San Francisco, Cal., Agents for balances and the Brunton Patent Pocket Transit.
H. S. Crocker Co., San Francisco, Cal., Agents for the Brunton Patent Pocket Transit.
Pacific Optical Co., Los Angeles, Cal., Agents for the Brunton Patent Pocket Transit.

HERMANN J. VAN DIEREN,
Assayer and Metallurgist,
1407 Seventeenth St., DENVER, COLO.
Stamp Mill and Reduction Works: 19th St. and Platte River.

Buyer of every description of Ores and Precious Stones. Rights for sale for process of treating refractory gold ores; also process for treating low grade copper ores. Write for particulars.

Hoskins' Patent Hydro-Carbon Blow-Pipe and Assay Furnaces.

No dust. No ashes. Cheap, effective, economical, portable and automatic.

SEND FOR PRICE LIST TO
W. HOSKINS, 81 South Clark St., Room 55, CHICAGO, ILL.

ALVIN PHILLIPS & CO.,
Chemists, Mining and Metallurgical Engineers,
1761 MARKET STREET,
DENVER, - COLO.

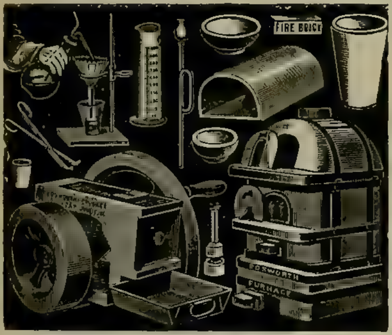
Complete Ore-Testing Works — capacity ten pounds to two tons. Modern Methods of Lixiviation, Cyanide and Chlorination. Concentration on Bartlett Table. Assaying and Bullion Refining. Chemical Analyses of Oils, Coal, Water, and all solutions. WRITE FOR PRICES.

SMITH & THOMPSON,
Manufacturers of Fine
ASSAY BALANCES.
Write for Catalogue.
2219 Stout St.,
Denver, Colo.

THE ROESSLER & HASSLACHER CHEMICAL CO.,
100 William Street, New York.

CYANIDE
Peroxide of Sodium
Hyposulphite of Soda
Chloride of Lime
Sulphide of Iron
And Other Chemicals for Mining Purposes.

THE DENVER FIRE CLAY CO.,
1742 to 1746 Champa St., DENVER, COLO.



Manufacturers, Importers and Dealers in
Chemicals, Apparatus and Assayers' Supplies, Fire Brick and Tile.
Sole Agents for the "AINSWORTH BALANCES."
WRITE FOR CATALOGUES.

THE LITTLE ALASKA GOLD WASHER.

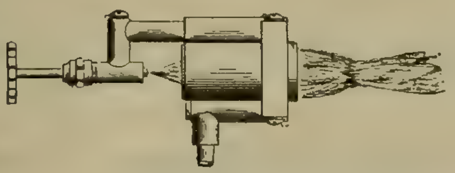
Price $6.
Saves the Gold.
Weighs only 7 1-2 Lbs.

After several years' practical use in different fields, our washer has established its superiority over all placer or beach washers. It is just the washer for Cape Nome; it was used extensively in Alaska last year with every success In working the operator does not have to wet his hands and can stand in an upright natural position. It is just the washer for the poor man who has not the money to put in expensive machinery. It will do the work of ten men with gold pans. It is just the washer for the prospector, being light and easy to pack. Don't fail to write us if in need of a washer; we can save you *time, labor* and *money.* RUSSELL & KINSEY, 1237 Magnolia Ave., Los Angeles, Cal.

INVENTORS, Take Notice!
L. PETERSON, MODEL MAKER,
544A MISSION STREET, bet. First and Second Sts., SAN FRANCISCO. Experimental machinery and all kinds of models. Tin and brasswork. All communications *strictly confidential.*

Keep Your Boilers Clean While They Are New. You Know What to Use;
IF NOT, WRITE TO
DEARBORN DRUG & CHEMICAL WORKS,
Offices and Laboratories:
29, 30, 31, 32 and 33 Rialto Bldg. - - - CHICAGO, ILL.

Taylor's Coal Oil and Gasoline Burner
(PATENTED)



A new heating burner for Assayers and Chemists, or for brazing, in which coal oil at 33 deg. to 45 deg., Beaume and 150 deg. fire test, or gasoline at 74 deg. test can be used for fuel. Adapted to crucible, muffle and brazing work. Price $6. For sale by

JOHN TAYLOR & CO.,
63 FIRST STREET, SAN FRANCISCO, CAL.

MINE AND MILL SUPPLIES.
Importers and Manufacturers of Assayers' Materials, Chemicals and Acids, Etc.
CATALOGUE ON APPLICATION.

IMPROVED BONE ASH.

It is 100% better than Bone Ash now being used; will absorb more lead, will never crack or split in the Muffle, can be dropped before or after using without breaking. Cupels can be made and used at once; no drying required. Excessive heat has no effect on them. Will stand shipping any distance. It takes up none of the precious metals in cupeling. Cupels much quicker. Once used always used. Sold under a positive guarantee or money refunded. Now being used by all smelters and assayers who have tried it.

Correspondence solicited.
Samples given if required.

J. J. CUMMINGS & CO., Sole Mfrs.,
Telephone Clay 972. 10 STEVENSON ST., SAN FRANCISCO, CAL.
For Sale also by Justinian Caire Co., Dealers in Assay Goods and Mining Supplies, 521-523 Market St.

PIONEER REDUCTION CO.
Established 1858. Nevada City, Cal.
Buyers of Gold, Silver and Copper Ores and Concentrates.
HIGHEST PRICES PAID FOR COPPER ORES.
WRITE FOR RATES.

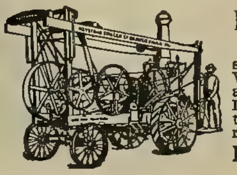
ESTABLISHED 1856.
Controls AND Check Assays
(A SPECIALTY.)
MARINER & HOSKINS,
ASSAYERS AND CHEMISTS,
Mining Engineers and Metallurgists.
81 South Clark Street.
Rooms 51-55,
CHICAGO, ILLINOIS.
SEND SAMPLES BY MAIL OR EXPRESS.
MAILING SACKS ON APPLICATION. : :

ST. LOUIS SAMPLING & TESTING WORKS,
1225 and 1227 Spruce St.,
ST. LOUIS, MO.

The Largest and Most Complete Ore Testing Works in Existence for Making all Kinds of Practical Working Tests of Ore, etc., to Determine the Most Suitable Method of Treatment.

PLANT FOR COAL WASHING, COKING AND STEAMING TESTS OF FUELS. ASSAYS, ANALYSES, CHEMICAL AND PHYSICAL INVESTIGATIONS OF ALL KINDS. MINERAL PROPERTIES, MINES AND METALLURGICAL PROCESSES EXAMINED AND REPORTED UPON. CORRESPONDENCE SOLICITED.

New Process of Copper Extraction.
CHEAP, CLEAN AND EFFECTIVE.
THE GARDINER LEACHING PROCESS
FOR COPPER ORES.
TESTS MADE ON ANY QUANTITY OF ORES AT REASONABLE RATES.
FULL PARTICULARS ON APPLICATION.
THE AMERICAN COPPER MINING & EXTRACTION CO., DENVER, COLO.



Prospecting Machinery.

Multitudes in use for testing for minerals. Sizes and equipments to suit any and all conditions. Unexcelled for Placer Testing, Oil Wells, Water Wells, testing for Lead and Zinc, Iron and Coal; goes through anything; brings up everything. Large sizes drill as much as 1500 feet. In use all over the world. Every purchaser pleased. Used on boats for testing river and lake beds. Water no hindrance. No skilled labor required.

KEYSTONE DRILLER CO., Beaver Falls, Pa., U. S. A.

Ammonia Process.

The practical success of this process is well known and is demonstrated chemically, technically and mechanically in every detail on a large scale. Refractory ores and tailings containing gold, silver, copper and zinc are extracted successful and profitable. Mail average sample and $10 and receive full report about the extraction.

Pocketbook, Ammonia Process, full description, $1.

Instructions in Chemistry and all successful and practical Lixiviation Processes.

Office and Laboratories:
334 KEARNY STREET, SAN FRANCISCO, CAL.
H. HIRSCHING,
Mining Engineer and Chemist.

THE JEFFREY MFG. CO.
Columbus, Ohio, U. S. A.

JEFFREY WATER ELEVATOR.
Best and Cheapest Pump for Irrigating and Drainage Purposes.
Estimates and Plans Submitted.

COMPLETE LINE
Elevating, Conveying & Power Transmission Machinery.

Western Branch,
Equitable Bldg.,
DENVER, COLO.

Send for Catalogue.

DENVER & RIO GRANDE R.R.
SCENIC LINE OF THE WORLD

The ∴ Mining Man's Favorite Route
BETWEEN
Denver, Colorado Springs, Pueblo and Florence, Cripple Creek, Leadville, Glenwood Springs, Aspen, Gunnison, Lake City, Creede, Durango, Silverton, Telluride and Ouray,

Reaching all the Mining, Milling, Cyaniding, Chlorinating and Smelting centers in Colorado and Utah, and all mining points in California, British Columbia and the Pacific Northwest by close connections and a perfect system of through car service.

Pullman Palace and Tourist Sleeping Cars between Denver and San Francisco and Los Angeles, and Pullman Palace and Tourist Sleeping Cars and Free Reclining Chair Cars between Denver and Portland. : : A Perfect Dining Car Service on All Through Trains. : :

For Illustrated Pamphlet, address

W. J. SHOTWELL,
G. A. D. & R. G. R. R.,
126 California St.,
San Francisco, Cal.

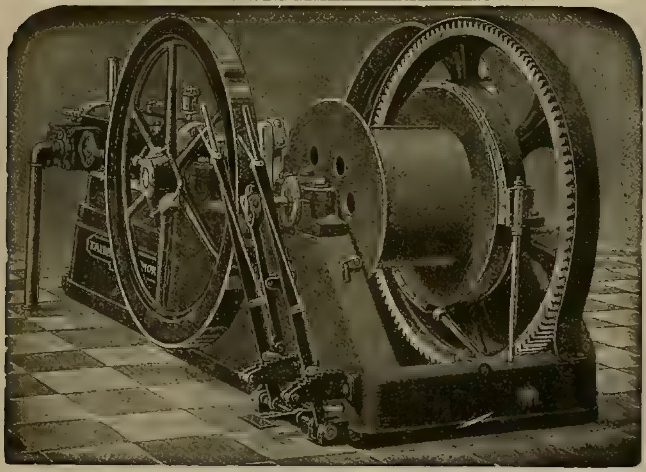
S. K. HOOPER,
G. P. & T. A.,
Denver,
Colo.

THE MINES OF
Eastern Oregon
Which are now attracting so much attention are reached only by the lines of the
OREGON RAILROAD & NAVIGATION CO.
For Descriptive Pamphlets, Through Rates, Etc., Address
E. C. WARD, Gen. Agt.,
630 Market Street, San Francisco.

COLORADO'S GOLD
Output for 1899 is unequaled by any State in the Union. Cripple Creek, Leadville, and all the important mining towns are reached by
THE COLORADO & SOUTHERN RY...
For copies of our publications on the Swandyke and Pine Creek Gold Districts, or our pamphlet "Hints to Prospectors," address
T. E. FISHER, GEN. PASS. AGT., DENVER, COLO.

J. M. HAYDEN & CO.
GLOBE BOX METAL
GRAND RAPIDS MICH.
THE BEST BABBITT

Notice the Shape of
GLOBE BOX---THE BEST BABBITT.
Send for trial order, Ladle free.
The Globe wire lace makes the smoothest joint, runs the stillest and lasts the longest of any lacing. Sent on approval. Write us for booklet with instructions, etc. J. M. HAYDEN & Co., 58 Pearl St., Grand Rapids, Mich.



FAIRBANKS-MORSE
GASOLINE-DISTILLATE GEARED HOISTER.

An efficient and reliable combination of a Fairbanks-Morse Gasoline-Distillate Engine on the same base with a Friction Hoist. Modern and up to date. We publish a special catalogue describing our Hoister which we gladly mail prospective purchasers.

FAIRBANKS-MORSE GASOLINE-DISTILLATE ENGINES.

ALL SIZES UP TO AND INCLUDING 54 HORSE POWER.
For Pumping, Milling, Lighting, Air Compressors, Etc.

FOR CATALOGUES AND FULL INFORMATION, ADDRESS

FAIRBANKS, MORSE & CO.,

310 MARKET ST., SAN FRANCISCO, CAL.
201 N. LOS ANGELES ST., LOS ANGELES, CAL.
FIRST AND STARK STS. PORTLAND, OGN.
1600 SEVENTEENTH ST., DENVER, COL.
FRANKLIN AND MONROE STS., CHICAGO, ILL.

THE MINE AND SMELTER SUPPLY CO.,
DENVER, - - COLORADO.
Mining and Milling Machinery and Supplies.

We beg to call your attention to

THE FINLAYSON PATENT
WIRE ROPE TRAMWAY—

the latest and best system of double-rope automatic aerial tramway in the market.
If interested in the most economical system of transporting ores from mine to mill and to shipping stations, send for our special tramway catalogue.

We carry a complete stock of Machinery and Supplies for immediate delivery.

Send for our special catalogues on Mining Machinery, Milling Machinery, Wilfley Concentrators, Tramways, Power Transmission Machinery, Machine Tools, Etc.

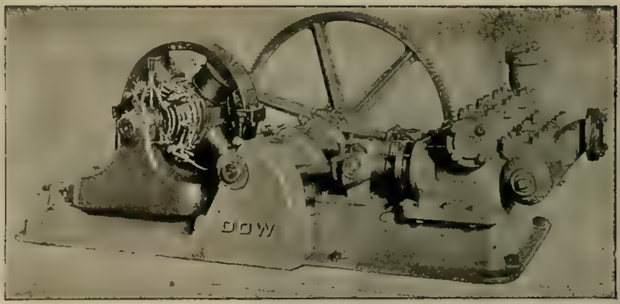
THE MINE AND SMELTER SUPPLY CO.,....................Denver, Colorado
THE MINE AND SMELTER SUPPLY CO.,...............Salt Lake City, Utah
THE MEXICO MINE AND SMELTER SUPPLY CO.,
No. 16 San Francisco St., City of Mexico.

BOILERS, ENGINES, STEAM HOISTERS, ELECTRIC HOISTERS, ROLLS, CRUSHERS, WILFLEY TABLES, CARS, CAGES, ORE BUCKETS, RAIL, PIPE, FITTINGS, BELTING, ETC., ETC.

GEO. E. DOW PUMPING ENGINE CO.
(Successors to DOW STEAM PUMP WORKS.)
108-120 BEALE ST., - - SAN FRANCISCO, CAL.

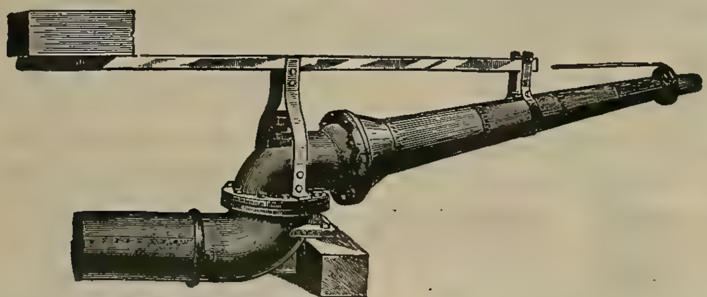
—MANUFACTURERS OF—

DOW PUMPS
FOR MINING PURPOSES,
Operated by STEAM, AIR, ELECTRIC or WATER POWER.
VERTICAL SINKING PUMPS, BUCKET OR DOUBLE PLUNGER PATTERN.
DEEP MINE STATION PUMPS.
PUMPING MACHINERY FOR EVERY POSSIBLE DUTY.



HOR. TRIPLEX MINE STATION PUMP WITH ELECTRIC MOTOR.

Double-Jointed Ball-Bearing Hydraulic Giants.



The above presents an improved **Double-Jointed Ball-Bearing Hydraulic Giant** which we build. The improvement consists of the introduction of a **Ball Bearing** by which the pressure of the water is reduced to a minimum and the direction of the nozzle changed at will with ease.

Catalogues and prices of our specialties of HYDRAULIC MINING MACHINERY furnished upon application. **JOSHUA HENDY MACHINE WORKS, 38 to 44 Fremont St., San Francisco, Cal.**

PIPE BARGAINS.

Suitable for Water Mains, Mining, Irrigation, Air, Oil, etc., etc. New Spiral Welded Asphalted Steel Pipe with any style coupling desired.

460 ft. 6-in. 3,480 ft. 10-in. 1,828 ft. 14-in. 1,077 ft. 18-in.
50,000 " 8 " 2,428 " 12 " 520 " 16 " 1,623 " 24 "

All Sizes Wrought Pipe, Well Casing and Straight Riveted Pipe in Stock. Equipment of All Kinds for Mine, Railroad and Contractors' Outfits. Write for Prices and Particulars.

BOWES & CO., 23 Lake St., Chicago, Ill.

THE WM. HAMILTON MANUFACTURING CO.,
LIMITED,
MINING MACHINERY,
PETERBOROUGH, ONTARIO,
CANADA.

CARY SPRING WORKS,
240 & 242 WEST 29th STREET, NEW YORK, U. S. A.

Telephone, 3346—38th St.

WIRE
SPRINGS
OF EVERY DESCRIPTION.

MANUFACTURERS OF
All kinds of ROUND AND FLAT
WIRE, TEMPERED AND
UNTEMPERED.
SPRINGS
For Machinery, Rolling Shutters,
Motors Etc.

MUSIC BOX AND FINE SPRINGS OUR SPECIALTY.

SELBY SMELTING AND LEAD CO.,

REFINERS OF GOLD AND SILVER BARS, GOLD DUST, ETC.

Buyers of Gold, Silver, Lead and Copper Ores, Gold Concentrates, Lead Bullion, Cyanide Product, Etc.

ORE AND BULLION ASSAYERS.

Works at VALLEJO JUNCTION, CAL. Office, 416 MONTGOMERY ST., SAN FRANCISCO, CAL.

THE IMPROVED BARTLETT CONCENTRATING TABLE.

The BARTLETT CONCENTRATING TABLE has been GREATLY IMPROVED recently by the substitution of iron in place of wood wherever possible. It is now built with SOLID IRON TOP, PLANED TO A TRUE SURFACE AND POLISHED; all parts are made by template and EACH PART BEING INTERCHANGEABLE. As now constructed, the table has no special wearing parts and will last for many years. It has a CAPACITY OF FROM FIFTEEN TO FORTY-FIVE TONS IN TWENTY-FOUR HOURS, according to the class of ore worked. It is the only table in the world which will take the place of jigs and do away with all costly and complicated machinery.

It is Especially Designed for Separating Zinc from Lead.

Send for our illustrated catalogue, containing all the latest information on the concentration of ores.

THE COLORADO IRON WORKS CO.,

Established 1860. DENVER, COLO., U. S. A.

THE

Pelton Water Wheel Company

Gives exclusive attention to the development and utilization of water powers by the most modern, economic and improved methods. An experience of more than fifteen years, involving both the theory and practice of hydraulic engineering as relates to power development in its widest range of application, is at the service of its customers.

Nine Thousand Wheels Now Running,

Averaging some 700,000 H. P.

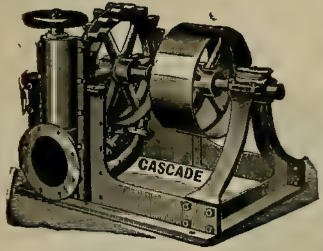
ELECTRIC POWER TRANSMISSION.

Pelton wheels afford the most reliable and efficient power for such service and are running the majority of stations of this character in the United States, as well as most foreign countries. Highest efficiency and absolute regulation guaranteed under the most extreme variations of load.

The Pelton Water Wheel Company,

121 & 123 MAIN STREET, SAN FRANCISCO, CAL.

TURBINE AND CASCADE WATER WHEEL



Adapted to all Heads from

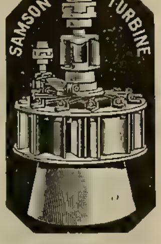
3 Feet to 2000 Feet.

Our experience of 38 YEARS building Water Wheels enables us to suit every requirement of Water Power Plants. We guarantee satisfaction.

State your Head and requirements. Send for pamphlet.

JAMES LEFFEL & CO.

SPRINGFIELD, OHIO, U. S. A.


SAMSON TURBINE.

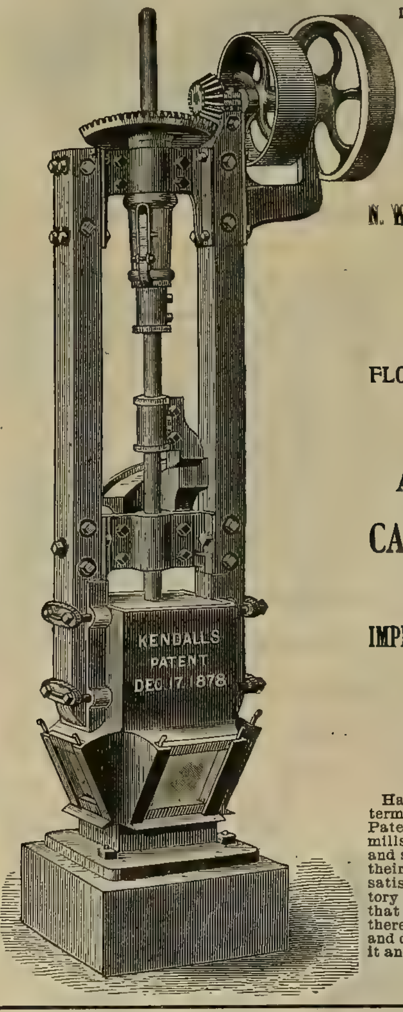
McFARLANE & CO.,

1734 FIFTEENTH ST., DENVER, COLO.

Mining and Milling Machinery.

STAMP AND CONCENTRATING MILLS BUILT AND ERECTED.

STEAM AND ELECTRIC HOISTS, CRUSHERS, ROLLS, REVOLVING SCREENS, JIGS, ORE CARS, CYANIDE TANKS, CORNISH PUMPS, CORLISS ENGINES.



L. C. MARSHUTZ. T. G. CANTRELL.

NATIONAL IRON WORKS,

N. W. Cor. Main & Howard Sts., San Francisco.

MANUFACTURERS OF

STATIONARY AND COMPOUND

ENGINES,

FLOUR, SUGAR, AND QUARTZ MILL

MACHINERY.

AMALGAMATING MACHINES.

CASTINGS AND FORGINGS

OF EVERY DESCRIPTION.

All work tested and guaranteed.

IMPROVED PORTABLE HOISTING ENGINES

Sole Manufacturers of

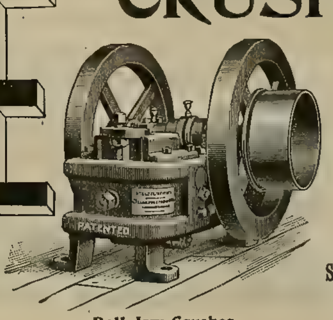
Kendall's Patent Quartz Mills.

Having renewed our contract on more advantageous terms with Mr. S. Kendall for the manufacture of his Patent Quartz Mill, we are enabled to offer these mills at **Greatly Reduced Prices.** Having made and sold these mills for the past 16 years, we know their merits, and know that they have given perfect satisfaction to purchasers, as numbers of commendatory testimonials prove. We feel confident, therefore, that at the prices we are now prepared to offer them, there is placed within the reach of all a light, cheap and durable mill that will do all that is claimed for it and give entire satisfaction.

MARSHUTZ & CANTRELL

Send for Circulars and Price List.

The ONLY **FINE CRUSHER** OF HARD ROCK.



Roll Jaw Crusher.

Reduces to Gravel and Sand.

Does as fine work as Breaker and two sets of rolls.

SEND FOR CIRCULAR.

STURTEVANT MILL CO.

113 CLAYTON ST.

BOSTON, MASS.

Founded by Mathew Carey, 1785.

HENRY CAREY BAIRD & CO.,
INDUSTRIAL PUBLISHERS, BOOKSELLERS & IMPORTERS,
810 Walnut St., Philadelphia, Pa., U. S. A.

☞ *Our New and Revised Catalogue of Practical and Scientific Books, 92 pages, 8vo; a Catalogue of Books on Steam and the Steam Engine, Machinery, etc.; a Catalogue of Books on Sanitary Science, Gas Fitting, Plumbing, etc., and our other Catalogues and Circulars, the whole covering every branch of Science applied to the Arts, sent free and free of postage to any one in any part of the world who will furnish his address.*

ASSESSMENT NOTICES.

MARIPOSA COMMERCIAL AND MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Mariposa County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 31st day of August, 1900, an assessment (No. 18) of Ten ($10) Dollars per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 320 Sansome street, room 24, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 10th day of October, 1900, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on THURSDAY, the 8th day of November, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

JOSEPH H. MOOSER, Secretary.

Office—320 Sansome street, room 24, San Francisco, California.

AMERICAN OIL AND REFINERY COMPANY.—Location of principal place of business, San Francisco, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 21st day of August, 1900, an assessment of ten (10) cents per share was levied upon all the subscribed capital stock of the said corporation, payable immediately to J. C. Anthony, secretary of said corporation, at its office, at room No. 323 of the Parrott building, Nos. 825 to 855 Market street, in the City and County of San Francisco, State of California.

Any stock upon which this assessment shall remain unpaid on the 26th day of September, 1900, will be delinquent and advertised for sale at public auction; and, unless payment is made before, will be sold on MONDAY, the 29th day of October, 1900, to pay the delinquent assessment, together with costs of advertising and expenses of sale.

By order of the Board of Directors.

J. C. ANTHONY, Secretary.

Office—Room 323 Parrott building, Nos. 825 to 855 Market street, San Francisco, California.

ALLIANCE EXPLORATION & MINING COMPANY.—Location of principal place of business. San Francisco, California; location of works, Ophir, Placer County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 3d day of August, 1900, an assessment (No. 3) of five (5) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 236 Sutter street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 11th day of September, 1900, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 2nd day of October, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

S. GOLDSMITH, Secretary.

Office—236 Sutter street, San Francisco, California.

POSTPONEMENT.

By order of the Board of Directors, the day of delinquence in the above assessment has been postponed to October 11th, 1900, and the day of sale to THURSDAY, the 1st day of November, 1900.

S. GOLDSMITH, Secretary.

Office—236 Sutter street, San Francisco, California.

MARINA MARSICANO GOLD MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Sunny Hill, Shasta County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 15th day of September, 1900, an assessment (No. 24) of 2 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, 217 Sacramento street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 23d day of October, 1900, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 12th day of November, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

CHAS. BOVONE, Secretary.

Office—217 Sacramento street, San Francisco, California.

DELINQUENT SALE NOTICE.

MAMMOTH GARFIELD GOLD MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Shasta County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment levied on the 5th day of June, 1900, the several amounts set opposite the names of the respective shareholders, as follows:

Name.	No. Cert.	No. Shares.	Amt.
Andrew Corbin	13	20,000	$3500 00
Philip Corbin	14	20,000	3500 00
Charles Glover	16	1,750	306 25
Jos. S. Silver	5	5	87
J. M. Spring	15	2,000	350 00

And in accordance with law, and an order from the Board of Directors, made on the 5th day of June, 1900, so many shares of each parcel of such stock as may be necessary, will be sold at public auction, at the office of the company, Rooms 54 and 59, No. 120 Sutter street, San Francisco, California, on TUESDAY, the 2nd day of October, 1900, at the hour of 2 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

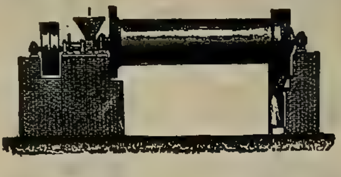
SAM W. CHEYNEY, Secretary.

Office—Rooms 54 and 59, No. 120 Sutter street, San Francisco, California.

PATENTS

Our U. S. and Foreign Patent Agency presents many and important advantages as a Home Agency over all others, by reason of long establishment, great experience, thorough system, intimate acquaintance with the subjects of inventions in our own community, and our most extensive law and reference library, containing official American reports, with full copies of U. S. Patents since 1872. All worthy inventions patented through DEWEY, STRONG & CO.'s Patent Agency will have the benefit of a description in the *Mining and Scientific Press*. We transact every branch of patent business, and obtain patents in all countries which grant protection to inventors. The large majority of U. S. and foreign patents issued to inventors on the Pacific Coast have been obtained through our agency. We can give the best and *most reliable* advice as to the patentability of new inventions. Our prices are as low as any first-class agencies in the Eastern States, while our advantages for Pacific Coast inventors are far superior. Advice and circulars free.

DEWEY, STRONG & CO.,
PATENT AGENTS,
330 Market Street, San Francisco, Cal.



THE DAVIDSEN PATENT TUBEMILL.

FOR FINE GRINDING,

Uniformity of Output, Effectiveness, Simplicity, or Economy of Operation and Maintenance, "THE DAVIDSEN" HAS NO EQUAL.

ENORMOUS GRINDING SURFACE. ✤ SLOW SPEED. ✤ ANY DEGREE OF FINENESS.

WRITE FOR CATALOGS.

F·L·SMIDTH & CO
ENGINEERS
66 MAIDEN LANE, NEW YORK
COPENHAGEN, VESTERGADE 29.K. LONDON. 9 BRIDGE ST., S.W.

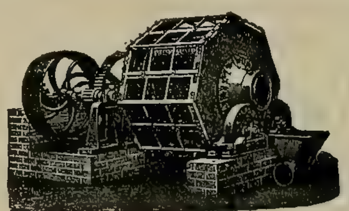
THE SMIDTH BALLMILL

Crushes, Grinds and Sifts in One Operation, Working Continuously.

AMONG ITS SPECIAL FEATURES OF MERIT ARE:

Maximum Output, Slow Speed, Low Horse Power, Absolute Uniformity, Ease of Access, Slight Cost of Repairs.

OUR AUTOMATIC FEEDER INSURES REGULARITY AND EFFECTIVENESS.

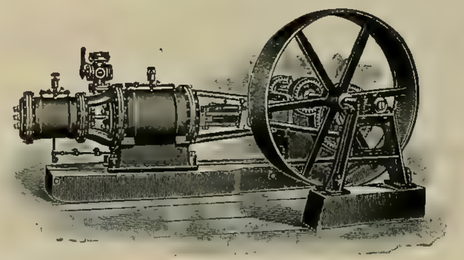


THE SMIDTH BALLMILL.

BEST. CHEAPEST. MOST SIMPLE.

WHY NOT have our catalogues, specifications and prices before you purchase

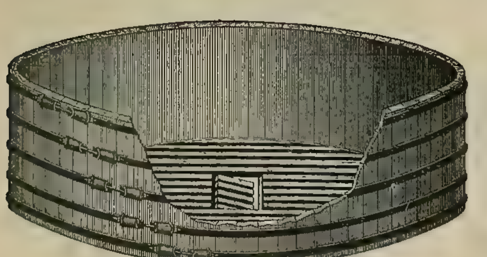
AIR DRILLS OR COMPRESSORS?



Our guarantees are strong; our customers are satisfied. We can satisfy YOU.

J. Geo. Leyner,
729 Seventeenth St.,
DENVER, COLO.

FOR CYANIDE PLANTS OR MINING—TANKS OF ANY DESCRIPTION.



Write to
PACIFIC TANK CO.,

348 E. 2nd Street, Los Angeles.
35 Beale Street, San Francisco.

Illustrated Catalogue Mailed Free.

HYDRAULIC, MINING AND DREDGING MACHINERY, RIVETED STEEL PIPE,

WRITE FOR PRICES AND ESTIMATES

AMERICAN IMPULSE WATER WHEELS, ETC.

WOLFF & ZWICKER IRON WORKS

PORTLAND
OREGON

THE MARION STEAM SHOVEL CO.,

Steam Shovels
Dredges and
Traction Dredges

Suitable for all kinds of **Excavating Work**, making a specialty of

PLACER MINING MACHINES,

separate or self-contained, either as a **dry land excavator** or **floating dredge.**

The Marion Steam Shovel Co.
MARION, OHIO.

GEO. W. BARNHART, No. 4 Sutter St., San Francisco, Cal.

MINE BELL SIGNALS. Adopted, Used and in Force in Accordance with Law.

We print in legal size, 12x36 inches, the Mine Bell Signals and Rules provided for in the Voorhies Act passed by the California Legislature. The law is entitled "An Act to Establish a Uniform System of Bell Signals to Be Used in All Mines Operated in the State of California, for the Protection of Miners." We furnish these Signals and Rules, printed on cloth so as to withstand dampness. **50 Cents a Copy.**

MINING AND SCIENTIFIC PRESS, 330 Market St., San Francisco, Cal.

Two Styles:
STAR and U.S.

Made in Brass Also. ★

STAR PATTERN for Heavy Pressure.
U. S. PATTERN for Ordinary Pressure.

We warrant them for all service where a quick reliable action is required.
It will pay you to investigate.
Full particulars from any jobbing supply house, or direct from the mauufacturers.

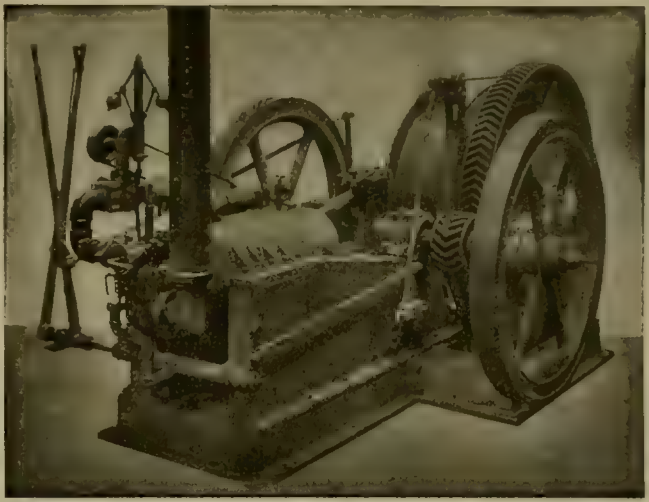
THE WM. POWELL CO., CINCINNATI, O.

D. Campbell Davies & Co.,
REPRESENTING THE LARGEST
EUROPEAN and AMERICAN
MANUFACTURERS
— OF —
Mills, Mine and Smelting Machinery Supplies.

EXPORT TRADE A SPECIALTY.

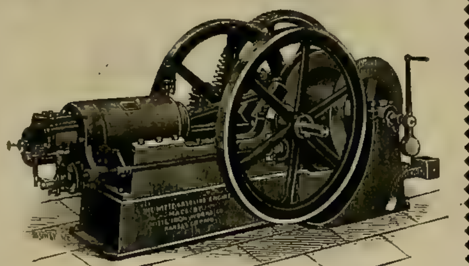
Apartado No. 83,
DURANGO, - - - MEXICO.

HERCULES HOISTS Are Sold the World Over.



Hercules Gasoline Hoist--Speed 385 Ft.; Load 2500 Lbs.

HERCULES GAS ENGINE WORKS,............141-143 FIRST STREET, SAN FRANCISCO, CAL.



WITTE GASOLINE HOISTS
ARE MONEY EARNERS.

Made for use in places far from factory. Are built in parts and in duplicate. Renewals easy and quick to get. Strong, substantial and reliable.

Operate on GAS, GASOLINE or DISTILLATE.

There Are Others, but None as SAFE AND RELIABLE.

Write for Illustrated Catalogue G.

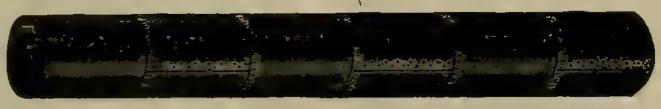
WITTE IRON WORKS CO.,
515 WEST 5th ST.,
KANSAS CITY, MO., U. S. A.

Hendrie & Bolthoff Mfg. & S. Co., Denver, Colo.
C. B. Boothe & Co., Los Angeles, Cal.
Tracy Engineering Co., San Francisco, Cal.

HERE'S THE "HOIST" THAT HOISTS---

The Weber Gasoline or Oil "Hoist." It is a money maker wherever used, and is especially adapted for mining, quarry and ship use. In sizes from 6 to 150 H. P., Single or Double Drum, operated on Gas, Gasoline or Distillate. Write for details, stating size wanted and for what purpose.

WEBER GAS & GASOLINE ENGINE CO.,
P. O. Box 1132-I,
Kansas City, Mo.

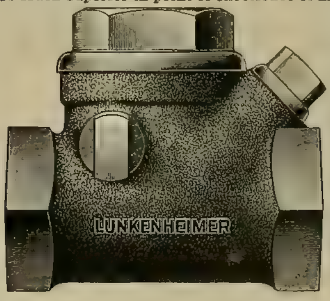


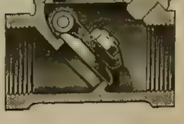
RIVETED IRON AND STEEL PIPE

FOR HYDRAULIC MINES, IRRIGATION AND POWER PLANTS. Manufactured from the best grades of IRON or STEEL by MODERN MACHINERY.

AGENTS FOR THE Celebrated CANTON STEEL.

Schaw, Ingram, Batcher & Co.,
539 Mission St., SAN FRANCISCO.
211 to 219 J St., SACRAMENTO.





THE LUNKENHEIMER
Regrinding Swing Check Valve

Is much superior in point of excellence of material, design and workmanship to any other valve of its class upon the market. The body is heavy and well proportioned, the seat is carefully finished and the workmanship is first-class. This valve is so designed that when the disc is raised the passage through the body is fully equal to the diameter of the connecting pipes.

By means of the regrinding feature the usefulness of the valve can be prolonged indefinitely. When worn in the seat the valve can be reground without removing valve from connecting pipes.

Made in brass, medium and extra heavy patterns, screw and flange ends ¼ to 3 inches. Iron body, brass mounted, screw and flange ends 2 to 6 inches. All valves are carefully tested and warranted.

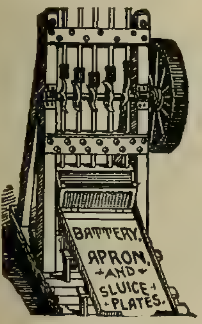
Specify "Lunkenheimer" make. Sold by dealers everywhere.

Write for Catalogue of Steam Specialties.

THE LUNKENHEIMER CO., Cincinnati, Ohio, U. S. A.,
SOLE MANUFACTURERS.

— BRANCHES: —

NEW YORK................26 Cortlandt Street
PHILADELPHIA............Bourse Building
LONDON, S. E.........35 Gt. Dover Street
MEXICO CITY, Puente de San Francisco No. 6

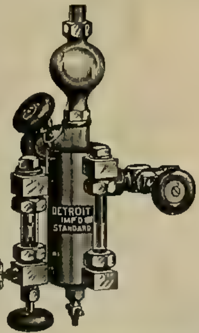


To Gold Miners!

Silver Plated Copper Amalgamating Plates
For Saving Gold in Quartz and Placer Mining.

ONLY BEST COPPER AND REFINED SILVER USED. OLD MINING PLATES BOUGHT OR TAKEN IN EXCHANGE FOR NEW PLATES. GOLD EXTRACTED FROM OLD PLATES AT A MODERATE COST. OLD PLATES REPLATED. GOLD, SILVER, NICKEL, COPPER AND BRASS PLATING.

Denniston San Francisco Plating Works,
652 Mission Street, Cor. Annie, San Francisco, Cal.
E. G. DENNISTON, ... Proprietor.
—:Send for Circular.:—

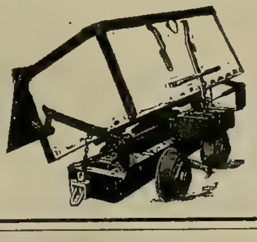


ALL ABOUT
Sight Feed Lubricators.

Our new catalogue for 1900 is ready for distribution. It explains in detail the principles governing the operation of **Sight Feed Lubricators**, using sectional view to show the internal construction, and containing cuts of the different styles in parts before being assembled into the complete lubricators, thus enabling every one to understand their construction and operation thoroughly.

In addition it shows our full line of **Glass Oilers, Oil Pumps, Oiling Devices, Multiple Oilers, Valves, Etc.** It will be sent to any address on application.

DETROIT LUBRICATOR CO., DETROIT, MICH.



OUR CARS HAVE BEEN IN USE FOR NINE YEARS.

TRUAX

CARS ALWAYS IN STOCK TO FILL RUSH ORDERS.

ORE CARS

CUT REPRESENTS OUR SIDE DUMP CARS.

SEND FOR PAMPHLET.

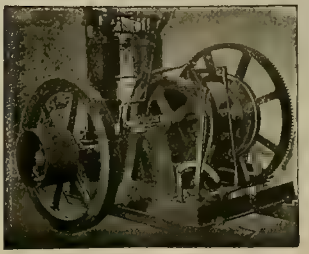
CARS MADE FOR ALL KINDS OF WORK.

TRUAX MFG. CO.
69 Stevenson St., S.F.

SMOOTH-ON
TRADE MARK
CASTINGS.

An iron cement for repairing leaks or fractures in steam or hydraulic work. When hard it will withstand a red heat, steam, water or oil, and expands and contracts with heat and cold the same as iron, insuring a tight joint at all temperatures. Difficult flange connections can easily be made with Smooth-On, as it adapts itself to the flanged faces whether parallel or not. Connections are easily taken apart. Unequaled for boiler patching, and repairing blemishes in iron castings. Write for catalogue and prices. Sole proprietors and manufacturers: Smooth-On Mfg. Co., Jersey City, N. J., U. S. A.

MESSRS. MADISON, BRUCE & SELLERS,
34-36 STEUART ST., SAN FRANCISCO, CAL......................AGENTS FOR PACIFIC COAST.



Mining Hoist.

THE GOLDEN GATE GAS ENGINE
Will raise more ore than any other AT LESS COST.

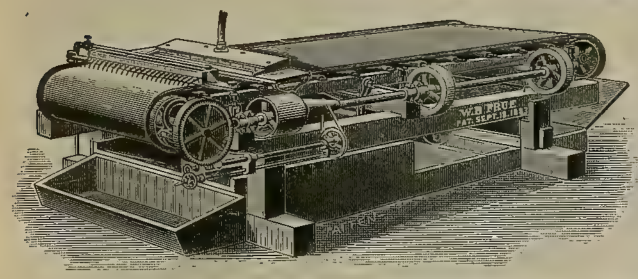
MANY IN USE, Giving Satisfaction.

Built for any Capacity and for any Purpose.
Pumping Water, Propelling Boats, Hoisting Ore, Machine Shop Power, Etc.

Send for Particulars and Catalogue.

ADAM SCHILLING & SONS,
213 & 215 Main St., San Francisco, Cal.

FOUR and SIX-FOOT FRUE VANNERS
With Brownell "Patent Lip" Flange Belts.



STANDARD MACHINE OF THE WORLD.

When a Concentrator like the Frue Vanner has been on the market nearly two decades, and the sales have constantly increased, it is safe to say it is the "Standard Machine of the World." More Frue Vanners have been sold during the last twelve months than for the same period at any time during the history of the machine. Practical mining men in all parts of the world where mining is carried on will testify as to its merits. It is the "standard" which all competitors are trying to imitate.

The results obtained by this machine are the "acme" of concentration, and several cheap and untried machines that have lately come on the market compare by it. The manufacturers will tell you that they are "just as good, and cheaper," etc. The facts are that no other concentrator made has an equal capacity, or will yield as clean a concentrate with as small loss in the tailings as the Frue Vanner. The amount saved from the lower first cost of an inferior machine counts little in the year's results, when compared with the increased output from a Frue. This machine not only gives better results at both ends of the belt (i. e., clean product and poor tailings), but is operated at less expense and requires less attention than any other machine on the market. At the Alaska-Treadwell mine, where they have ordered over 350 Frue Vanners, one man attends 48 machines for 12-hour shift.

FOR DESCRIPTIVE PAMPHLETS, ADDRESS

J. S. BROWNELL, Western Agent FRUE VANNING MACHINE CO.,
132 MARKET STREET, (Successor to Adams & Carter.) SAN FRANCISCO, CAL.

The Copper King, Limited.

Pacific Coast Smelting and Refining Works.

Works:
Seal Bluff Landing,
Cal.

Mines:
Fresno County,
Cal.

Purchasers, Samplers and Smelters
of
Gold, Silver and Copper Ores, and Furnace Products.

Offices:

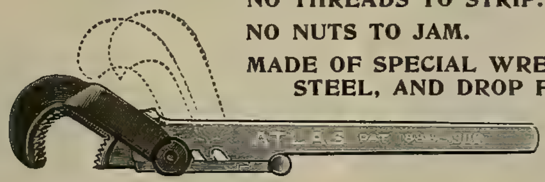
222 Sansome St.,
San Francisco, California.

Basildon House, 7-11 Moorgate St.,
London, E. C., England.

ATTENTION! USERS OF PIPE WRENCHES.

THE LATEST, BEST AND CHEAPEST PIPE WRENCH.

NO THREADS TO STRIP.
NO NUTS TO JAM.
MADE OF SPECIAL WRENCH STEEL, AND DROP FORGED.

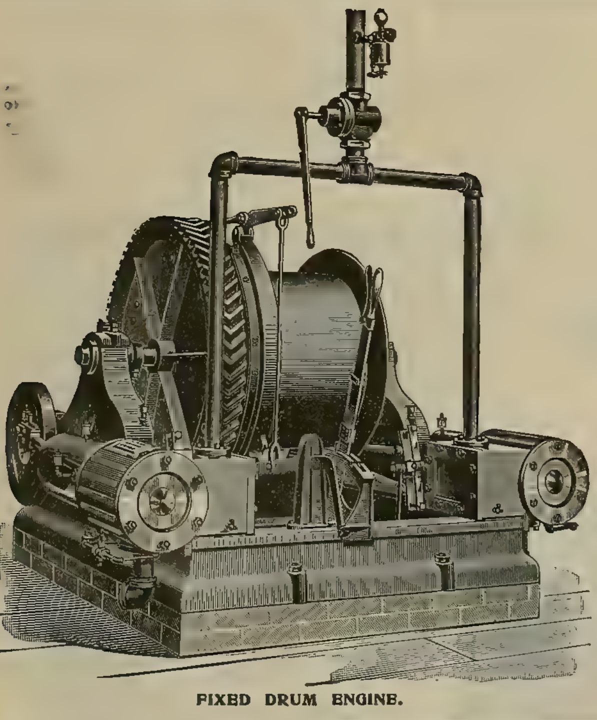


The good qualities of Chain Pipe Wrench and Screw Pipe Wrench combined, without the faults of either.

Quick, effective and positive in adjustment. Cannot slip, crush or lock on the pipe.

Made in four sizes: 10, 18, 24 and 36 inches. Handling from ⅛ of an inch wire to 4½-inch pipe. Price no higher than other pipe wrenches on the market.

ATLAS PIPE WRENCH CO.,
Flood Building, SAN FRANCISCO.
NEW YORK OFFICE, 121 LIBERTY ST. WORKS, NEW HAVEN, CONN.



FIXED DRUM ENGINE.

PARKE & LACY CO.,
21 and 23 FREMONT STREET, SAN FRANCISCO, CAL.

Hoisting and Pumping Machinery
...FOR...
MINE PROSPECTING AND DEVELOPMENT.
SOLE AGENT FOR THE
Ingersoll-Sergeant Rock Drills and Air Compressors.
LICENSEE FOR THE MANUFACTURE AND SALE OF THE
Ropp Straight Line Furnace for Roasting, Chlorinating and Desulphurizing Ores.
Huntington Centrifugal Roller Quartz Mill,
Simmons Ball-Bearing Hydraulic Giants, Paul Ball Mill.
WE CARRY IN STOCK
Horizontal, Vertical and Portable Engines and Boilers,
Rock Breakers, Cornish Rolls, Pulverizers, Concentrators, Ore Feeders,
Hoisting Engines, Horse Power Hoisting Whims, Water Wheels, Steam Pumps, Ore Cars, Wire Rope, Ore Buckets, Water Buckets, Skips,
Blowers and Exhaust Fans, Shafting and Pulleys, Belting, Oils and Mine Supplies.
SOLE AGENT FOR
Manganese Steel Shoes and Dies. Bullock Diamond Drills.
KNOWLES PUMPS AND PULSOMETER PUMPS.
Estimates Furnished for Complete Plants for Hoisting Works, Smelters, Concentrating and Stamp Mills.

DEWEY, STRONG & CO., Patent Agents, 330 Market St., S. F., Cal.

to be ...
the Library.****
CALIFORNIA STATE

MINING AND SCIENTIFIC PRESS.
AND PACIFIC ELECTRICAL REVIEW.

No. 2097.—VOLUME LXXXI. Number 13. SAN FRANCISCO, SATURDAY, SEPTEMBER 29, 1900. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

New Mexico Placer Syndicate's Experimental Dredger.—See Page 372, "Catching Black Sand."

High Explosives.

In the issues of June 23, 30, July 7, 14 appeared a series of articles on high explosives which gave considerable detail regarding their use, manufacture and properties.

The chief explosives in use are nitro-glycerine, gun cotton, dynamites consisting of nitro-glycerine combined in various proportions with various bases, blasting gelatine, explosive gelatines and gelatine dynamites consisting of various combinations of nitro-glycerine and gun cotton, with a mixture of niter, cellulose and soda. Besides these is the Sprengel group of explosives, which consists of two practically inert substances, which, upon being mixed, produce powerful explosives. One of these substances is usually a hydrocarbon. An infinite variety of explosives of this class has been produced. Whenever an announcement is made of a new high explosive, insensitive and powerful, with secret ingredients, one is likely to be correct in the assumption that it is of the Sprengel group. Among the better known of these are the following: Rack-a-Rock—chlorate of potash and a liquid hydrocarbon (dead oil). Bellite—ammonium nitrate, nitro-benzole and niter. Roburite—ammonium nitrate with chlorinated di-nitro benzole. Hellofite — naphthaline, phenol, or benzine in fuming nitric acid. Securite—meta di-nitro benzole with nitrate of ammonia or niter.

The composition of a sufficient number of this class of explosives has been given to indicate the variety of constituents which can be used in making high explosives of this group. They are all insensitive and require a powerful initial explosion to educe their full power. Those having nitrate of ammonium are likely to be objectionable and not of advantage in submarine work and places where water is present, owing to the hygroscopic quality of that salt, which tends to deliquesce, unless well protected from moisture. Two recent explosives, of secret composition, marsite and thorite, probably belong to this class. It is thought that the latter may be usefully employed for torpedo shells, but it is as yet a question whether it can be completely exploded when in large charges, so as to give an explosion of the first order.

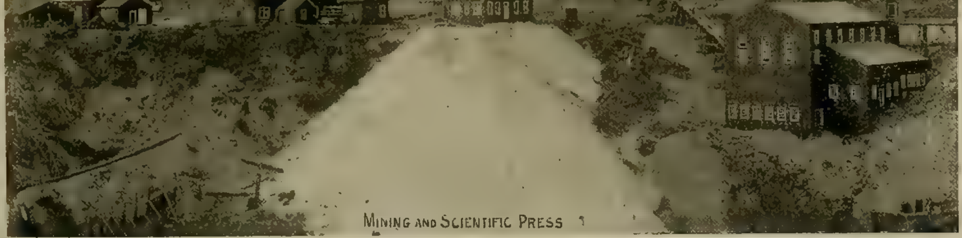
The picric acid class of explosives has attracted attention, more because of public notoriety than of intrinsic merit. Among these are: Melinite, for which the French have claimed so much, and lyddite, used by the English in the South African war. These are both essentially the same, consisting chiefly of picric acid combined with nitro-cellulose, and in some cases with cresilite, a coal tar product. Emmensite, another of the picric acid class, was experimented with, but has recently disappeared from sight.

The relative power of explosives is difficult to estimate, and authorities differ regarding it, for there is a notable difference in the results obtainable, depending on the physical conditions attendant upon the placement of the explosive and the means and method of the initial explosion. Some confinement of tamping is essential. The difference in the results secured between an explosion in the open and when covered, however slightly, is great, and is to be borne in mind by those using explosives for industrial purposes. The same amount or degree of tamping is not necessary for the high explosives as for gunpowder, and much needless and dangerous work might be avoided were due consideration given to this point of difference.

The following table is given as showing the relative force of the various high explosives, submarine work excepted, gunpowder being taken as one: Gunpowder 1, gun cotton 5.5, nitro-glycerine 12, explosive gelatine 14, blasting gelatine 16, dynamite (No. 1) 10, bellite (Sprengel) 6, roburite (Sprengel) 3, melinite 3, lyddite 3.

There is nothing definite nor positive about such comparative tables. A writer in an English technical journal on the same subject gives the following table: Gunpowder 1, nitro-glycerine 4, dynamite 5, gun cotton 5, explosive gelatine 6. The difference between the two tables is noticeable. All such comparisons must be accepted as rough approximations, since the same explosive under apparently similar conditions gives discordant results, for exact measures of the forces developed by explosives are impossible.

Experience and observation show that the energy of a high explosive depends considerably upon the character of the detonation by which the main explosion is secured, and one ounce of gunpowder, even when strongly confined, exploded in contact with gun cotton only inflames it, while ten grains of confined fulminate of mercury produces full explosion of the gun cotton. That the energy of explosion depends upon the nature and force of the initial explosion is probably true of all explosives, including gun cotton. A too low initial explosion will simply produce a rapid burning, instead of a detonation of the explosive. High explosives are subject to sympathetic explosions; that is, explosions of detached quantities of the material through the detonation of adjacent explosions. The effect of all explosives is increased by their being surrounded with a resisting medium. There are some singular phenomena noted in connection with explosions. One noticeable incident is cited in connection with the cutting of the Chicago drainage canal. The final bottom in a rock cut about 16 feet deep was being made by the removal of a depth of cutting of about 6 feet. The material was a close-grained limestone. By the use of a channeling machine the rock to be removed had been previously cut off vertically from the sides of the excavation. The face of the rock to be removed was nearly vertical. A row of holes quite near together had been drilled in a straight line across the cut, parallel with and about 6 feet back of the face. After the holes were loaded with dynamite they were simultaneously fired by electricity, throwing off a mass of rock back to the line of holes. After the blast, examination showed a plainly defined crack extending entirely across the cut, nearly parallel with and about 6 feet back of the line of holes which had been fired.



Sampling and Reduction Works, Republic, Wash.—See Page 372.

MINING AND SCIENTIFIC PRESS.

ESTABLISHED 1860.

Published Every Saturday at 330 Market St., San Francisco, Cal.

ANNUAL SUBSCRIPTION:

United States, Mexico and Canada	$3 00
All Other Countries in the Postal Union	4 00

Entered at the S. F. Postoffice as second-class mail matter.

J. F. HALLORAN	Publisher.

Special Representatives:

EASTERN.	
E. H. HAVEN	150 Nassau St., New York City.
MIDDLE WEST.	
CHAS. D. SPALDING	153 La Salle St., Chicago, Ill.
INTER-MOUNTAIN.	
W. A. SCOTT	43 Jacobson Building, Denver, Colo.
SOUTHERN CALIFORNIA.	
W. D. CURTIS	223 W. Second St., Los Angeles, Cal.

San Francisco, September 29, 1900.

TABLE OF CONTENTS.

ILLUSTRATIONS.—New Mexico Placer Syndicate's Experimental Dredger; Sampling and Reduction Works, Republic, Wash., 369. A Coal Conveyor, 374. Latest Mining and Metallurgical Patents, 375.
EDITORIAL.—The "Scrip" Decision; Awarded the Grand Prize at Paris; The Stealing of Valuable Ore; Miscellaneous, 369.
MINING SUMMARY.—377-378.
LATEST MARKET REPORTS.—379.
MISCELLANEOUS.—High Explosives, 369. Concentrates, 371. Republic Sampling and Reduction Works; Blast Furnace Smelting; Catching Black Sand, 372. The Metallurgy of Zinc; The Etard Chlorination Process, 373. A Coal Conveyor; "Pure Water is a Poison;" American Miners in Korea, 374. Latest Mining and Metallurgical Patents, 375. To Splice a Wire Rope; Metric System and Equivalents; Mixing of Concrete; Some Facts About Steel; A Celebrated Case, 376. Personal; List of U. S. Patents for Pacific Coast Inventors; Notices of Recent Patents; Recently Declared Mining Dividends; Books Received; Catalogues Received; Commercial Paragraphs, 379.

Up to 1850 the United States was a nation of poor men. Mining began to put out great increase of natural wealth, and the national prosperity is directly and indirectly due to such output and mineral development. Mining has done a great deal for the nation, but the nation has done very little, comparatively, for the mining industry.

◆

It is recommended by thoughtful miners that it would be a needed additional safeguard against fire were a small building away from the main mine plant to be provided for a pump house. Of late several fires have been noted in mine plants that caught close to the pump, and with such suggested arrangement in case of fire connection could be made surer, with increased chance of saving the buildings.

◆

The difference between theory and condition is exemplified by the approved suggestion throughout British Columbia that the provincial tax on metal ores be made differential; that is, practically, that the tax be doubled in the case of ores sent out of the province for treatment, the idea being to encourage local smelters, which, in the main, is a good plan, but under existing conditions in British Columbia is not to be given serious consideration.

◆

When accumulated debris from the wash of the land occasioned by the development of the country and mining operations since 1849 covered some land along the Yuba and Feather rivers, Cal., it was loudly claimed that as a resultant the land was not worth 10 cents a square league. Now when the Government wants 3500 acres of this land to build dams and restraining barriers, this "worthless" land is held at figures up to $100 per acre.

◆

Tesla has so injured his prestige by premature and impracticable assertions that his announcements in the field of electrical discovery do not attract the attention they formerly commanded. His latest claim is to have successfully overcome the cause of electrolysis, and he has an invention designed to prevent the escape of electricity from a wire. He claims that he can insulate the wire by passing through it or near it air kept at a low temperature, producing a coat of ice on the wire which cannot be broken through by the strongest currents, and at the same time gives an insulation that costs practically nothing. By means of this the loss of electricity or electrical energy in transmission, it is claimed, can be rendered so small as to be insignificant, and power can be transmitted to great distances by means of underground wires. So far it is only a claim, but on a subject of surpassing interest to the electrical world.

The "Scrip" Decision.

That nothing is ever settled until it is settled right is again shown by the decision this week at Los Angeles, Cal., by Judge Ross in the U. S. Circuit Court in the case known as "the scrippers' suit," involving the right of "scrippers" to file upon oil land as agricultural land prior to the discovery of oil thereon. Judge Ross rules squarely against the scrippers. His former decision was based largely on legal technicalities and the letter of the law. Last Monday's ruling is based as largely on equity and the spirit of the law. In his decision he reviews the affidavits made by the scrippers that the lands filed upon by them were not mineral or claimed for mining purposes, and that their application therefor was not made for the purpose of fraudulently obtaining title to mineral land, but with the object of obtaining the same for agricultural purposes, and declares these affidavits to be manifestly false, holding that had the applicants stated that they wanted them for that purpose, and desired to select them under the law authorizing agricultural lands to be taken in exchange for lands situated within a forest reservation surrendered to the Government, the officers of the local land office would doubtless have refused to file or receive the selection of such land under the forest lieu land Act.

It is to be noticed that Judge Ross has injected an element of common sense into his ruling, where he holds that the "scrippers" could legally file only on lands "vacant and open to settlement," going on to exempt public land containing mines "of any mineral" from such locatable area. The cause of the bona fide prospector and miner has been aided by Judge Ross's decision.

The complainants had alleged the non-mineral affidavits were not required by law, but Judge Ross declares the fact remains that such affidavits were made and constituted a representation and one of the means by which the selectors sought to secure the lands, and, having been made for the purpose of evading and defeating the law, his court will not lend its aid toward securing the fruits of the fraud.

The statute under which the scrippers filed is a plain standing offer on the part of the Government to exchange any of its lands that are vacant and open to settlement for a like quantity of similar land within a forest reservation, for which it had previously issued a patent or to which an unperfected bona fide claim had been acquired.

In all cases the land authorized to be selected in lieu of that relinquished is required to be vacant and open to settlement. Vacant public land is open to settlement only when it contains no known salines or mines, whether of gold, silver, petroleum or any other mineral.

It is, to say the least, doubtful if any persons authorized to select vacant lands only are authorized to select lands in the actual bona fide occupancy of others under the settlement laws or under a mining location, even though the location be invalid by the absence of a valid discovery of mineral.

Whether the lands in controversy should be classed as mineral or agricultural is a question for the determination of the Government. The lands in controversy were surveyed by the Government in 1854 and returned as agricultural, but Secretary of the Interior Teller, in a communication to the General Land Office, speaks at large of the notations of surveyors, saying they are prima facie evidence only of the character of lands and subject to rebuttal by satisfactory proof of the real character of the land; and the determination of the real character of land is subject to revision by the Commissioner of the General Land Office, and an appeal from him by the Secretary of the Interior. And the rule to be adopted is that they will be considered agricultural or mineral according as they are more valuable in the one class or the other.

In view of the late increase in the development of California's oil wealth, the matter is of considerable importance. Judge Ross's decision checks and rebukes the wholesale effort to absorb the territory in question by perversion of what was intended to be a just and salutary law. The decision is favorable to the miner and commands respect.

In accordance with its usual custom of going into detail in all things affecting the mining interests, this paper in the earlier part of the present year published a complete exposition of the subject— "Scrip, and the Law of Title to Oil Lands"—which ran through the issues of April 7, 14 and 21, and gave the whole subject fullest and fairest discussion.

The lands in question have been withdrawn from public entry by the General Land Office; a U. S. judge has checked their spoliation. It is now in order for the real developers of the mineral wealth, the petroleum miners of California, to have suitable congressional action next winter. Nothing but alteration of the present law governing that subject, by the national legislature, will insure permanent relief from attempts at similar encroachment.

◆

Under date of Aug. 31st the U. S. Commission to the Paris Exposition of 1900 takes pleasure in informing the Mining and Scientific Press that, in accordance with the official announcement of the awards at the Paris Exposition, this paper is "entitled to use the award of grand prize." While, of course, the Mining and Scientific Press expected an award of some kind of "grand prize" at the Paris Exposition, yet, without desiring to detract in the slightest from courteous appreciation of the honor accorded this paper at Paris, it is not as highly valued as was the prize awarded to the Mining and Scientific Press by the World's Columbian Commission on the occasion of the World's Fair at Chicago, when a special award was made to this paper—the only one of the kind accorded to any journal exhibiting there, the award being in the official language of the Commission: "For the general reliability of its news and the clear and intelligent editorials therein. * * * * Favorably known for the fullness and accuracy of its weekly reports of the progress of mining." Probably when fuller reports come from Paris as to the manner of award, it may be that in the case of the Mining and Scientific Press the World's Fair at Paris has been as complimentary in its reference to this paper as was its predecessor at Chicago.

◆

On page 378 is an item from Cripple Creek, Colo., regarding the stealing of valuable ore by miners employed in the Elkton mine, which constitutes a very good advertisement for the mine in question, and recalls an unauthenticated statement regarding the sale of a mine in Shasta Co., Cal., some years ago, which was not of itself a gilt-edge proposition, but was being worked in the hope of possible profit resulting from development. In some way the story got out that the mine was being systematically robbed of ore by men in its employ, and one of the first things told to a prospective purchaser, brought there by the owner, was how shamefully the latter was being robbed, being too easy a man for such smart ore thieves as his superintendent employed. The sale of the mine was quickly made, and the stories regarding the alleged ore thieves as quickly ceased, there being apparently no further reason for their continuance.

◆

Looking through some old files of this paper and reading therein accounts of building and installation of mining and metallurgical plants that in their day were up to date, it is noticeable how archaic and far off it all seems now, though then they were considered quite the thing; and the thought naturally comes, when, in 1920, the present issues of this paper are looked into as dusty files of twenty years past, will the modern appliances now described seem so obsolescent as those of 1870 and 1880 seem now? The contrast emphasizes the advance and progress in mining and metallurgy.

◆

An interesting case comes up this week before the U. S. District Court for the northern district of California, being an application of the Government for an injunction to restrain the Mountain Copper Co. at Keswick from causing sulphur fumes or requiring it to put in some device to condense them. This course is taken to institute a suit for alleged damage to vegetation in the vicinity of the works. Such suit has long been threatened, and the matter might as well be made the subject of judicial determination now as any time.

◆

In January, 1898, in a magnificent way, was celebrated in San Francisco the fiftieth anniversary of the discovery of gold in California, and the event had commemoration commensurate with its importance. It was largely a celebration of the hydraulic mining of gold. In the present year occurs the fiftieth anniversary of quartz gold mining in California, a form of the gold mining industry that has not reached in California its fullest development and that will inure to the State's prosperity in a permanent and enduring manner.

Concentrates.

U. S. GOLD COIN is 21.6 carats fine.

COLORADO IRON ORE is largely used for flux by gold and silver smelters.

INTENDING visitors and others can have their mail addressed care this office.

IN silver production probably 10% is now produced by pan amalgamation and tank lixiviation.

THE Garretson copper smelting furnace was illustrated and described in the issue of Jan. 21, 1899.

A MINING CLAIM is a franchise from the people and should be either worked, patented or forfeited.

SILVER losses in cupellation are generally assumed to be due to absorption by the cupel, and volatilization.

THE amount of air required to consume in a gas engine 1000 cubic feet of natural gas of average composition is 10,870 feet.

THE shipments of lead concentrates from the Cœur d'Alenes during August is understood to have aggregated 15,300 tons.

A CUBIC FOOT of air temperature 56° F., barometer 30 inches, weighs .077 pound; at 80° F., barometer 31 inches, it weighs .076 pound.

THE underlying fact in the present action of the American Smelting & Refining Co. is a guarantee of $4 for lead produced during 1900.

CHEMICALLY pure zinc does not decompose water to any appreciable extent; commercial zinc is violently attacked by even slightly acidulated water.

THE Arizona law authorizing the recording of mining claims with the recorder of the county in which the claim is situated, went into effect July 1, 1895.

MERCURY will evaporate at any temperature above 42° F. Its low specific heat—.033° F.—is what makes it so extremely sensitive to changes of temperature.

IT is ultimately more satisfactory to have the ore valued by the smelter than by the assay returns, where quantity is more important than simple specimens.

THE Rand gold production has all along been given in crude ounces, as the gold comes from the plates or vats. United States gold production is given in ounces fine.

THE Government fee for the filing of certificates of improvements prior to the giving of Crown grants on mining claims in British Columbia has been raised from $10 to $25.

A CHANGE of temperature from 5° F. to —20° F. will cause a 30-foot 85-pound railway rail to contract .1 inch; a change from 5° F. to 70° F. will cause it to expand $\frac{1}{17}$-inch.

A "MINERS' INCH" is equivalent to one-fortieth of a cubic foot of water per second. It takes 4 miners' inches at 100 feet pressure to obtain 1 H. P.; that is, 6 cubic feet per minute.

ONE PER CENT carbonic oxide in air is liable to occasion death if inhaled. Gunpowder explosion and underground ignition of fuel produces this gas with insufficient ventilation.

WITH fairly good water it takes years to scale a boiler, but once scaled it will scale every three months or so, as the skin of the iron is gone. Kerosene or caustic soda is not recommended.

GASOLINE ENGINES are made that supply power at one-tenth of a gallon of gasoline per H. P. per hour. They are economical motors in any country, and invaluable where water is scarce.

EXPLOSIVES are only comparatively safe so long as they are treated as dangerous. To put this into practice is to approximately insure immunity from accident; to neglect it is to court disaster.

NO RIGHT can be initiated on government land which is in the actual possession of another by a forcible, fraudulent or clandestine entry thereon for the purpose of locating it as a mining or other claim.

A CUBIC FOOT OF LEAD ORE weighs 674 pounds. Thus a vein of galena, 1 foot wide, 6 feet high and 6 feet long (a fathom) will produce 16,582 pounds, or a vein $1\frac{1}{2}$ inches wide will net one ton to the fathom.

SO FAR as known the Belgian Government is the only one having an official rule that when men are being hoisted or lowered in a mine shaft a capable assistant is required to stand by the engineer to replace him in case of sudden indisposition.

CAREFUL sizing of pulp from batteries before sending it onto a concentrating machine gives good results. It is not reasonable to expect to save coarse and fine sulphurets on a single belt or table with an equal volume of water and the same grade.

WHILE it is not necessary that a locator should be the first discoverer of mineral upon the land, in order that a prior discovery by another shall inure to his benefit, and give validity to his location, it must have been known to and adopted and claimed by him.

WHERE a locator of a mining claim on government land fraudulently antedates his notice of location for the purpose of defeating an actual locator thereon, such location is fraudulent as against such rightful claimant, and it is also fraudulent as against the Government.

ANY journal published anywhere, any time can refuse to publish any advertisement and is not obliged to give its reasons. Probably the journal mentioned correctly concluded there was a certain style of patronage that it could not afford to take, considering the interests of its readers.

IN September, 1899, Cripple Creek, Colo., mine dividends aggregated $733,500; it is thought that the dividends for the current month will aggregate double that amount. In 1899 Cripple Creek mines paid a total of $4,354,402 in dividends. The 1900 total is estimated at $7,000,000.

ELECTRICAL underground concentration sounds attractive, and the idea is not to be condemned, but it would take great and expensive experimental work to demonstrate its economy. The one insuperable objection would seem to be the entailed watering and unwatering of the property.

CORROSIVE action of mine water on iron pipe is frequent. In some cases, as at the Stanley mine, Idaho Springs, Colo., the corrosion of the iron is attributed to the copper and ferric sulphate. In the case cited after a trial of iron, lead, copper, bronze and wood pipe, the latter was found most satisfactory.

THE plans of the Comstock Pumping Association are understood to mean even more than the mere unwatering of the flooded levels, which work is going steadily on. It is conceived that sinking the Osbiston or Combination shaft to a depth of 5000 feet would demonstrate the existence of large ore bodies at that depth.

IN smelting electrically, "black lead" or plumbago crucibles are used, the pot standing on a heavy copper plate connected to one pole of the dynamo, another copper plate acting as a cover for the pot and to which the other pole of the dynamo is attached. The heating of the charge is by radiation, as in a muffle furnace.

ALL money orders may be cashed at any money order office at which they may be presented, irrespective of the office on which they are drawn. In all cases the owner must be identified. At the office on which a money order is drawn the order must be cashed as soon as it is presented, even if the advice has not yet arrived.

ALL explosives containing nitro-glycerine freeze at a comparatively high temperature, are generally in a frozen state, and must be thawed before they can be of any use. How to make a simple and effective thawer has been repeatedly published herein. The Hendrie & Bolthoff Mfg. Co., Denver, Colo., make an excellent thawing device.

A CEMENT for a crack in an iron tank is made as follows: Five parts brimstone, two parts black lead, two parts sifted cast iron filings; melt together (taking care that the brimstone does not catch fire); have the crack absolutely dry; heat the damaged part with a red-hot piece of iron; heat the cement in a melting ladle till soft; then apply.

THE Supreme Court of the United States, in the case of Chambers et al. vs. Harrington (III U. S., 310) held "that when adjoining claims to mineral lands are held in common work for the benefit of all done upon one of them in a given year to the amount required to be done upon all in that year meets the requirements of Sec. 2324, United States Revised Statutes."

PLATINUM ore is a complex body, consisting of the metal in combination with varying proportions of other members of the platinum group, iridium, rhodium, palladium, ruthenium, osmium, with from 4% to 20% iron. Russia is the only country where platinum ore is mined. The Pacific coast platinum is found in alluvial deposits, generally associated with osmoiridium.

PROBABLY the best way to settle this whole public land question, including corporate absorption of the mineral area of California and other States, is for the Federal Government to turn all the public lands over to the States in which they are situated. Federal administration of public lands in this west half of America has rarely been right and has often approximated to fraud.

THE usual method of removing mill scale from forgings and plates is to place the iron in a solution containing one part of hydrochloric or sulphuric acids to ten parts of water, for from four to twenty hours. An electrical process with varying success is to use a solution of sulphate of soda, the plates to be cleaned forming a negative electrode and an iron plate the positive electrode.

AGRICULTURAL PATENTS obtained between 1866 and 1872 were granted subject to the condition of the extralateral right attached to an apex in adjoining mineral land. The right of the holder of a valid lode location to follow the dip of the vein into adjoining agricultural land has been passed on adversely by a U. S. circuit judge, but the question has never been decided by the U. S. Supreme Court.

IT is not unlikely that resumption of work in the South African mines will see successful effort to put in practice the proposition to sink to a depth of 8000 feet. Relay winding stations, electricity, the ingenuity of the American mining engineer, and the maker of American mining machinery will furnish successful solution to the problem, though it involve new questions in ventilation, pumping and hoisting.

PETROLEUM REFUSE has been successfully solidified for use as fuel. In one process about 10% of soda lye, with 10% fatty matter, is treated in a boiler, and enough petroleum refuse added to the heated mass to make 100 parts. This mixture is heated under constant stirring for one hour. The temperature is kept just under the boiling point of petroleum. In this incipient stage of saponification the mass acquires the property of taking up large quantities of oil. The mixture is run into moulds, cooled and cut into any desired form.

TO PUT a California mining location on record so as to protect the locator, in case of jumping, since the law of 1897 was repealed, in the absence of a local mining district and a recorder (as prior to the law of 1897), the Civil Code of California, Section 1,159, provides that all notices relating to mining claims may be filed with the county recorder, which will give the public due notice. A plain preliminary notice on a claim and recording, as stated, should give the locator protection.

LIKE all other accomplishments of modern civilization, machine tools in their present form are the result of a process of slow development; a machine does not spring full-fledged into being, but is gradually differentiated from the original type, gaining here and there a useful member and losing here and there a superfluous one. Many of our modern machines illustrate "the survival of the fittest" and adaptation to environment, changed and modified by a thousand years of trial.

GALENA introduced into a bath of molten anhydrous zinc chloride results in a double decomposition with the formation of zinc sulphide and lead chloride, any silver present being contained in the latter. Metallic zinc added to the melt will result in the formation of argentiferous lead, with the regeneration of a fresh quantity of zinc chloride. An alternate method consists in the leaching out of the zinc chloride and silver by water, leaving chloride of lead behind, which is ultimately to be recovered.

THE Supreme Court of California has decided that "an appropriation of water by means of a ditch is not measured by the capacity of the ditch, but is limited to such quantity, not exceeding its capacity, as the appropriator may put to a useful purpose; and no matter how great in extent the original quantity appropriated may have been, any amount less than the whole amount appropriated which has not been devoted to a beneficial use within five years is lost and forfeited as against a subsequent appropriator thereof."

IT has long been noted by millmen that amalgam contains more gold in winter than in summer. This has been ascribed to the warmer water in summer, making the amalgam more fluid; amalgam retorting 40% in summer may retort 45% in winter. Experiment does not conclusively demonstrate that there is a temperature at which the affinity of quicksilver for gold is at a maximum, but experiment does seem to show that in battery amalgamation there is a greater saving of fine gold at a temperature of 50° F. battery water than at a temperature of 60° or 70°.

A "LAID" ROPE consists of a core composed of a strand of either hemp or wire, around which are twisted six strands, each containing a similar core covered with six individual wires. A "formed" rope comprises six strands laid around a core as explained above, but each strand containing a larger number of component wires. Around the six strands above mentioned a further outside layer of twelve is laid, thus making eighteen strands in all, independent of the core. A "cable laid" rope consists of "laid" ropes closed together to form one cable, as in the ordinary hemp roping.

A MINING blacksmith and tool sharpener says: I used to temper drills to bore diorite. I half filled a bucket with clean water and spilled about a half a pint or more (if it was plentiful) of muriatic acid into it and mixed it thoroughly. I then warmed the drills just red, cooled them up about $\frac{3}{4}$-inch and let them come down to a straw color. I have seen a drill bore several inches tempered in this way, where half an inch would dull it if tempered in the ordinary way. It will help the boring considerably if camphorated turpentine is used instead of water to keep the bore wet. Camphorated turpentine is made by dissolving camphor gum in turpentine.

THERE are three ways of converting oxygen into ozone. If a stick of phosphorus be left in a closed bottle half filled with water for several days ozone will be found in the enclosed air. This is the chemical method. If a solution of sulphuric acid in water be electrolyzed with platinum or gold electrodes, ozone will be found at the surface of the anode. This is the electrolytic method. If electricity at high potential be discharged through air ozone will be produced. This is the electrostatic method. Whenever a frictional electrical machine is worked small quantities of ozone are evolved. It is produced for industrial purposes chiefly by the electrostatic method.

IN emery the abrasive material is crystallized aluminum oxide; in carborundum it is carbide of silicon. Although carborundum is much harder, its crystalline structure is less favorable for grinding than is emery. The crystals of carborundum are long and narrow, with few cutting edges and smooth faces, while emery crystals are nearly cubical and have rough surfaces. Perhaps the greater hardness of carborundum is offset by the better cutting properties of the emery. This is also indicated by the difficulty in keeping carborundum wheels from glazing when too much slag is used in making them. Emery has the advantage over carborundum for grinding or polishing purposes in all cases except where the finest grades are used. For the latter carborundum seems to be better.

Republic Sampling and Reduction Works.

Written for the MINING AND SCIENTIFIC PRESS by D. JACKLING.

The accompanying illustration* shows in a general way the design and arrangement of the sampling and reduction works of the Republic Consolidated Gold Mining Company, at Republic, Washington, which are now nearing completion.

The small building in the center foreground is the machine shop; the small building on the right is the assay office and laboratory, and the one on the left the storehouse. The main artery of the mine, No. 4 tunnel, runs under the right hand end of the mill. The mouth of it may be seen between the machine shop and assay office. A connection has been made, however, back about 100 feet, turning at right angles, and coming to the surface near the right hand side of the sampler, under the tramway from sampler to main mill. There are two other tunnels tapping the vein, at depths of 200 feet and 380 feet, respectively, the dump from the lower one of which is seen in the right hand background.

The plant is designed to handle 200 tons daily, and for several months after starting will draw its supply of ore entirely from the Republic mine, in order to absorb a large quantity of ore already mined and on the dumps, as well as an accumulation of tailings of several thousand tons from the old mill. When these accumulations have been used up, the works will take, in addition to the output of the Republic mine, sufficient custom business on the ores offered by other mines in the district to make up its full capacity, and provision has been made for easy enlargement of the plant to keep pace with increasing custom business and to accommodate all offerings. The plant is near the mouth of No. 4 tunnel, which is the principal opening to the Republic mine, tapping the vein at right angles to its strike at a depth of 600 feet, with a total length of 2500 feet. The sampling mill was located with a view to convenience for receiving ore from the No. 4 tunnel of the Republic mine, and from the mines in the upper part of the district by means of a surface gravity tramway, which will be built for that purpose by the time the mill is ready to receive custom ores. There is no suitable site for the large mill below the sampling mill, and it being located above, necessitates hoisting the crushed and sampled ores to the main crude ore storage, which is done by a self-dumping skip running on an inclined track, and operated by a small friction hoist located on the sampler, where its operator can also load the skip from a bin, under which the skipway terminates. The sampler is designed to handle 200 tons ore in ten hours, and will only be run on day shift until the mill capacity is increased. The storage bins will accommodate 600 tons of unsampled and a like amount of sampled ore—1200 tons in all. From the upper storage bins the ore is charged direct into a No. 5, style D, Gates crusher, passing which it is elevated to a revolving trommel, through which the fines pass direct to a set of 15x36 Gates high-grade rolls. The rejections from the screen return to a style H, Gates crusher, and to the screen again by way of the same elevator until it is fine enough to pass the screen to the rolls. Under the rolls, the first sample is taken by a Brunton sampler, the rejections going by elevator and shoots to either of the six lower storage bins. The sample is elevated to a small set of rolls and further crushed, after which it passes in succession two more automatic samplers, the rejections going to the storage bins, and the final sample to a small sample hopper in the adjacent sampling room. This sample is about 1% of the total ore crushed, and is further reduced to proper bulk by hand sampling, after necessary additional crushing and grinding. The sampling mill machinery will reduce all the ore passing through it to not coarser than ½-inch mesh, and this is done in order to avoid any coarse crushing machinery or roughing rolls in the main mill. The process to be employed in the mill is essentially fine, dry crushing, roasting, cyaniding with certain modification in detail, and precipitation with zinc dust. From the main storage bins the ore passes by gravity through two 26x5-foot revolving driers, to two sets 15x36 rolls, and thence to two sets 15x26, and is elevated by two elevators to a system of fine screens, consisting of three 8-foot by 48-inch hexagonal screens, and three 6x8-foot Jeffrey Columbian separators. The fines pass direct to storage bin over roasting furnaces, and the rejections to three 6x8-foot ball pulverizers, and from them again over the screens until required fineness is reached. The roasting plant consists of three straight-line furnaces, having a hearth area of 100x12 feet and a capacity of about seventy-five tons each. The ore falls from the 400-ton fine ore bins by gravity into the furnace feeders, and after being roasted "dead," is automatically cooled and discharged from them into a 300-ton storage bin above the leaching tanks.

The leaching and precipitating plant contains sixteen steel leaching tanks, 22 feet square by 6½ feet deep; two gold solution tanks, 14 feet diameter by 10 feet deep; one sump tank, 24 feet diameter by 5 feet deep; two precipitation tanks, 10 feet diameter by 8 feet deep, and three fresh solution and standardizing tanks, 14 feet diameter by 10 feet deep. All tanks are steel. The last mentioned three are located on a platform 12 feet above tops of leaching tanks, and all the other round tanks in the precipitating section, adjacent to the leaching room, but on a lower level. The precipitating section also contains four 24x36-inch section, all iron Johnson filter presses for collection of product; two Root rotary solution pumps, a triplex vacuum pump, and small engine to drive the whole. Leaching tanks are loaded by means of side-dumping basket cars running on two parallel tracks over each row of tanks. Tailings are discharged either by sluicing or shoveling into cars through four openings in the bottom of each tank. Steam power is used throughout, and the steam plant is located adjacent to the fine-crushing section of the main mill, and consists of six 60-inch by 16-foot return tubular boilers, having a combined capacity of about 500 H. P. The sampling mill, roasting machinery, precipitation department, machine shops and fine crushing department are driven by a separate engine for each. The main engine room, between the boiler house and fine crushing section, contains, besides the 180 H. P. Corliss for driving the fine crushing machinery and driers, a compressor for the mine and a 30 H. P. generator for lighting purposes. Each department was made independent in its motive power, both for convenience in operation at present and in order that electric power, which is contemplated for the near future, might be readily applied. Wood is used for fuel, both for steaming and roasting purposes. The mill will be equipped with dust exhausting and collecting appliances where needed to keep it as free from ore dust as possible. The extreme dimensions of the sampler are 96x63 feet and of the mill 315x280 feet. The gases pass away from the furnaces through 435 feet of brick flue, 8 feet square, to a steel stack 8 8 feet in diameter and 112 feet high. A fully equipped machine shop has been provided, as well as commodious blacksmith shops, assay office and laboratory, and storehouse. All the buildings are frame, the sampler and mill having corrugated iron roofs.

---

* See front page.

Blast Furnace Smelting.

The reduction effected in lead ore smelting is due to carbonic oxide, incandescent carbon, and, under certain circumstances, to iron, sulphur, and metallic sulphides. By far the most important of the reducing agents is the carbonic oxide, the action of which is modified by various factors, such as the interior shape of the blast furnace, its temperature, the blast pressure and volume, the tuyere area, the size and condition of the charge, etc. All these are sufficiently important to merit consideration. The reduction of carbonic oxide (carbon monoxide) consists in its power of robbing oxygen from a metallic oxide, thereby con verting itself into carbonic acid (carbon dioxide), and the metallic oxide into metal. As carbonic acid begins to dissociate at 1200° C., the reducing power of carbonate oxide can be active only at a lower temperature, such as exists at a certain height above the bosh or tuyere zone. The location of this height naturally depends on the interior shape of the furnace. If the bosh is contracted, the blast and the charge are there more concentrated, and accordingly a thicker layer of incandescent fuel is maintained between the unmelted charge and the molten slag. The carbonic acid, generated by the fierce combustion in front of the tuyeres, in the presence of an excess of oxygen, has to pass through this layer of glowing carbon, which, rapidly absorbing oxygen, converts the dioxide into monoxide. As the bosh contraction is passed and the area of the furnace is increased, the gases rise more slowly, and the carbonic oxide has plenty of time to absorb oxygen from the ore, oxidizing itself back into dioxide, and reducing the metals. On the other hand, the reverse takes place when there is no bosh contraction, but the furnace sides are kept straight. In this case both blast energy and charge are diffused over a wider area, consequently the layer of incandescent fuel through which the carbon dioxide ascends is thinner, less of the gas is converted into carbonic oxide, and the reducing action is, therefore, decreased. Tuyere area also affects the formation of carbonic oxide. Small tuyeres admit thin streams of air that are rapidly absorbed by the glowing coke with the evolution of carbonic oxide; large tuyeres, on the other hand, deliver more oxygen than can be absorbed by the fuel, and the gas formed is almost entirely carbonic acid, which mostly passes through the furnace as such. In the one case, therefore, the furnace atmosphere is reducing; in the other it is oxidizing. A third factor is the strength of the blast. A strong blast favors reduction, because the air pressure, forcing the carbonic acid formed in the tuyere zone into intimate contact with particles of the incandescent fuel above, even to the center of the charge, forms the maximum amount of carbonic oxide or reducing agent. A weak blast, on the contrary, does not penetrate so closely to the center of the charge, nor insure such intimate contact; and, in consequence, less carbonic oxide is generated. In connection with the strong blasts, it should be remarked that their use necessitates a greater height of ore column, respectively furnace shaft, otherwise there will be a waste of fuel by the escape of overheated gases, still capable of doing drying and roasting work in the furnace. The other determining agent is the quantity and fineness of the ore. Small charges favor better mixing of the ore and fuel, and therefore the more intimate action of the reducing gas on the charge. Fine ore, also, by impeding the draught, causes the carbonic oxide to more thoroughly permeate the charge in its efforts to escape, and so to remain longer in contact with the ore. Both causes tend to promote reduction.—C. C. LONGBRIDGE.

Catching Black Sand.*

Written for the MINING AND SCIENTIFIC PRESS by JNO. D. KING.

Noticing some questions in the MINING AND SCIENTIFIC PRESS of May 19, 1900, in regard to the saving of black sand and extracting the gold held therein, stirs interest in that class of work, as I have kept a vigilant search for several years for all that is being done in this line.

The river dredger placer machines offer better facilities for saving the gold-bearing silica and black sand than other placer machines, on account of their compactness, quantity of dirt handled and nature of their machinery. As so many dredging plants are not a paying investment, it would be well to look into the concentration of these sands, for, when some cheap and efficient means of saving the values they contain is found, no doubt many otherwise valueless placers will be dividend-paying propositions.

In 1898–99 I was dredge-master for the New Mexico Placer Syndicate on the Chama river, in Rio Arriba county, N. M., where an experimental dredger was built, and many tests were made with various devices for saving the values of the river placers of that district. Ordinary sluice-boxes with different designed riffles, and loaded with quicksilver, were first tried with no success; failure revealed the fact that the bright-looking gold was covered with a transparent siliceous coating, making the particles look twice their actual size. Forty assays were then made from the river material, ranging from the surface to 20 feet in depth, giving an average of 40% free gold, 40% in combination with the silica and 20% in combination with the black sand. There was 1.158% black sand of the material as it came from the buckets; and extracting it with magnets was tried with the result that only the magnetic iron was caught, and assays from this showed but a slight trace of gold.

The amalgamation idea was discarded and the boxes were provided with cocoa matting, expanded metal and devices with undercurrents. These gave little satisfaction, as the interstices would quickly fill up, letting the values run over and causing too frequent shut-downs.

All who are experimenting in this class of mining seem to be working in the same channel, viz., to save the black sand by a single operation—that is, by dumping the whole mass into a box, sluicing off the coarse material and saving the valuable silica and black sand as in washing gold; but I find the gravity of the silica too near that of the black sand to allow of such rough work. The Chama river people have been carrying on experiments in this line with undercurrent devices for the past ten months. The result is they find they must use screens, which, by sizing to one-fourteenth of an inch, will take off four-fifths of the material as it comes from the buckets, giving their machines much lighter work. By leaving their concentrates run 70% to 80% of the reddish silica, so manifest in the Chama, and which is the silica that carries the gold, they obtain a concentrate assaying from $35 to $60 per ton. While engaged with them, I built a revolving burlap concentrator that worked well; the interstices would catch the reddish silica, black sand and fine gold, and, as it revolved, the concentrates were washed into a hopper, leaving the burlap clear to be filled anew as it came in contact with the sluicing material. As before stated, they were looking for a device to do away with screening, which would condemn that class of machinery, as it could not handle such a vast amount of material; besides, the large boulders would not let it do good work and would knock it out quickly. Therefore, it was set aside to make room for other experiments. Where screens can be used, I do not know of another machine so efficient as one with a revolving burlap. I once tried bumping tables to bring a 6% black sand concentrate to 60% and found they were too slow and took up too much space to adapt them to placer work, as were also devices that required stopping and cleaning up every few hours.

As all placers have a peculiarity of their own, and necessary smelter facilities for treating the concentrates vary with locality, a slight modification may be required; but, in general, screening the material as fine as practical through a series of revolving screens, and running the fine material over one or more revolving burlap machines, according to amount handled and fineness required, to be determined by values in the silica and smelter facilities, is (from what data I can collect from the experiments of others and those of my own) the best arrangement for extracting the gold-bearing silica and black sand of the placers.

---

* See illustration front page.

The Metallurgy of Zinc.

Written for the MINING AND SCIENTIFIC PRESS by DR J. OHLY.

There is no field of metallurgy so disheartening or disappointing from an economic point of view as the manufacture of zinc from its ores, considering the loss involved and the cumbrous and tedious mode of its production. In fact, the manufacture of zinc has preserved the same status, as to the principle underlying its production, which it held at the time of Albertus Magnus, (Albert von Bollstaedt), the great "Doctor Universalis," of whom contemporanean chroniclers of the thirteenth century report conclusively the following opinion: "It is generally admitted that Albertus was a God-fearing man of great erudition, and it is clearly proven that he never offended the dictates of the Church, or stood in league with the devil." Not so favorable was the judgment bestowed upon the forerunner of the iatrochemical school, Theophrast Bombast, of the fifteenth century, whose name seems to have lengthened with the expanse of his reputation, and to have evolved at the zenith of his glory into the title: Philuppus Aureolus Theophrastus Bombastus Paracelsus of Hohenheim, shortly known as Paracelsus in history.

It was this man Bombast who first introduced the application of metallic salts like those of mercury and copper, besides the dispensation of opiates, into medicine, and pointed out distinctly the production of zinc from its ores by the addition of charcoal and subsequent distillation. Though acknowledged as the precursor of the school mentioned above, he ranks necessarily with the alchemists, since he claimed in some of the passages of his writings to have discovered that mysterious substance known as "the philosopher's stone," and to have succeeded, merely by fusing a small particle of it with metallic lead, in transforming that base metal into shining aggregates of precious gold. Charlatan that he was, like the rest of his colleagues, he slyly kept a door open for escape, and remarked in some of his later publications that the preparation of the philosopher's stone, as well as the substance itself, were illusions, and that all those "adepts" who claimed to have compounded the same were deceptive characters and mendacious quacks.

To Paracelsus and his predecessor, Magnus, then, we owe the method yet applied to-day in the production of zinc, which has developed, after the gradual introduction of a few improvements, consisting in the greater number of vessels employed and the enlargement of the furnaces used, into the following modes of manufacture:

Of the processes known to have been worked on a commercial scale, the English and the Carinthian (Kaernthen, Austria,) methods—the latter a modification of the former—have been entirely abandoned. They comprised mainly the utilization of vertical retorts of fireclay, and the reduction of the roasted ore from the top to the bottom of the charge, under the addition of non-caking carbon, which operation necessitated an excessive consumption of fuel.

The Belgian and Silesian processes, however, represent "the survival of the fittest," and are serving at the present time in the Joplin district of Missouri, in Kansas, Indiana, and in Europe generally, for the reduction of the ore to the metal. The main difference between these two systems consists in the shape of the retorts, which have a cylindrical or elliptical form in the Belgian process, while they are muffle-shaped in the other. Since the height and length of the retorts employed in the Silesian process is greater than that of the vessels used in the Belgian system, their width being nearly equal, the charges of zinc oxide and carbon are necessarily greater in the first case, so that the production of metal for a given period is larger when operating the Silesian process than the output resulting on the application of the Belgian method. In recent years the tendency has prevailed to increase the number of retorts employed, which, in the Silesian process, are usually placed in a single row in the furnace and in the Belgian in tiers, so that a furnace receives nowadays a charge of six to eight tons for a single operation. Thus the distillation furnaces, operated at Iola, in southeastern Kansas, are generally elongated and double structures, fitted with 300 retorts on each side, which are arranged in five rows of sixty each. On the other hand, the furnaces at Cherryvale, Montgomery Co., Kan., situated also in the southeastern section of that State, and those of Indiana (which are fired by natural gas) contain 100 retorts per side, and are arranged in five rows of twenty each.

The loss experienced in the two systems varies between 15% and even 30% of the metal originally present in the ore, and it is generally assumed that the loss incurred by the Belgian method amounts to between 15% and 20% of the zinc, while the loss resulting on applying the Silesian system is calculated to be from 5% to 10% greater. This great loss in the last case is accounted for by the circumstance that poorer and more refractory ores are usually employed in that process.

The retorts and tubes, which latter are required for the purpose of joining the necks of the retorts with the nozzles, are manufactured in place by means of appropriate machinery, and the cost of their preparation forms a considerable part of the expenses incurred. The charging of these retorts requires great skill, and so does the firing, which is done either by the direct burning of coal or by gas, while the workmen watch carefully the different stages of the process. These are indicated by the varying color of the flames and vapors, which are gradually evolved, the first fumes given off being of a brown coloration and consisting of the yellow oxide of cadmium, accompanied by the appearance of the latter metal itself; the next, the characteristic, very intense bluish-white light of zinc vapors, which continues to show until the operation is completed.

The chemical reaction (I) involved in these operations appears to be very simple on paper, but great care must be taken during its practical application to maintain, by the proper addition of carbon, an atmosphere of carbon monoxide, CO, in the retorts, because else a secondary oxidation of the zinc formed takes place in presence of carbon dioxide, CO_2, as shown by the second equation:

$$\text{I.—}ZnO + C = Zn + CO.$$

$$\text{II.—}Zn + CO_2 = ZnO + CO.$$

Cadmium, which is a constant associate of zinc in its ores, accompanies the latter metal through all the stages of preparation or reduction concerned, and undergoes exactly the same reactions as zinc; but, being volatilized already near 865° C., while zinc vaporizes only toward 1000° C., the former metal makes its appearance first during the distillation process described above.

The ores employed for the extraction of zinc are almost exclusively zinc blende or zinc sulphide, generally known among miners as "black jack," and smithonite or zinc carbonate, the latter being rather rare, but readily reduced to oxide by burning in kilns, while blende requires careful roasting, so as to avoid the formation of difficultly decomposable sulphate, the operation lasting between two and six hours, according to the nature of the ore. It is essential that the ores used for smelting be as rich as possible, and also uniform in character, hence concentration, mostly performed by Frue vanners, is constantly resorted to. As the dressing works in the Joplin district turn out concentrates averaging 60% zinc, the value of the latter is readily calculated, since this percentage is equivalent to 1200 pounds of zinc per ton.

By the first of July of the present year zinc ore was selling in Joplin at from $25 to $26 per ton, while an ore of the same degree of concentration brought $44 per ton a year ago, and $55 per ton in April, 1898. This low price of the ore was, however, not caused by overproduction in the mining district, but more so by the manipulation of the market. Since the smelters are supposed to have driven down the prices to the lowest point possible, and the contents of the ore bins throughout the district have been practically bought in, while but one-half of the mines are producing at present, a rise of price has taken place during the past month.

A remarkable fact which may have escaped observation generally is the circumstance that zinc sulphides, or sphalerites, carry sometimes high values in silver, as the Mexican ores do, for instance, and that it is worth while to have them tested for the presence of this metal by the assayer.

It is quite evident that the only rational manner of ascertaining the value of zinc ores must be based upon their assay valuation, though it has been customary at Joplin for a number of years to have these values determined by inspection. These inspections were formerly made by men of much practical experience, generally natives of the district, who understood to closely judge the values of the ore by daily examining a handful of the product of the mills, comparing its appearance with that of the material of former days and taking in consideration the locality of the mines, besides the percentage reached by them previously. At present the work of these inspectors has been almost entirely replaced by the more reliable methods of the assayer, and the selling of the ore is mostly proceeded with on this basis. The character of the ore as to admixtures of foreign constituents is, however, also considered, when fixing the value of the ore, in a similar manner as is done with manganese or tungsten ore, brought on the market, for it is customary among the buyers at Joplin to deduct 50 cents per ton for each per cent of lead present in the ore and $1 for each per cent of metallic iron which the ore may contain above 1%. The smelting charges, including transportation and cost of smelting, amount to $10.50 per ton of ore, so that the present prices of $25 to $26 per ton leave a gross margin of about $15 per ton to the smelter.

Presenting briefly the several methods now in operation for the production of zinc from its ores, we have:

First.—The Silesian process.

Second.—The Belgian process.

Both are objectionable on account of the loss in metal occasioned by them, and the cumbersome character of the utensils employed for the reduction of the ore.

Third.—The electrolytic process, which has been found to be impracticable and too expensive, in spite of the numerous efforts made to improve it, so that no economic process of that kind is in operation at present.

Fourth.—The process proposed by the German chemists, Dr. Dr. Lungwitz and Dr. Schupphaus, of the Royal Polytechnic School of Berlin, whose scheme consists mainly in the production of metallic zinc in a blast furnace under a pressure of three atmospheres. It is based upon the generally acknowled principle that the boiling point of a liquid or liquid metal is lowered by the increase of pressure. The process is to be regarded, however, as an experimental venture only, as long as its practicability remains unproven by an actual test on the large scale, and it must necessarily appear that the maintenance of a pressure exerted during the course of reduction of the zinc oxide in a clumsy and voluminous structure like a blast furnace is combined with quite extraordinary difficulties.

Fifth.—The reduction process consisting in admixing powdered aluminum to metallic oxides, and taking advantage of the initial heat produced by the ignition of a small quantity of a mixture of barium peroxide and powdered aluminum, placed in proximity to the former.

It has been found that the metals chromium and manganese can be produced in almost chemically pure condition and free from carbon in this manner, though the costliness of the operation excludes it from application in the manufacture of other less valuable metals from their oxides, like zinc. The author has also found by actual experiment that the heat produced by the ignition of a small amount of barium peroxide and powdered aluminum, when placed upon an intimate mixture of zinc oxide and pulverized aluminum, is not sufficient to induce the reduction of the chemically pure oxide thus mixed and made use of in his experiments, and that no reduction to metallic zinc takes place even when the zinc oxide is mixed with both powdered aluminum and barium peroxide in varying proportions. A trial to reduce such zinc oxide, mixed with powdered charcoal, under addition of a small quantity of aluminum to start the reaction, by means of the heat obtainable in a muffle furnace used by assayers, gave also negative results, so that no satisfactory prospect lies in this direction.

Since neither of the practicable processes, enumerated above, give entire satisfaction, and, in fact, all of them leave much to be desired, an improvement of some kind would naturally be hailed with great acclamation and appreciation. If we, however, consider and examine the means at the disposal of the metallurgist, it will soon be found that there remains hardly another recourse than to resort to the application of the electric current; and that, to all probability, the solution of the problem will be best accomplished by mixing the oxide of zinc, into which form the ores of that metal are usually brought before treatment, with powdered charcoal, and subjecting the mixture to the effect of the electric current in a properly constructed furnace of large producing capacity. In this manner, it seems to the writer—and especially under the observation of the necessary precautions in preventing the vaporization of the metal by the addition of a protective layer of a dense slag, fused beforehand, and the maintenance of the lowest degree necessary to induce and sustain the reducing action of the charcoal—that satisfactory results may yet be in reach for the producer of zinc on an economic plan.

The Etard Chlorination Process.

The claim of the Etard chlorination process to public favor is the simplicity of preparation of the solution. It is known in its application as the permanganate process. The solution consists of an admixture of certain quantities of hydrochloric acid and permanganate of potash, or of sulphuric acid, salt and permanganate of potash with water. The cost of the solution when mixed in proportions for gold extraction purposes is stated to be about 1½ cents per gallon. Its application is as follows: In a vat of any shape or size with a depth of not less than 2 feet a hole is bored through one side near the bottom. A filter bed is laid down in the bottom, consisting of coarse gravel, to a depth of about 3 inches; finer gravel is spread over this and a layer of clean sand on the top. Upon this filter is placed the roasted ore to a depth of 1, 2 or 3 feet, according to whether the fineness of the material will allow the solution to pass through, or the depth of the vat will permit such a thickness. The solution is then run onto or poured on the ore and allowed to percolate through it and the filter, then through the previously mentioned vent and into a second vat placed below the outlet. This is allowed to go on for six hours, during the latter part of which time the solution escaping can, if possessing the characteristic color of the permanganate solution, be returned to the ore and allowed to percolate a second time. To find when the extraction is complete, a sample of the ore is taken from the vat, washed with water, then shaken up with some of the original solution and allowed to filter through a filter paper into a test tube. To this is added a little of a solution of sulphate of iron; and if, after the red color of the permanganate disappears, the liquid remains clear, the operation is complete;

if a blue tinge follows the disappearance of the red, there is still gold in the ore, and more solution must be added to it. When the gold is all dissolved, the remains of the solution still in the ore are washed out by pouring water on the ore and allowing it to percolate through into the vat containing the gold solution. There are several methods by which chloride of gold can be precipitated from the solution. In one a solution of sulphate of iron is prepared either by dissolving copperas in water, or by pouring sulphuric acid on scrap iron in water. The solution thus prepared is poured into the vat containing the gold solution. Any remaining red color of the permanganate immediately disappears and a bluish-green color takes its place. This color depends for its intensity upon the quantity of gold held in solution, the pigment being the gold itself—no longer in a state of solution, but one of suspension in the liquid. The gold is now in a state of molecular division—too finely divided to be visible to the naked eye except by the hue it gives to the liquid, but yet sufficiently palpable to gradually sink to the bottom of the liquid if sufficient time is given. In twenty-four hours the whole of the gold will be deposited at the bottom of the vessel as a black slime, and the liquid will be gold free. The liquor is then run off or decanted and the slimes are roasted in a porcelain dish to drive off the moisture, then mixed with fluxes, placed in a crucible and melted. The resulting ingot is fine gold.

A Coal Conveyor.

The handling of run of mine coal, without breakage, at the rate of 150 tons per hour is a matter which coal operators will be interested in, especially those working veins on high levels.

The illustration herewith is a view of one of the Jeffrey wire rope retarding conveyors now used by the Dayton Coal & Iron Co. of Dayton, Tennessee. It is practically 500 feet in length and carries run of mine coal from the upper level to the tipple and cars located below. The carrying side of the conveyor is lined with heavy sheet steel, in which the cable with its special flights operates. The coal is fed into this runway and is carried along on the horizontal plane by the conveyor flights, while on the incline the same flights simply act as a check to keep the coal from running away.

A small engine is used to start the conveyor. This system is inexpensive in its first cost, has large capacity and is continuous in its operations; the cost of maintenance is slight.

It is replacing the tram car system in some places, which indicates its value where the merits of this type of lowering coal are known. For catalogue address the Jeffrey Manufacturing Co., Columbus, Ohio.

THE production of crude petroleum in California in 1899 was 2,642,095 barrels, valued at $2,508,751, about 95 cents per barrel. As compared with 1898, there was an increase of 384,888 barrels in production and 10 cents in the average price per barrel. Los Angeles county, which takes first rank in the amount of production, produced 1,398,690 barrels, valued at 95.3 cents per barrel. Out of the total quantity produced in Los Angeles county, 1,022,966 barrels, valued at $960,726, or 93 cents per barrel, were produced in Los Angeles. The other counties of California which produced petroleum, ranged according to their output, were: Ventura, 496,200 barrels; Fresno, 439,372; Santa Barbara, 208,370; Orange, 108,077; Kern, 15,000.

EASTERN REPORTS agree that the American Telephone & Telegraph Co. (which now includes the American Bell Telephone Co.), the Telephone, Telegraph & Cable Co. of America, the Western Union Telegraph Co. and the Postal Telegraph Cable Co. will consolidate into one big company to be known as the National Telephone & Telegraph Co.

"Pure Water is a Poison."

This is the startling proposition put forward by Dr. Koppe in an article in the Deutsche Medicinische Wochenschrift. He says:

By "chemically pure water" we usually understand perfectly fresh, distilled water, whose behavior and properties are well understood. It withdraws the salts from the animal tissues and causes the latter to swell or inflate. Isolated living organic elements, cells, and all unicellular organisms are destroyed in distilled water—they die, since they become engorged therein. They lose the faculty, upon which life depends, of retaining their salts and other soluble cell constituents, and consequently these are allowed to diffuse throughout the water.

Distilled water is, therefore, a dangerous protoplasmic poison. The same poisonous effects must occur whenever distilled water is drank. The sense of taste is the first to protest against the use of this substance. A mouthful of distilled water, taken by inadvertence, will be spit out regularly. The water once in the stomach, the superficial stratum of epithelium experiences a powerful distension, the cells are leached by their salts, die, and are cast off. This local poisonous effect of distilled water makes itself known by a sensation of uneasiness, belching, etc., furnishing all the symptoms of a catarrh of the stomach on a small scale.

The harmfulness of the process, so much resorted to to-day, of washing out the stomach with distilled water, is acknowledged, and we find the physicians who formerly used that agent are now turning to the "physiological solution of cooking salt," or "water with a little salt," or the mineral waters recommended for that purpose. The poisonous nature of absolutely pure water would surely have been recognized and felt long since, were it not that its effects, in their marked form, can seldom occur, for through a train of circumstances, "absolutely pure" water can rarely be found. The ordinary distilled water, even when freshly distilled, is not really absolutely pure, while that used in the laboratories and clinics is generally stale, has been kept standing in open vessels, generally in rooms where chemicals of every sort abound and whose gases and effluvia are taken up by the water.

The relative purity of samples of distilled water is best determined by the electrical conducting power of each, since the latter rises regularly and uniformly with the increased impurity of the sample. The purest water has but a small conductive power, since water is readily decomposed into hydrogen and hydroxyl (H and OH). To illustrate this fact, let us examine some investigations of Oswald and Koppe (the author), in which the numerals represent ohms multiplied by 10^{10}.

Oswald used in his physical work water with the conductive index of 2.13. A similar water was obtained by Kohlrausch and Heidweiller by melting natural ice.

Koppe obtained, by melting natural ice, a water with 8 as an index of conductivity. Ordinary distilled water gave 49.2, and ice prepared from distilled water which had been boiled gave, on melting, 1 with the index 10. The following are the indices of certain German waters:

Gasteiner Giftbrunnen ("poison springs")	31.9
Water from artificial ice	137
Vienna, public mains	220 to 239
Giessen, public mains	296
Selterswater, natural	5.700
Salt, solution 0.73%	11.050
Salt, solution 1.46%	20.038

"Water melted from natural ice," proceeds Koppe, "was purer than even boiled distilled water. Our patients are delighted when we get for their use this transparent and brilliant ice, and we (as physicians) think that surely nothing can be safer than water melted therefrom—but many a belch comes from the stomach of the patient allowed to hold a bit of the ice in his mouth and swallow the water. If this process is permitted for any length of time we hear complaints of 'weak stomach,' 'catarrh of the stomach,' etc., which we must charge up—solely to the purity of the water!

"And here it is all the worse. In the mouthful of 'pure water' taken inadvertently in the laboratory, as stated, the sense of taste comes to our rescue, and we spit it out, but here the sense of taste is benumbed by the cold."

This explanation seems to be all the more reasonable when patients with hitherto healthy stomachs, who, after operations, are for any reason allowed to swallow "ice pills," begin to belch, and not infrequently contract catarrh of the stomach. There are well known sequelæ of the use of ice, but up to the present no reasonable hypothesis has been offered as to the etiology of the same. It has been charged, it is true, to the "bacteriological contents" of the ice, but examination of the latter has demonstrated it to be almost free from bacteria such as would account for the phenomena, though otherwise frequently containing bacteria. As a remedy our clinicians say we must use only artificial ice, made from distilled water. Well, it is possible that artificial ice may be better borne than the natural, but it is not because it is purer than the latter, but exactly the contrary. It is simply because the melted water thereof more closely approaches our ordinary drinking water.

This point in the care of the sick, which is certainly worthy of investigation and explanation, finds its analogy in the daily experiences of the traveler in high mountainous regions. The guide books warn him against quenching his thirst with snow and glacier water, and the waters of the mountain brooks as well, for, in Germany, these not only do not quench thirst, but give rise to much discomfort. With the greatest possibility of being correct, we may assume that snow and glacier water are of the highest degree of purity, approaching distilled water very closely, or, indeed, excelling it in purity (see the index of electrical conductivity of the Gasteiner Asche above—only 31.8, even less than the ordinary distilled water. The index of the Housbrunnen in the Kurhaus at Provencheres, in Gastein, is only 31.6).

The harmfulness of glacier water, like that of the pure, cold mountain brooks, most of which, indeed, spring from glaciers, arises from the fact that they are exceedingly pure waters and produce identically the effect of the use of distilled water—they are poisonous. The supposition that the coldness of the water causes the sick, uneasy feelings cannot stand for a moment, though this coldness is very probably the reason that its unfitness for use is not at once recognized and the liquid rejected.

The last link in our chain of prolegomena is found in the case of another of the Gastein springs. The water of this spring has an electrical conductivity of 31.9, therefore far excelling ordinary distilled water in this respect, and hence, according to our proposition, its use should demonstrate the poisonous nature of pure water. By a most strange coincidence, from the oldest times, for hundreds and hundreds of years, this spring has been known as the gift-brunnen—the "poison spring." Its water is never drank; it is commonly regarded as poisonous, although no chemical examination of it—and they are almost innumerable—has yet been able to detect the slightest trace of any poisonous substance. Its poison lies in the fact of its extreme purity! This, we know, is a proposition that nobody will take in earnest—still, it is devoid of anything wonderful in a physiological point of view, and, furthermore, it is borne out by fact.

American Miners in Korea.

Thos. Woon of Nevada county, Cal., has returned from Korea and tells the Union that developments are under headway and show Korea to be rich in mineral wealth. The operations at present are confined chiefly to gold mining. The gold is found in quartz ledges from 1 to 17 feet in thickness, generally rich from the outcroppings down. The mines are old ones, partially developed, and appear to have been worked for centuries past. The natives never worked them below the water level, having no pumping machinery or other appliances for removing the water. The advent of American machinery and modern methods have changed affairs and the richer deposits are now being worked successfully. No prospecting for locations is necessary, as the old shafts made by the natives are taken as indications of paying ledges. The land is owned by the Government, and an American who wishes to engage in mining secures a concession through the resident consul, something which is easily accomplished with proper representations and the payment of certain sums for the privilege of mining.

The Oriental Con. M. Co. of New York is mining on a large scale at a point about 300 miles in the interior, with good results. This company employs 1500 Koreans and a few Chinese in the mines, also about forty Americans or Europeans, who act as foremen or bosses. The white men employed are usually miners who have had experience in mining elsewhere. The milling is done on the ground, excepting a small quantity of sulphurets, which is shipped to the smelting works in San Francisco. The machinery and large quantities of mining supplies are shipped from San Francisco to Nagasaki, Japan, and are then transferred to a small steamer, which carries them to the Korean coast. They are taken up an inlet and a river far into the interior and landed a few miles from the mines. Bull carts and ponies are then used for freighting from the landing to mining headquarters. A considerable quantity of canned goods and provisions come from London to supply the wants of the white men engaged in the mines.

The New York company, of which J. Sloat Fassett is a large stockholder, is managed by Leigh Hunt, who gained a concession and interested capitalists in the proposition. Now the property of the company is valued at high figures. The Chittibalbi mine is one of the best of the group.

The climate of Korea is dry, the heavy rains falling in July and August. The winters are cold and the mercury often registers 25° below zero. The inhabitants are mild-mannered, peaceable people, and it is safe to travel anywhere. The foreigners carry firearms and the Koreans are afraid of them, knowing that they have the protection of the Korean Government at present. However, there is a hatred of the foreigners, and if the natives were encouraged they would attempt to drive them out of the country. In case the Chinese trouble should spread, or Japan and Russia engage in a general war over Korea, the ports would be blockaded and the safety of Americans and Europeans might be endangered.

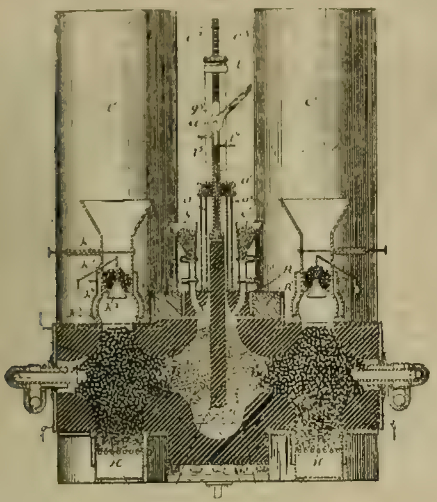
There are no railroads in the vicinity of the mines, and no newspapers are published. Bulletins are posted occasionally at headquarters, however, giving news from the war. It is a cheerless country in which to live, though thickly settled by natives.

Mining and Metallurgical Patents.

Patents Issued September 18, 1900.

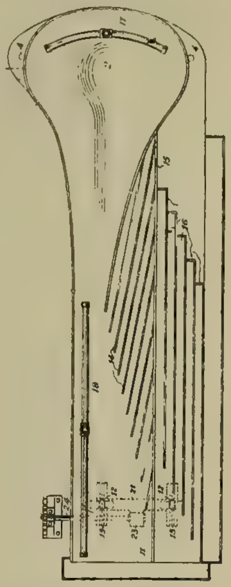
Specially Reported for the MINING AND SCIENTIFIC PRESS.

ELECTRIC FURNACE.—No. 658,315; A. H. Cowles, Cleveland, O.



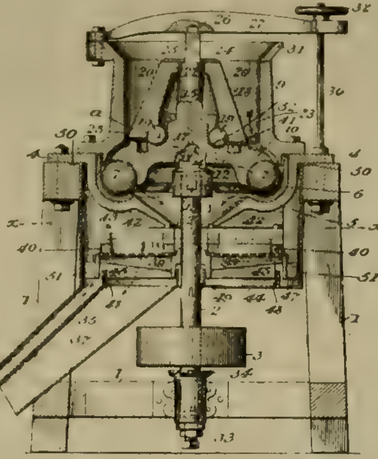
Combination in furnace, of electric smelting chamber having electrodes and electric circuit connections therewith, two or more fuel chambers with electric smelting chamber interposed between them, communicating flues therebetween, a blast mechanism for causing flow of gas through series of fuel chambers and electric chamber, and reversing mechanism for gas flow, whereby ore or other material in electric smelting chamber can be preheated by regenerative gas flow.

CONCENTRATOR.—No. 658,120; J. W. Pinder, Groveland, Cal.



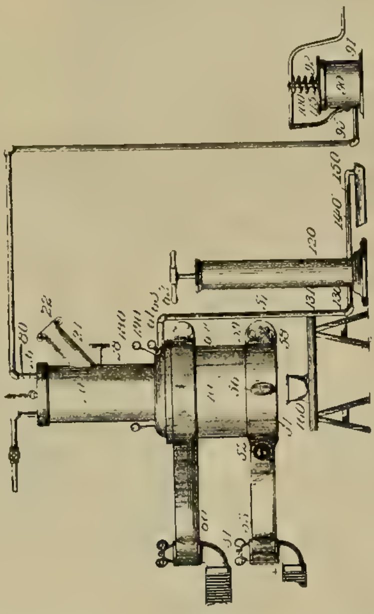
Concentrating table consisting of rounded head having bottom sloping toward central point and surrounding rim, lower end of table forming continuation of bottom into which it merges, lower end approximately flat and inclined longitudinally, also transversely, with rim upon upper edge, pipes by which water is delivered into head portion and along sides of lower portion, tapering rib connecting with rim of head portion and extending toward lower end, approximately parallel with discharge side of table, tapering riffles having deeper ends contacting with tapering rib, diverging toward center of table, other tapering riffles exterior to rib, approximately parallel with side of table, troughs at lower discharge side and end respectively to receive materials separated upon table and means whereby rotary motion of head and longitudinal movement of lower end of table are simultaneously produced.

CRUSHING AND PULVERIZING MACHINERY.—No. 657,933; T. R. Goth, San Francisco, Cal.



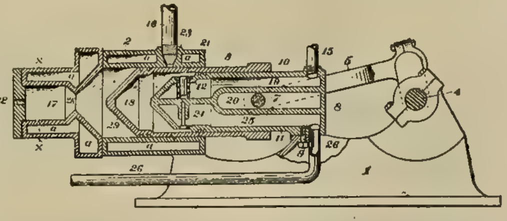
Combined crushing and pulverizing machine, superimposed gyratory muller supported on and actuated by rolling balls, mounted in revoluble member having inclined eccentric raceway on top and concentric groove or guide for pulverizing balls on bottom, these race or guide ways of different radius to give upper and lower balls oblique position in line of pressure and in respect to axis of revolution, two sets of balls therein opposing each other, exerting oblique force on gyrating muller; the revoluble member 10 having inclined and eccentric raceway on its top for balls 19, a concentric way or groove on its bottom to receive pulverizing balls 7, stem 15 and adjustable means for applying pressure on stem, thereby to pulverizing balls 7.

APPARATUS FOR SEPARATING METALS FROM ORES BY ELECTRICITY.—No. 657,911; G. D. Burton, Boston, Mass.



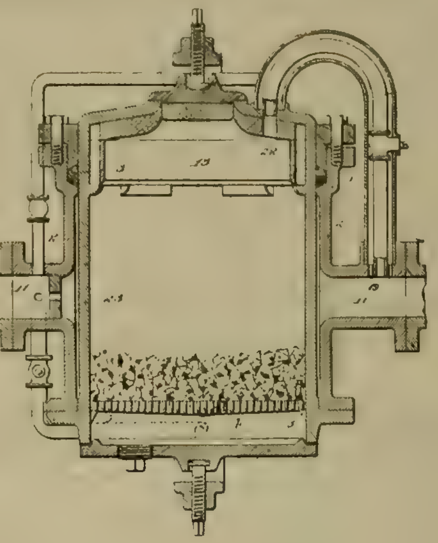
In an electric furnace, combination of reducing chamber composed of conductive material, having stack provided with means for feeding ore, chamber provided with exterior flange, electrode comprising clamp adapted for contact with chamber near top and under flange serving as support for chamber, electrode adapted to serve as bottom for chamber, means for passing large heating current through electrode.

REAR COMPRESSION GAS ENGINE.—No. 657,934; G. E. Hoyt, San Francisco, Cal.



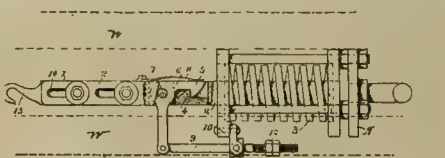
In gas engine, main cylinder, trunk pinion movable therein, forming combustion chamber between two, extension 17 to combustion chamber in which ignition takes place, a fixed trunk piston extending within movable piston forming a compression chamber between two latter, fixed piston being divided into two chambers or passages, gas inlet to one passage 19, gas outlet from other passage 25 to combustion chamber, valve opening from passage 19 to compression chamber, and valve opening into passage 25 from compression chamber.

APPARATUS FOR REHEATING COMPRESSED AIR FOR INDUSTRIAL PURPOSES.—No. 657,922; T. A. Edison, Llewellyn Park, N. J.



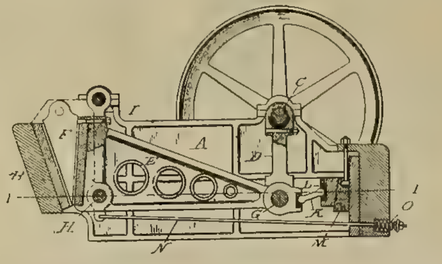
Apparatus for heating air, comprising pipe supplying compressed air from source of supply to translating device, reheater in pipe for heating the air by radiation, solid combustible in the heater, by-pass including reheater for permitting portion of air to pass through reheater to support combustion and to be heated directly, means to permit drop in air pressure between inlet to by-pass and translating device to automatically cause air to flow through by-pass in quantity depending upon consumption at translating device.

MANUFACTURE OF FLAT WIRE CABLE.—No. 658,118; E. I. Parsons, San Francisco, Cal.



Tension-regulating device comprising slidable bar having hook at one end, spring-pressed latch-lever fulcrumed to other, shank with relation to which hook-bar is guided and slidable, shank having catch with which latch-lever is adapted to engage, frame or yoke with relation to which shank and connected nook-bar are slidable, spring and handle through which pull is exerted thereon and rod having one end connected with latch-lever and carrying adjusting nut or like stop with which frame contacts when spring is acted upon by pull and required tension reached whereby latch is disengaged and hook-bar allowed to slide upon its guide.

CRUSHING MACHINE.—No. 658,071; E. Reynolds, Milwaukee, Wis.



In crushing machine, combination of main frame; fixed jaw; jaw F carried upon forward end of frame E; links I pivoted to upper part of frame and likewise connected to lower forward part of frame E; eccentric mounted upon frame; link D connecting eccentric and rear end of frame; link K bearing against fixed portion of main frame and rear end of frame E, being in line with pivotal points of movable frame E when link is in its position of greatest thrust.

ABOUT $100,000,000 worth of india rubber has been imported into the United States during the past four years, and about $60,000,000 worth in the last two years. Ten years ago the annual importations of india rubber amounted to about $15,000,000; now they exceed $30,000,000, and are steadily increasing. Practically all of the importations of rubber come in crude form for use of manufacturers. Northern Brazil, southern Mexico, the West Indies, Central Africa, India, the Straits Settlements and the Dutch East Indies supply this increasingly important feature of our importations.

To Splice a Wire Rope.*

The only tools needed are a cold cutter and hammer for cutting and trimming the strands, and two "needles" 12 inches long. These latter are made of good steel, ½ inch thick at one end, tapered ovally to a point, and having a handle riveted on, as shown in Fig. 3.

When the rope is cut and ready for splicing, unwind three strands of each part 15 feet, keeping them together and not separating them. Now cut out the hemp center to the point x, as shown in Figs. 1, 2 and 3; rewind the strands for 7 feet to A, and cut off three of them from each end of the rope at A, A, Fig. 1. Then, as shown in Fig. 1, from x to A the rope is without a hemp center. Draw the two ends A together, letting B, B pass, as shown in Fig. 1; uncoil the strands e, d, c, Fig. 2, keeping them together, and follow immediately with the long strands e′ d′ c′, holding all the strands firmly and keeping them together so that the three long strands e′, d′, c′ will take the place of the short strands e, d, c; next, do the same with the strands f, a, b, keeping them together as before, and laying them in the places from which f′, a′, b′ have been uncoiled. Take about two turns around the rope with these; the operator will then find that the rope is united and round, as shown at Y, Fig. 3. Now take the short strand a′, Fig. 2; unwind it, and follow with the long strand a, making two wraps or turns around the rope; then unwrap the short strand b′, and follow it with the long strand b, making the long end fit in the place previously occupied by the short strand of the same letter; do the same with f, e, d and c, until the last strand reaches x, Figs. 1 and 3, at the two ends of the splice. By following these directions closely it will be unnecessary to tie the strands, as each strand locks the other, and there is no danger of entanglement if care be taken that the strands follow one another in their natural order.

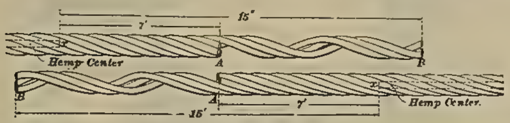


FIG. 1.

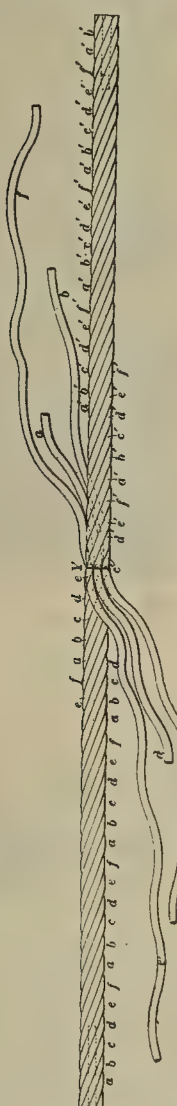


FIG. 2.

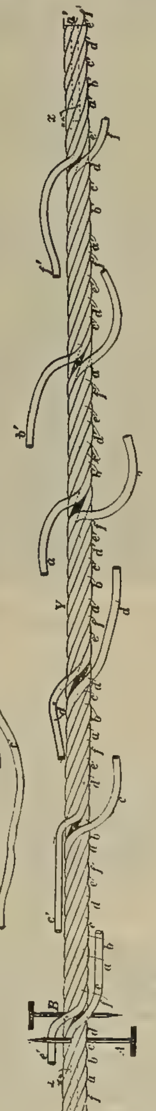


FIG. 3.

After cutting off the ends of each strand the rope will have the appearance shown in Fig. 3, where, if the ends were tucked in, e′ would butt against x, e against c′, c against d′, d against a′, etc. The next operation is to run the strands into the middle of the rope. To do this push the needle A, Fig. 3, through the rope from the under side, having three strands in front of the needle and two at the back, the strand e being back of the needle. Push the needle B through from the upper side, having the strand e in front of the needle; push the needles as close together as possible with the strand e between them; place the needle A on the knee and hold it there firmly, then turn the needle B around the coil of the rope, forcing the strand e′ into the center of the rope. Continue similarly with all of the strands, and should any of them seem too full tap them lightly with the butt end of the needle, which will round them off and fix them into place. All of the strands should meet as nearly as possible in the center, as they take the place of the hemp center, and this will keep the rope round and prevent the slipping of the strands.

The splice as thus made may seem at first somewhat rough, but a little use of the rope will overcome all irregularities. A beginner should make several splices on a rope that is not in use. If the above directions are followed, after a little practice any man can make such a splice in thirty minutes, and if pushed it can be done in twenty minutes; but this requires two men, one coiling and uncoiling, while the other follows up with needles and cold cutter. To do this the hemp center must be left out, as shown in Fig. 1.

A new rope, owing to the wild character of the strands, must have the hemp center left in; otherwise the operation is the same, excepting that, when ready to run in the strands, the needle is pushed through at x, Fig. 3, and turned so that its broad side will be at right angles to the rope; cut the hemp center and pick out enough of the center by turning the needle around the coil of the rope to let in the strands e′ and e; put in e′ and e, and then push the needle through at the end of the strand e, taking out enough of the hemp center to put in the strands c′ and c; continue this until all the strands have been entered. With a new rope it will take one hour to make the splice.

---

*From the Mechanic Arts Magazine.

Metric System and Equivalents.

MEASURES OF LENGTHS.

1 millimeter = 0.001 meter = 0.0394 inch.
1 centimeter = 0.01 meter = 0.3937 inch.
1 decimeter = 0.0 meter = 3.937 inches.
1 meter = 1. meter = 39.37 inches.
1 dekameter = 10. meters = 393.7 inches.
1 hectometer = 100. meters = 328 feet 1 inch.
1 kilometer = 1000. meters = 3280 feet 10 inches.
1 myriameter = 10000. meters = 6.2137 miles.

MEASURES OF VOLUMES.

1 milliliter = 0.001 liter = 0.061 cubic inch.
1 centiliter = 0.01 liter = 0.6102 cubic inch.
1 deciliter = 0.1 liter = 6.1022 cubic inches.
1 liter = 1. liter = 0.9081 quart.
1 dekaliter = 10. liters = 9.081 quarts.
1 hectoliter = 100. liters = 2 bushels, 3.35 pecks.
1 kiloliter = 1000. liters = 1.308 cubic yards.

WEIGHTS.

1 milligramme = 0.001 gramme = 0.0154 grain.
1 centigramme = 0.01 gramme — 0.1543 grain.
1 decigramme = 0.1 gramme = 1.5432 grains.
1 gramme = 1. gramme = 15.432 grains.
1 dekagramme = 10. grammes = 0.3527 ounce.
1 hectogramme = 100. grammes = 3.5274 ounces.
1 kilogramme = 1000. grammes = 2.2046 pounds.
1 myriagramme = 10000. grammes = 22.046 pounds.

METRIC AND ENGLISH EQUIVALENTS.

Inches millimeters ÷ 25.4
Feet = meters × 3.28089
Yards = meters × 1.09363
Miles = kliometers ÷ 1.6093
Sq. In. = sq. millimeters × .00155
Sq. Ft. = sq. meters × 10.7643
Acres = sq. kilometers × 247.114
Cu. In. = cu. centimeter ÷ 16.3862
Cu. Ft. = cu. meters × 35.31658
Lbs. avoidupois = kilogrammes × 2.2046
Tons (2000 lbs.) = kilogrammes ÷ 907.18
Lbs. per foot = kilo. per meter × .67196
Lbs. per cu. ft. = kilo. per cu. meter × .06243
Sq. millimeters = square inches × 645.137
Square meter = square feet × .0929
Grammes = ounces × 28.4595
Grammes = pounds × 453.5926
Kilogrammes = pounds × .45359

Mixing of Concrete.

The following account of the mixing of the concrete for the piers of the new ship canal at the entrance of Duluth Harbor, Minn., is of interest, showing the careful way in which the work was done, and is from a report of Major Sears, W. S. of the Engineer Corps.

"The mixing was done on movable platforms, which were always placed alongside the molds to be filled. Mixing on the molding platform was prohibited, to insure the preservation of a smooth molding surface for the base of the blocks. The pebbles were always thoroughly washed, and while moist from the washing were transported in measuring carts of one-half cubic yard capacity each to the mixing platform, dumped and spread to an even thickness of 6 inches. The sand was spread on the pebbles in a like manner, and the cement, after being weighed, was spread on top of the sand and pebbles. After a thorough mixing dry, the mixture was again spread out on the platform to an even thickness of 6 inches, and water was added carefully, the mixing proceeding as the water was being applied, and continuing until the mass was in such a condition of plasticity that five or six sharp blows from the back of a shovel would produce a glistening appearance upon the surface of the concrete so treated. The concrete was then immediately shoveled into the molds, and, after being spread in layers not more than 5 inches deep, was thoroughly rammed with iron rammers having a face area of 25 square inches and weighing forty pounds each. Special flat rammers of oak shod with ½-inch steel were used for compacting around the sides of the mold. No attempt was made to provide special material for the surface of the block, a smooth and handsome appearance being accomplished by thorough ramming of the concrete. The batches as mixed contained each one cubic yard of pebbles, one-half cubic yard of sand and 432 pounds of cement. As indicated above, the pebbles and sand were accurately measured and the cement was always weighed."

Some Facts About Steel.

The term steel signifies iron containing a small percentage of carbon, which may vary from less than 1% to 15%. In modern times steel signifies iron that has an infinitesimal amount of carbon in it, provided it is produced by the open hearth or Bessemer process.

Meteoric iron is a close representative of nickel steel, and was used by the ancients. The majority of steel in the early times was obtained from wrought iron. Wrought iron is produced from cast iron melted in contact with iron cinder and iron ore, and, when cooled and worked, again heated in closed vessels with shavings of horn and similar material.

The most important invention in connection with the production of steel was that of Sir Henry Bessemer and termed the Bessemer process. The Bessemer process dates back to the fifties. The essence of this invention was the production of steel from pig iron by the use of an air blast. A blast of air is forced through the molten cast iron so that the carbon and silicon contained in it are burned out, they forming the fuel. The converter in which the metal is treated by the Bessemer process is an egg-shaped vessel having a capacity of several tons, which is turned on its side to receive the charge, and afterward brought into an upright position. Its bottom is full of holes, through which the hot air blast is forced.

Steel under the intense heat of a converter is as liquid as water. In 1878 a great advance was made in the art by Sidney G. Thomas, by which ordinary grades of iron ore were rendered available for steel making. The Thomas invention related to the addition of a quantity of lime to the charge, and the lining of the converter with special bricks formed of lime, which absorbed the phosphorus in the cast iron. The slag obtained by the Thomas process is found to be rich in phosphorus, and is used largely as a fertilizer. The Thomas improvement is considered the greatest yet made on the Bessemer process.

Following the Thomas discovery, the next important improvement in the process was that made by William Siemens in 1882, which consisted in burning the fuel so as to produce a gas which was burned in a peculiar furnace, obtaining thereby high temperature and great economy of heat.

The tenacity of good steel is very high, exceeding that of any other metal. The fractured surface of steel generally presents a crystalline appearance, uniform in strength. Much carbon makes steel close-grained and lustrous. Natural steel is obtained by refining cast iron so as to deprive it of a sufficient portion of carbon to bring it to a malleable state. Indian or Wootz steel is made by melting one pound of malleable iron in a crucible with 10% by weight of the wood and leaves of the plant Cassia ariculata. Mild steel contains from $\frac{2}{10}$% to $\frac{5}{10}$% carbon. When more is present it is termed hard steel.

Steel in its hardest state is too brittle for most purposes, and the requisite strength and elasticity are obtained by tempering, which is performed by heating it to a certain color, dependent on the use to which it is to be put, and cooling quickly. The tensile strength of steel ranges from 75,000 to 96,000 pounds. The average is about 86,000 pounds. A hemp rope 16.5 inches in circumference would be the equivalent to a steel rope 5 inches in circumference.

A Celebrated Case.

TO THE EDITOR:—Referring to your issue of Sept. 1, 1900, under "Concentrates," in an article in regard to dip of veins, it is stated that, under certain conditions, the side lines of a claim may become end lines. I would like to know, if convenient (and if you should possess the information), a reference to the title of the case upon which the article is founded, so that I may refer to it.

Portland, Or., Sept. 20.

The case of the Del Monte M. & M. Co. vs. the Last Chance M. & M. Co., decided by the U. S. Supreme Court. The entire decision, as furnished this paper officially from Washington, D. C., comprising about 14,000 words, with illustrations, appeared in the issue of July 2, 1898.

MINING SUMMARY.

ALASKA.

Miners have penetrated the rim rock of Last Chance basin, near Juneau, with a tunnel which strikes the basin 86 feet below the surface. The gravel carries gold.

The American G. M. Co. of Juneau has leased its mines at Sheep creek to F. Hammond, formerly Supt. of the property.

The Gold Digger, published in the staid and steady town of Nome, says the Koyukuk stampede is founded on fraud, and gravely warns the outside world against bad boomers.

ARIZONA.

COCHISE COUNTY.

J. W. A. Off, Prest. Con. Mines Co., near Willcox, will erect a 50-ton smelter.

GILA COUNTY.

A deposit of turquoise is reported in the Pinal mountains, west of Globe.

MOJAVE COUNTY.

Kingman Miner: The Tennessee mill ruins have been cleared away and work on the new mill will soon commence.——A. M. Harrington has resigned as Supt. Lucky Boy. The mine is working twenty-five men.——A. E. Ware, manager White Hills M. Co., says that the silver-gold ore below the 600 level of the Occident mine is holding out. The shaft will be continued to the 1000 level.

PIMA COUNTY.

The Helvetia M. Co. is reported to be contemplating the erection of another 150-ton smelter.

The Oro Fino G. M. Co. of Nogales has been formed; capital stock, $1,500,000. The company owns sixty acres of ground. There are three veins. A small shipment has been sent out averaging $150 per ton in silver. A. B. Hayes is secretary.

The American Wolfram Co. has made mineral entry at Tucson on the Immense and other lodes, in the Arivaca district.

PINAL COUNTY.

T. Cavanaugh has bonded to the Ray Copper Co., for $25.000, a group of copper claims lying between the Ray and the Innes group on Mineral creek.

Harrison & Chittenden are exploiting a group of lead-silver properties south of the Gila river, 8 miles east of Dudleyville.

Supt. J. J. Pheby of the Silver King tells the Florence Blade that he has recently taken ore out of the new shaft which yielded 30% copper and 1000 ounces silver. The new shaft is down 150 feet. He keeps eight teams hauling ore to Mesa City, to be shipped to Canyon City, Colo.

Supt. Parry of the Sunset group, Casa Grande district, is shipping lead ore to Deming.

J. R. McLane, general manager Kelvin C. Co. and Agassiz C. Co. of Boston, Mass., is at Florence to close up a deal on the Piety Flat group, opposite Kelvin.

YAVAPAI COUNTY.

(Special Correspondence).—Over at the Congress mine the sixty new stamps will soon be in, making 100 stamps there. The company here is running its new 40-stamp mill all right. The name of the postoffice has been changed from Weaver to Octave.

Octave, Sept. 20.

YUMA COUNTY.

C. S. McIntire will superintend the new mill to be erected by T. M. Drennan 50 miles below the Needles. The machinery is at Mellen.

CALIFORNIA.

AMADOR COUNTY.

(Special Correspondence).—Mr. Joyce, one of the owners of the Defender mine at Camp Contreras, desired to sell the mine and had a flattering offer for it. But his partner did not wish to sell. The mine has been bonded at good figures; the bonders are to sink a shaft 300 feet deep, to put up a new mill and hoist, and make other extensive improvements. They will not be allowed to take any ore from the upper or present workings, but must get all they take out from the shaft as they go down. The Defender has been a paying mine for the past two years, and the money that has been paid for the present mill, hoist, etc., has been taken out of the shaft, no drifting having been done. It is a good property.

Ione, Sept. 22.

(Special Correspondence).—The Lincoln mine, under the management of E. C. Voorhies, is going ahead with good prospects. The Mutual mine, a location north and east of the Lincoln, has a vertical shaft down 300 feet, drifting south and crosscutting west.

The Central Eureka has just completed one of the best 10-stamp mills in the county, with electric power and all else which makes a complete saver of the gold, of which there is a liberal amount in the ore. This mine has developed into a good property, and its future at the present depth of 1800 feet is promising. The South Eureka, south of the Central Eureka, has improved in value of late; credit is due the stockholders who have been digging up assessments. It is believed that Supt. Parks' skill will bring them out all right. The Oneida mine has a finely equipped steam hoisting works and mill; location most favorably situated for cheap work. In the Kennedy mine, whose reputation as a dividend-payer is well known, the new vertical shaft is making good progress, preparing for permanent steam hoist, which will be equipped with all modern improvements; forty stamps are running as usual; chlorination works always producing.

Sutter Creek, Sept. 25.

The Shenandoah M. & M. Co., through S. K. Thornton, has made final payment on the Shenandoah mine, near Plymouth. The shaft has been sunk 500 feet, stations cut and drifts run on the 200, 350 and 500 foot levels, north and south. Milling tests have proved satisfactory, running from $5 to $13 a ton.

Record: The Peerless mine has a depth of over 400 feet, sinking being pushed.——Water power is being used at the Oneida mill for the present, the Electric Co. not having sufficient power to run the mill at the time of its completion. Only twenty of the sixty stamps are in operation.

Dispatch: The east shaft at the Kennedy mine is down about 1630 feet. The first ground for this shaft was broken in November, 1898, and, at the present rate of sinking, the 3100 feet which it was intended to sink at the outset will be attained by the end of three years from the start. Good work has been done.

BUTTE COUNTY.

The Daisy Dean M. Co. has incorporated at Chico; capital stock, $20,000; J. H. Roberts, J. O. Jilson, C. L. Crane, L. A. McIntosh.

Twelve men are employed at the elevator near Pentz. Thirty men are at work in the Cherokee mine cleaning out the tunnel to put a new flume in the 3000-foot tunnel. The pipe line is completed between the Cherokee and the Banner mine.

At the Golden Trout mine machinery for the new mill is on the ground.

At Forbestown the 20-stamp mill addition to the mill of the Gold Bank Co. is crushing ore.

The Cherokee mine is to be reopened; J. B. Boyle will have charge.

CALAVERAS COUNTY.

The Melba G. M. Co. has elected as directors W. H. Busch, J. P. Rixford, W. W. Hutchinson, E. C. Bank, P. B. Whitfield, A. W. Bean, G. W. Baker, J. R. Tregloan. Work will soon be resumed under the superintendency of Mr. Tregloan.

W. W. Weatherwax, Supt. Burdena mine, Campo Seco, has resumed work. A double-compartment shaft will be sunk 200 feet.

The Woolly West M. Co. is organized at Mokelumne Hill, W. T. Harris Pres. and Supt., to operate the Sparrow Hawk quartz mine. The ledge in this mine runs parallel with Esperanza creek in a southwesterly and northwesterly direction, gradually drawing nearer the creek in its southwesterly trend. The size of the ledge as shown by several crosscuts along the lead, exposing the walls for a distance of about 1000 feet, is from 2½ to 4½ feet from wall to wall. A shaft has been sunk 60 feet; average grade ore about $5 per ton. It is a tunnel proposition; the ore can be sent to the mill by gravitation tramway. The creek affords water enough to run a 10-stamp mill for eight months in the year.

The Ozark M. Co., operating on Six-mile, near Murphys, has reached bedrock, after passing through 25 feet of gravel, which prospects well.

EL DORADO COUNTY.

Grizzly Flat reports that since the Mt. Pleasant mine is unwatered Brown Bros. have good ore. The mine was sold to Brown Bros. for $5000—a trifle, considering its record.

KERN COUNTY.

The Continental Oil Co., near Bakersfield, has a flow of oil in well No. 11.

The Kelly Oil Well Co., at Oceanside, is working in blue shale, and is down 300 feet.

MARIPOSA COUNTY.

Manager McKenzie has bought a 20-stamp mill for the Mariposa mine.

The Green copper mine, in Oakvale, is being operated by O. R. Sydney.

T. M. Carroll of San Francisco has bought the properties of the Bunker Hill G. M. Co., sold to satisfy judgments held by him.

MONTEREY COUNTY.

J. M. Krinkel, recorder Los Burros mining district, says Gillis' total cleanup is nearly $3500. Fifteen new claims have been recorded.

NAPA COUNTY.

At St. Helena the Napa County C. M. Co. is incorporated; capital stock, $1,000,000. F. J. Taylor has two tunnels started.

NEVADA COUNTY.

Brunswick stock sold recently at 25 cents a share.

The Crystal Lake G. M. Co. has incorporated, capital stock $1,000,000; 48,125 shares subscribed. A. D. Wilson, P. H. Morris, F. W. Brenid, E. O. C. Ord, C. Y. Brownlee, M. Clarken, J. M. Gregory; principal place of business, Benicia, Cal.

PLACER COUNTY.

(Special Correspondence).—After lying idle for three years, operations have been resumed at the Trinidad mine near here. A 10-stamp mill is running at full capacity. The company expects to put in a plant to work the concentrates within sixty days. J. D. Hoff is Supt.

Cisco, Sept. 22.

Sentinel: The Rocky Bar G. M. Co. is opening a claim on the American river, 3 miles from Colfax, on an extensive scale. P. Nicholls has charge. A. M. Burnham is superintending the work for the company.——Fifteen men are putting an undercurrent in a gorge in the American river, an extensive work.——J. S. Goodwin of You Bet is putting in an undercurrent in Greenhorn canyon, near the site of the old Clipper mill. Fifteen men are employed.——A 10-stamp mill is being put in on the quartz mine owned by L. D. Butts, about 4 miles from Cisco.

PLUMAS COUNTY.

C. B. Wingate, Supt. Thistle Fork mine, has discontinued prospecting by the bore-hole method on the company's ground.

G. Gaberel, Supt. Duke mine, Twelve-mile Bar, says the mine is yielding satisfactory returns for the outlay.

RIVERSIDE COUNTY.

A new industry in Perris is shipping earth to the cement works at Colton. There is a bed of adobe near Perris especially adapted to the cement which the Colton company is manufacturing; twelve carloads a day are sent to the factory.

SAN BERNARDINO COUNTY.

H. A. Cohen is at Capt. De Lamar's Gold Mountain group, where forty stamps are dropping on ore, with the first regular clean-up to take place during his presence in California.

The Orange Blossom group, in Hykorum district, near Bengal, will be worked this season by the Desert P., E. & D. Co. of Needles; L. V. Root Sec'y, W. B. Coombs Supt.

SANTA BARBARA COUNTY.

The Santa Barbara & Naples Oil & Land Co. located well No. 2 on their property near the ocean. The well will produce enough oil to run a second rig. They claim that from five to ten barrels could be got out by perforating the casing. The plan is to go right on down until oil sand is struck.

SHASTA COUNTY.

The Hiatt mine at Quartz Hill is being worked by D. G. Hunt under bond.

SIERRA COUNTY.

A strike is reported in the Osceola, a 2-foot ledge of ore.

At the Rainbow mine, Alleghany district, Clinton and Hegarty have ore which shows free gold.

The Plumbago continues to be the chief producer of Sierra county.

In the Harper mine at Forest City a crosscut is being run to tap the pay shoot.

The Wideawake G. M. Co., capital stock $110,000, will work a gravel channel near Downieville. F. W. Whelan, president; A. T. Eastland, vice-president; J. L. Fields, secretary, Oakland, Cal.

SISKIYOU COUNTY.

(Special Correspondence).—The Black Bear mill is running sixteen stamps on good ore. They have a 32-stamp mill on the property, arranged in 4-stamp batteries, but lack of water compels them to hang up sixteen stamps. Development work is being carried on. At the White Bear men are prospecting for the old ore body that paid $14,000 and then pinched out. At the Black Bear the main tunnel is in 950 feet. The vein is being followed down from near the end of the tunnel. If the ore holds out Supt. Dagget is going to sink a vertical shaft from the surface and crosscut to the vein. The Black Bear has paid $3,000,000 since it was opened up, and is good for years to come. Twenty men are employed.

At the Ball mine, near Rollin, on the 1st. Supt. L. D. Ball doubled his force; forty-five men are working on the property. The Ohio mine is producing good ore and 1000 tons more than was expected will be taken out. New ore bodies will be opened up there this winter. At the M. I., another of the Ball group, development work is being carried on and good ore is taken out. Some of the ore shows free gold. Ore is being taken out of the Mountain Laurel, adjoining the M. I. The tunnel is in 600 feet and from near the end an incline shaft is down 70 feet. If the ore holds up well Supt. Ball will run a tunnel into the hill lower down to tap the vein this winter. The mill on the property is being put in shape. The mill has twenty stamps, three concentrators, will have two new ones, and will be ready to run Oct. 15th.

The large cyanide plant of the Portland G. E. Co., below the Ball mill, is idle. It was a failure and incompetency was the cause of it. The plant is at present in litigation.

At Rollin the 5-stamp mill of L. A. Fagundas will soon be ready to crush custom rock.

Rollin, Sept. 25.

The Sterling G. M. Co., a West Virginia corporation, has bought the Sterling and Hungry Feeder quartz mines, in Hungry Creek district, with mill, tracks, apparatus, timber claim, etc., and intend working the ledges on an extensive scale.

Terry and Duniway are taking out from $12 to an ounce of gold per man each day in their quartz ledge on Scott river.

The mill of E. D. Baker at the Cherry Creek mine is in operation.

STANISLAUS COUNTY.

Alvinza Hayward and E. P. Newhall have bought 160 acres in the Adobe Valley country, in the Coast Range back of Grayson. Newhall has developed a quicksilver lode on the Loughead land, a shaft has been sunk 100 feet, a drift run 100 feet and a pumping plant installed. Twelve men are employed.

TRINITY COUNTY.

A miner at Coffee Creek has sent to the State Mining Bureau ore containing some emerald deposits, tiny crystals visible here and there in the rock, the first discovery of the kind in that part of the State.

TUOLUMNE COUNTY.

Near Carters, at the Grizzly, the north drift from the 700 level is in 300 feet.

S. Ralston of Sonora has bonded the Hope to an Eastern company, he retaining the position of Supt. A 10-stamp mill is in course of construction.

New Era: At the Black Oak the ledge has been drifted on 100 feet, exposing all the way 8 feet of ore worth $100 per ton.

The Seminole will be started up again with C. H. Thomas Supt.

C. W. Knox, working the Riverside mine near Columbia, has a seam running $65 to the ton.

At Big Oak Flat work in the shaft at the Mack has been discontinued until the mill has been completed.

Sinking goes on in the Longfellow shaft and the mill is running.

S. Wetmore has charge of the Esperanza mine near Columbia.

YUBA COUNTY.

The secretary of the local Chamber of Commerce has received from the U. S. Debris Commission a map showing the location of the proposed dam at Daguerre Point and the adjacent land which will be necessary to be procured before the work can be commenced. The amount of land wanted comprises 5560 acres. The Commissioners state that they have addressed communications to the owners of the land, asking prices, etc. Replies to about one-half of these communications had been received and the prices asked for the land range from $5 to $100 per acre.

COLORADO.

CHAFFEE COUNTY.

Buena Vista expects that the new tunnel on the Princeton will cut the veins of eighty-five claims. The scheme is backed by Pennsylvania oil men, who say they have lost enough money in the oil business to have put a tunnel through the mountain, and it is their intention to find out what deep mining will develop.

CLEAR CREEK COUNTY.

A strike of free gold is reported in the Free America, in zinc ore. F. M. Linsley, the manager, has assays of 35% zinc and 7.95 ounces gold per ton. Some of the specimens show free gold through the zinc.

At the Bonanza property, in Chase gulch, twenty men keep two batteries of stamps going at some of the Black Hawk mills; values two to three ounces gold per cord.

The 2:40 mine in Willis gulch is shipping a car of iron to the Denver smelters.

At the O'Neill mine the company will sink to a depth of 1000 feet.

Near Georgetown the Dunkirk property has been worked since last October by the Dunkirk M. & L. Co., in charge of C. H. Morris.

FREMONT COUNTY.

In 1898 Colorado produced 444,383 barrels of petroleum; in 1899, 390,278 barrels. The value of the 1899 product was $404,110, or $1.03 per barrel. In 1898 the larger output was valued at $367,504, or 82.8 cents per barrel.

W. B. Milligen, manager Union G. Ex. Co., Florence, started the preliminary run to test the machinery of the mill this week. The mill when completed will be the largest chlorination mill in the State. It will have a capacity of 450 tons of ore per day.

LAKE COUNTY.

At Leadville, Brown, Nelson & Mortenson have organized the Garbutt M. Co., capital $400,000. The company has a lease on the Garbutt, St. Crispen and Maud Hicks lodes, adjoining the property of the Ibex Co., which is developed by a 422-foot shaft. The present operators are working on the 300-foot level. Copper-iron sulphides have been opened up and shipments made, carrying about $20 per ton in gold, silver and copper.

Leadville Miner: Manager Guth of the Banker mine has advices showing that the proposition of building a stamp mill for working the low-grade ores in the mine is being favorably considered. Bodies of oxidized ore carrying from $2 to $12 per ton are said to exist in the upper workings.——J. H. Henly, Supt. Ibex M. Co., with Long, Callen et al, have a lease upon the Fanny Rawlings property and have begun work.

OURAY COUNTY.

"The London capitalists who deposited £1,400,000 with the Morgans for the purchase of the Camp Bird mine in Colorado," says the London Daily Express of the 28th, "had the money returned to them yesterday, John Hays Hammond having advised against the purchase."

SAN MIGUEL COUNTY.

Telluride Journal: The Butterfly Co. has a bond on the Silver Bell mine, a cross vein of the Butterfly and Terrible, which the workings of the Butterfly will open at great depth.

TELLER COUNTY.

There was a sensation at the Elkton mine last week. For some time it had been suspected that some of the miners had been guilty of stealing high-grade ore and detectives were put to work in the mine with the suspects. When the shift came off on the 19th inst. each man was searched, and seven were found to have ore of very high grade hidden in their pockets. All were arrested by a posse of officers. Supt. Camp estimates that fully $10,000 worth of ore was stolen last month from the mine. The ore taken from those searched is estimated to be worth at least $500.

The sheriff has levied on properties of the Victor G. M. Co. under execution for a judgment secured by D. H. Moffat for $151,000 against the company in Denver. The legal period must elapse before the sale of the property, and after that comes a period of redemption; the final distribution of the property can not be held for several months.

For the week ending Sept. 13 the production of Stratton's Independence mine amounted to 1050 tons of ore, $64,800; of that amount the profit to the English company is calculated to be 65%.

The Golden Cycle Co. expects to put 100 miners to work. The shaft is enlarged to 4½x14 in the clear, and is now down 700 feet.

At Victor 80 feet of ore is blocked out on the Golconda. In four years $85,000 has been spent without, until the present time, a ton of pay ore being secured. The shaft is 700 feet deep and sunk in granite formation. E. R. Argertinger is manager and Supt.; H. Hodgson, consulting engineer.

GEORGIA.

BARTOW COUNTY.

(Special Correspondence). — The Blue Ridge M. Co. of 33 Wall St., New York, has purchased the property of the Etowah Iron Co. of this place. The property is near here and has an area of 17,500 acres, consisting principally of iron and manganese ores. J. J. Calhoun of Cartersville has been appointed Gen. Supt., and Thos. Crabb, Jun. Am. Soc. C. E., Newark, N. J., has been appointed chief engineer. Mining operations will begin at once.

Cartersville, Sept. 22.

IDAHO.

BOISE COUNTY.

Ola residents earnestly request that the following be believed: "E. S. Miller left this place on the 23rd of last June with a four-horse team loaded with butter and eggs, and was hauling near Warren and drove into a wet sag and got stuck. He began digging around one of the wheels and his shovel struck a quartz ledge which proved to be 10 feet wide. He had some of the rock assayed in Warren and it went $10,000 a ton. Miller was offered $60,000 for his claim, but refuses to sell." It is a little late in the year for those stories, as the close season begins July 1.

LATAH COUNTY.

At the Blue Bird mine, 37 miles east of Palouse, C. Anderson, manager, will push work on the mine.

At the Bishop mine on Jerome creek, 24 miles east of Palouse, Thomson Bros., Rock Rapids, Iowa, have agreed to advance $12,000 for its development.

SHOSHONE COUNTY.

Near Wallace, G. S. Anderson is making a survey for the Cœur d'Alene M. Co., owner hydraulic elevator at Murray, to determine practicability of bringing waters of Big and Lost creeks onto high bars along Prichard creek.

Near Mullan the G. H. M. & S. Co. has completed the installation of new machinery. About 100 men are employed.

Wardner News: J. B. Green, at his concentrator plant, is putting in a single-deck slime table, 14 feet diameter, which will be run on mill slimes. The concentrates saved run 66.3% lead, 28.5 ounces silver, 7.4% moisture. The first carload gave smelter returns above all expenses of $481.29; the second car run $481.37.

Near Burke the new plant of the Hecla M. Co. is finished. Machine drills will soon be put into the mine. The gallows-frame for the hoist is 85 feet high, built of red fir timbers 24x32 inches. Four boilers, each 250 H. P., burn coal, automatic attachment—first in the Cœur d'Alenes.

MICHIGAN.

HOUGHTON COUNTY.

The tax assessment of the copper mines of the county has been increased over $39,000,000, due to the State Tax Commission. They are now assessed at $122,000,000. The Calumet & Hecla mine shows the biggest increase, $21,000,000.

MONTANA.

FERGUS COUNTY.

At the New Year G. M. Co. Supt. Meredith says that the mill is not being run at present. Work in the mines has been increased and ore is being taken out.

FLATHEAD COUNTY.

Near Libby Jno. Hartt proposes the resumption of operations at the Silver Cable, where there is silver and lead ore which can be concentrated, and a mill, ore to be conveyed from the mine to the mill by an aerial tramway, already built but unfortunately planned. A new route will have to be selected and the tramway altered and reconstructed.

MADISON COUNTY.

The deal for the purchase of the Boss Tweed and Clipper groups of mines at Pony is reported off. The intending purchasers were to make the first payment last week, but failed to do so. The option lapsed and the properties revert to the former owners. It is understood that the hitch in the negotiations was not due to any lack of faith in the richness of the mines, but to the fact that a big payment in advance was demanded, and that the owners of the Boss Tweed and Clipper reserved for themselves eight of the best properties of the group, all of which surrounded the two developed mines.

Two corporations have bought the Manser properties—the Montana C. & G. M. Co. and the Verdi M. Co. The Montana Co. is sinking a double-compartment shaft on the main vein. The intention is to sink this shaft below the water level, where rich copper sulphides are expected. The Verdi Co. is driving a tunnel above the water level to tap the veins running through its property. B. J. Soper is Pres. Verdi Co.

MISSOULA COUNTY.

A trust deed is filed in Missoula conveying property of the Western Montana P. M. Co. to T. C. Marshall, trustee of their mining property, for the purpose of bonding the same for $50,000.

SILVER BOW COUNTY.

In the Pennsylvania mining case won against the Boston & Montana by Aug. Heinze, Judge Clancy of the District Court has allowed Heinze $265,015 as costs in the case. He asked for $324,134. The Boston & Montana has a stay of execution and will appeal to the Supreme Court.

NEVADA.

ESMERALDA COUNTY.

There was another car of seventeen tons of ore received at the Selby smelter this month from Bell & Court's Southern Klondike mines, which netted over $3900 above freight and working charges. This is the fourth car received from these mines since March, aggregating fifty-five tons and netting $13,000. Most of this ore coming from the surface croppings on three or four separate claims indicates a very promising future for that district.

HUMBOLDT COUNTY.

The Ogden Copper Co. is organized in Ogden, Utah, capital stock $375,000, to work seven claims near Golconda, 10 miles from the S. P. road. Assays show 10% copper, $2 gold, eight ounces silver.

LINCOLN COUNTY.

G. K. Fischer is at the DeLamar mine in Nevada to devise a method for economical handling of 400,000 tons of mill tailings, from which the owner expects to net an average of $1 per ton.

LYON COUNTY.

Supt. Kyle has shipped to the San Francisco office of the company a bar of bullion valued at $2524.80, of which $2422.81 is gold and $101.99 silver; it represents the returns from 170 tons of ore from the Silver Hill mine crushed at the Pollard mill in Silver City.

WASHOE COUNTY.

The Bank of Nevada has placed an attachment upon the Reno Smelting & Milling Co.'s plant for $1900.

At Olinghouse W. C. Williams is hauling ore to the Slip mill for reduction. A cleanup of thirty-two tons netted $2600.

NEW MEXICO.

(Special Correspondence).—The Caballero Onyx M. Co. of New Mexico has been organized here, capital stock $350,000, to develop and work mines of onyx. The company will put in a manufacturing plant. Officers: L. Gilbert president, H. E. Runkle vice-president, C. W. Alexander secretary; main office in this city.

El Paso, Texas, Sept. 21.

COLFAX COUNTY.

A tract of placer land, 2½ miles long and 1000 feet in width, along the Moreno river, has been secured by H. J. Reiling of Chicago. The pay dirt is 18 feet in depth and will be worked by dredgers. Tests of the gravel give 30 cents per cubic yard. The dredgers will have a capacity to handle 5000 yards daily. It is expected that two dredgers will be ready for use by June, 1901.

GRANT COUNTY.

The 20-stamp mill owned by the Mimbres Con. M. Co., on the Mimbres, 3 miles below Georgetown, was totally destroyed by fire on the 16th. The mill was erected in 1881, and until the '90's treated forty tons of ore daily. The original cost of the mill was $40,000.

OREGON.

JOSEPHINE COUNTY.

H. E. Ankeny is putting the Sterling mine in readiness for the coming season.

Booth & Wilhelm are opening up newly discovered copper property on Pickett creek.

W. T. Cope has bonded the Golconda mine on Williams creek for $12,000.

The Old Channel Co. is making improvements on the A. & B. property at Galice, lately purchased, and will operate four giants. At the Old Channel mine, on Six-mile, they will run three giants.

The Hammersley mining property has been bonded to H. Philips of the Preston Peak copper mines.

The Yellow Horn mine, near Placer, will put up a quartz mill.

The Waldo C. Co. has bought the copper mine near Waldo, formerly owned by Strong, Kelly & Shipley, and the smelter on the mine placed there by Brown & Wheeler.

TEXAS.

EL PASO COUNTY.

El Paso reports that on October 1 the Federal Smelting Co. will begin work on a new smelter at El Paso. Authority for the statement is H. J. Clifford, Supt. of the Dragoon M. Co., in Grant Co., N. M. The Dragoon mines are owned by the Federal Copper Co., composed of G. W. Jacobs and others in New York City. The company bought a site for the plant and tracks at El Paso last winter. Mr. Clifford says that the company has practically been forced to build by the smelting trust which he says was formed two months ago when the Guggenheim smelters raised $2 per ton on treating ore. The Dragoon or Federal Co. has been one of the largest patrons of the El Paso smelter for several years and the building of its smelter at El Paso will mean a revival in that section. It is further asserted that the new plant will cost $250,000 and will employ 300 men.

UTAH.

TOOELE COUNTY.

Salt Lake Tribune, 23: The management of the Con. Mercur M. Co. yesterday contracted with an Eastern chemical company, through its personal representative, who is now in town, for 400,000 pounds of cyanide of potassium, to be used in the leaching of the former's ores at Mercur. It is the largest contract of the kind ever placed in this country, and yet the consolidated company is now consuming as much as 60,000 pounds of the chemical per month.

At Ophir W. A. Clark has bought the Miners' Delight group in that camp.

WASHINGTON.

OKANOGAN COUNTY.

E. P. Wheeler, manager Mineral Hill M. Co., at Conconully, will run a 2500-foot tunnel into Mineral hill.

FOREIGN.

BRITISH COLUMBIA.

Under date of the 15th inst. Alfred R. Selwyn, Esq., C. M. G., F. R. S., writes from Vancouver: "I have been shown by one of our bank managers a water-worn, well-rounded pebble of stream tin ore. I believe this to be the first well authenticated occurrence of stream tin ore in Canada."

Greenwood reports that shipments at the B. C. mine in Summit camp will reach 2000 tons for the present month.

The Robinson group, near the Athabasca, at Nelson, has been bonded to R. L. Spencer, and will be operated under the superintendence of B. Thomas.

The Van Anda smelter and mines closed down on the 1st; the men quit work until some arrangement was made to pay their wages. The smelter was to start up again this week.

At Greenwood men are clearing land for the buildings of the Standard P. S. Co., in charge of S. Young. The smelter will have a daily capacity of 200 tons.

At Moyie, the 16th was payday for the St. Eugene Consolidated; $27,323 was distributed among its 266 employes.

The Yellow Jacket and Maude S. group, 30 miles east of Rossland, is sold to L. Will of Syracuse, N. Y., for $65,000, first payment $10,000. T. James is manager.

The Tamarac is to have a tramway from the mine to the millsite on the Salmon river.

The hydraulic compressor plant on the Mist group by the British America corporation is approaching completion.

MEXICO.

The Lewis Co. of New York, which bought the Mendoza copper mine, Barranca del Cobre, Chihuahua, now has everything on a paying basis.

The Angelica C. & S. M. Co., with property 15 miles from San Gabriel, State of Durango, has been organized in Carnegie, Pa.; A. C. McCaughan Supt.

F. H. Husted of the Guazaparez M. & M. Co., Chihuahua, will put in a 35-ton lixiviation plant.

Books Received.

"The Ammonia Process," a 66-page pamphlet, 5x7 inches, published by Henry Hirsching of San Francisco, designed as stated by the author "to introduce the ammonia lixiviation process into practical business life." The article "Extraction of Copper from Ores with the Ammonia Process," contains a detailed account of the author's operations with his process at Goodsprings, Nev. The chemistry of ammonia and copper also receives considerable detailed attention. There are also several formulæ for the preparation of sundry standard solutions, and tables of symbols, molecular and equivalent weights, and percentage composition of many chemical compounds, etc.

The General Electric Co. is distributing a 92-page pamphlet on the subject of "Aging of Transformer Iron," containing five important articles that have been issued regarding this subject, as follows: "The Aging of Transformer Iron," by Prof. W. Elwell Goldsborough; "On Slow Changes in the Magnetic Permeability of Iron," by W. M. Mordey; "Effects of Prolonged Heating on the Magnetic Properties of Iron," by S. R. Roget, B. A.; "Hysteresis in Sheet Iron and Steel," by Arthur Hillyer Ford, and the "Aging of Transformer Steel," by J. A. Capp. This pamphlet is one that could with profit be in the hands of every central station manager, and will be furnished free of charge upon application to the General Electric Co., Spreckels building, San Francisco.

Catalogues Received.

"Electric Mine Locomotives" is the subject of the latest trade treatise issued in black and gold by the General Electric Co., which sumptuously supplies illustrated description of electric mine haulage, a system that since 1888 has so developed as to be of great practical advantage, being in many cases safe, efficient and economical. The subject of cost is gone into in full detail, the exposition of this matter being a principal feature of the pamphlet.

The general catalogue of the Geo. E. Dow Pumping Engine Co. of San Francisco is a good example of a valuable trade treatise. On the left hand pages appear illustrations of the several styles of pumps, and on the opposite right hand pages concise descriptions, with lists of sizes, capacities and details of construction. The typographical excellence of the work is commensurate with its value. The catalogue appears simultaneously with the announcement of the removal of the establishment to the new works, First and Natoma Sts., San Francisco, where increased facilities enable the concern to fill the orders received for steam, electric and power pumps, and hydraulic machinery—a business in which their twenty years of successful experience gives them commendable reputation. The company gives itself a good advertisement by making prominent illustrated mention of the fact that the battleships Oregon, Wisconsin and Ohio, and sundry other cruisers, monitors, gunboats and steamships have been completely equipped with Dow marine pumps.

◆

Personal.

James D. Hague of Grass Valley, Cal., is visiting Telluride, Colo.

D. Fricot of Calaveras county, Cal., has returned from Paris.

E. A. Hardy, late Supt. Santa Ysabel mine, Stent, Cal., is in San Francisco.

C. E. White is Supt. Nevada C. M. Co., Cottonwood, Nev., succeeding Geo. Gardner.

Max Boehmer, M. E., of Leadville has opened an office at 42 Jacobson building, Denver, Colo.

Thos. Ellis of Alameda, Cal., returns to his properties in Oaxaca, Mexico, on the 1st prox.

J. A. Kelly will build and run the 10-ton concentrator at the Highland mine, Ainsworth, B. C.

E. C. Rhodes of the cyanide department of the El Oro M. Co., El Oro, Mexico, is in Pasadena, Cal.

S. F. Emmons of the U. S. Geological Survey is examining the country in the vicinity of De Lamar, Nev.

Clarence King and G. W. Middleton are examining the Groom copper property, near Wickenburg, Ariz.

D. Ross goes from the Wildman-Mahoney mine, Sutter Creek, Cal., as Supt. Badger mine, Baker county, Or.

M. E. Ailes of the U. S. Treasury Department is examining the Government assay offices west of the Missouri river.

Wm. Magenau, E. M., has resigned as assayer for the Dexter G. M. Co., Tuscarora, Nev., and is succeeded by A. V. Corry, E. M.

R. H. Toll, a Denver, Colo., mining engineer, is now in charge of the precipitation plant of the Esperanza mine, at El Oro, Mexico.

W. Spencer, surveyor at the Golden Gate, Mercur, Utah, goes to the Cochiti mine, Bland, N. M., to take charge of underground work.

J. H. Kervin, late in charge of the Ontario, Utah, assay office, goes as chemist at the new smelting plant of the Bingham C. & G. M. Co., Bingham, Utah.

Benj. S. Buckman has returned from a two years' absence in Corea, and is with the Oriental Con. M. Co., which owns three quartz properties, with a total of eighty stamps, near Michigan Bluff, Cal.

◆

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s Scientific Press U. S. and Foreign Patent Agency, the following are worthy of special mention:

Bicycle Brake.—No. 658,119. Sept. 18, 1900. Wm. H. Parsons, Great Western Mine, Cal. This invention is designed to provide a novel brake for bicycles and the means for operating the same. It consists of a supplemental rim or extension carried by the driving wheel of the machine, a segmental band having one end fixed to the upwardly extending fork, and a fulcrumed lever to which the other end is attached. A sprocket wheel is turnable journaled upon said lever in line with the lower part of the driving chain, where it passes between the pedal shaft and rear axle sprockets so that when the pedals are pressed backwardly or against the forward movement of the machine, the tension of the chain will press upon the sprocket, and act through it and the lever to pull the band into frictional contact with the rim, sufficiently to retard or stop the progress of the machine.

Car.—No. 658,142. Sept. 18, 1900. G. A. & R. F. Dunn, Dinuba, Cal. This invention is designed to provide a car having a self-contained mechanism by which its direction of travel may be changed without independent or exterior appliances. It consists of superposed frames having wheels journaled at right angles to each other, and side links pivotally connected at opposite ends to the frames so that one frame may be raised above or lowered upon the other. There are means for connecting the frames to hold them together when the lower one has been raised into contact with the upper one, and this allows the wheels of the upper frame to rest upon the track or surface while those of the lower frame are lifted independent of the surface. When the lower frame is depressed and the upper one raised the reverse operation takes place and the other set of wheels are then in position to support the weight of the car and to carry it in a direction at right angles with the first set.

Concentrator.—No. 658,120. Sept. 18, 1900. J. W. Pinder, Groveland, Cal. This invention relates to a device for concentrating heavy materials and afterwards separating the lighter and worthless material therefrom. It consists of a table, the head of which is made concave, and the lower end connecting the said head portion is inclined both lengthwise and sidewise. In conjunction with this table are a series of diagonally disposed tapering riffles parallel with the side of the table, and separated from the first named series. The discharge from each series is received upon the next, and the upper end of the table is supported on vertical standards upon each side so disposed as to allow a perfect freedom of movement which is produced by the operation of a horizontal crank wheel centrally connected with the head so that a revolving motion is given to the head of the table, while the lower end reciprocates with a longitudinal movement upon supporting wheels or rollers. The compound movement thus produced acts as previously stated.

◆

List of U. S. Patents for Pacific Coast Inventors.

REPORTED BY DEWEY, STRONG & CO.,
PIONEER PATENT SOLICITORS
FOR PACIFIC COAST.

FOR WEEK ENDING SEPTEMBER 18, 1900.

658,313.—Pipe Cap and Plug—J. A. Bernardi, Salem, Or.
658,204.—Voting Machine—C. Christensen, Oakland, Cal.
658,139.—Flusher—I. P. Clarke, Alameda, Cal.
658,236.—Vote Register—H. A. Clifford, S. F.
658,142.—Car—G. A. & R. F. Dunn, Dinuba, Cal.
658,212.—Saw—J. M. Garrison, Santa Barbara, Cal.
657,933.—Crusher—T. R. Goth, S. F.
657,934.—Gas Engine—G. E. Hoyt, S. F.
658,266.—Balance Sheet—L. H. Johnson, Portland, Or.
658,016.—Sewing Machine—F. T. Leilich, S. F.
658,111.—Shoulder Brace—Louise S. Long, S. F.
658,271.—Wood Filler—E. A. Meyer, Fruitvale, Cal.
658,274.—Saw Gage—J. Morin, Seattle, Wash.
658,219.—Cable Grip—G. C. Niles, Bayside, Cal.
658,118.—Flat Wire Cable—E. I. Parsons, S. F.
658,119.—Bicycle Brake—W. H. Parsons, Calistoga, Cal.
658,120.—Concentrator—J. W. Pinder, Groveland, Cal.
658,124.—Snap Hook—W. W. Semple, Pendleton, Cal.
658,130.—Saw Handle—G. R. L. Stimers, Loyalton, Cal.
658,298.—Fence Post—Nancy A. Taylor, McCoy, Cal.
658,306.—Harrow—J. D. Whitten, Kingsley, Or.
33,235.—Design—W. Duguid, Seattle, Wash.
33,206.—Design—G. Stocker, Pasadena, Cal.

◆

Latest Market Reports.

San Francisco, Sept. 27, 1900.

SILVER—Per oz., Troy: London, 29d (standard ounce, 925 fine); New York, bar silver, 62⅝c (1000 fine); San Francisco, 62¾c; Mexican dollars, 51c.

The Chinese imbroglio has greatly affected Mexican currency. The drain upon Mexican silver dollars for export to the Orient has caused a scarcity in the circulating medium at the City of Mexico, and exchange has dropped from 2.10 to 2. Interest rates have risen from 6% to 12%, and premiums of 8% are offered on the intrinsic value of the Mexican dollar by exporters.

COPPER.—New York: Lake, 1 to 3 casks, 17.00 cash; carload lots, 16.75; Electrolytic, 1 to 3 casks, 16.87½; carload lots, 16.62½; Casting, 1 to 3 casks, 16.75; carload lots, 16.60. San Francisco: 18. Mill copper plates, 20c; bars, 22@23c.

LEAD.—New York, $4.37½; Salt Lake City, $4.25; St. Louis, $4.32½; San Francisco $5.00, carload lots; 5½c 1000 to 4000 lbs.; pipe 6¾, sheet 7½, bar 6c; pig, $4.70 @5.10. London, £17 15s.

SPELTER.—New York, $4.15; St. Louis, $4.00; San Francisco, ton lots, 5½c; 100-lb lots, 5¾c.

ANTIMONY.—New York, Cookson's, 10½c; Hallett's, 9½c; San Francisco, 1000-lb lots, 12c; 300 to 500 lbs., 13@14c; 100-lb lots, 15@18c.

IRON.—Pittsburg, Bessemer pig, $14.25; gray forge, $13.50; San Francisco, bar, per lb., 2.55c in small quantities.

STEEL.—Bessemer billets, Pittsburg, $17.50; sheet bars, $22; San Francisco, bar, 7c to 12c per lb.

TIN.—New York, pig, $29.75; San Francisco, ton lots, 30c; 1000 ℔s., 31c; 500 ℔s., 31½c; less, 32c; bar tin, ℞ ℔, 33c.

QUICKSILVER.—New York, $51.00; large lots: London, £9 2s 6d; San Francisco, local, $48.50 ℞ flask of 76½ ℔s.; Export, $45.50.

NICKEL.—New York, 50@60c ℞ ℔.

MAGNESIUM.—New York, $3.00 ℞ ℔.; San Francisco, $4.00.

ZINC.—San Francisco, 5½c; slab, 6c; bar, 7¾c.

SOLDER.—Half-and-half, 100-℔. lots, 20½c; San Francisco, Plumbers', 100-℔. lots, 17½c.

BABBITT METAL.—San Francisco, No. 1, 10c.

ASSAY LITHARGE.—San Francisco, 10c ℞ ℔, small lots.

BISMUTH.—New York, ℞ ℔., $1.60 50-℔ lots; San Francisco, $2.50 to $2.75 ℔ lots.

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 30c to 35c.

PHOSPHORUS.—F. o. b. New York or Philadelphia, 45@50c ℞ ℔.

TUNGSTEN.—New York, ℞ ℔., 95c; San Francisco, $1.15.

PLATINUM.—San Francisco, crude, $17 ℞ oz.; New York, $18.25; manufactured, $19.50@22.00.

POWDER.—F. o. b. San Francisco: No. 1. 70% nitro-glycerine, per ℔., in carload lots, 15¼c; less than one ton, 17¼c. No. 1*, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1** 50%, carload lots, 11¾c; less than one ton, 13¾c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9½c; less than one ton, 11½c. No. 2** 30% carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9, in lots not less than 1000.

FUSE.—Triple tape, $3.60 per 1000 feet; double tape, $3.00; single tape, $2.65; Hemp, $2.10; Cement No. 2, $3.00; Cement No. 1, $2.65, in lots of 3000 feet and up.

CANDLES.—Granite 6s, 16 oz., 40s., 12¼c ℞ set; 14 oz., 40s., 11¼c.

CHEMICALS.—Cyanide of potassium, 98%-99%, jobbing, 32½@33½c ℞ ℔.; carloads, 30@31c; in 10-℔. tins, 40c; sulphuric acid, 66% B, 2c ℞ ℔.; soda ash, $1.60 ℞ 100 ℔s. 58%; hyposulphite of soda, 2¾@3c ℞ ℔.; blue vitriol, 5½@6c ℞ ℔.; borax, concentrated, 7@8c ℞ ℔.; chlorate of potash, 12@13c; roll sulphur, 6c; alum, $1.90@2.00; flour sulphur, French, 2¼@2½c; California refined, 1¾@2c; nitric acid, in carboys, 8c ℞ ℔.; caustic soda, in drums, 3@4c ℞ ℔.; Cal. s. soda, bbls., $1.00; sks, 95c ℞ 100 ℔s.; chloride of lime, spot, $2.50@2.60; nitrate of potash, in kegs, 8c; caustic potash, 10c in 40-℔. tins.

OILS.—Linseed, pure, boiled, bbl., 75c; cs., 80c; raw, bbl., 73c; cs., 78c. Deodorized Stove Gasoline, bulk, 15c; do., cs., 21c; 86° Gasoline, bulk, 21c; do., cs., 27c; 63° Naphtha or Benzine, deodorized, in bulk, per gal., 14c; do., in cs., 20c; Lard Oil, Extra Winter Strained, bbl., 70c; cs., 75c; No. 1 bbl., 50c; cs., 55c; Neatsfoot Oil, coopers' bbls., 60c; extra bbls., 65c; cs., 60c; No. 1 bbl., 52½c; cs., 57½c.

COAL.—San Francisco, coast, yard prices: Wellington, $9; Seattle, $7.00; Coos Bay, $5.50; Southfield, $9.00. Cargo lots, Eastern and foreign: Wallsend, $8.00; Brymbo, $7.50; Pennsylvania, hd., $14.00; Scotch, $8; Cumberland, $12; Cannel, $9.50; Welsh Anthracite, $12.00; Rock Springs, $8.50; Colorado Anthracite, $14.50. Coke, $16 per ton in bulk; $18 in sacks.

◆

San Francisco Stock Board Sales.

San Francisco, Sept. 27, 1900.

600 Challenge	19c	200 Mexican	31c
100 Confidence	75c	100 Ophir	52c
300 G. & C.	32c	100 Overman	10c

◆

Commercial Paragraphs.

The Jeffrey Mfg. Co., Columbus, Ohio, have issued a new chain catalogue that is now ready for distribution upon request.

A. E. Chodzko, mechanical engineer, has moved his offices from 320 Sansome to 220 Market street, San Francisco.

WANTED.

A Rich Placer proposition, adapted to working by Railroad Steam Shovel, or Dry Land Excavator. Description, with price and terms, to receive attention must be accompanied by reliable reports and references.

Address: EDWARD N. BREITUNG,
MARQUETTE, MICH.

Quicksilver
—FOR SALE BY—
The Eureka Company,
OF SAN FRANCISCO.
Room 1, - - 320 Sansome Street,
SAN FRANCISCO.

Recently Declared Mining Dividends.

Montana Ore Purchasing Co., Montana, $1 per share	Sept. 29
Amalgamated Copper Co., regular quarterly dividend 1½% and ½% extra	Oct. 29
Con. Mercur, Utah, 10 cents per share, $100,000	Oct. 10
Mammoth M. Co., Utah, 5 cents per share, $20,000	Oct. 1
Granite M. Co., Colo., 1 cent per share, $5000	Sept. 24
Golden Cycle M. Co., Colo., 1 cent per share, $10,000	Sept. 20
Modoc G. M. & M. Co., Colorado, 1 cent per share, $5000	Sept. 24
Elkton Con. M. Co., Colo., $75,000	Sept. 20

SITUATIONS WANTED.

SITUATION WANTED AS ASSAYER.
Address B. H. W., care of the Mining and Scientific Press office.

WANTED.—SITUATION BY A MAN OF EXperience who is competent to take charge of a gold mine. Understands assaying, surveying, and has business qualifications. Best of references as to character and ability. Address K. C., this office.

WANTED.—SITUATION BY A COMPETENT and experienced millman on concentrators or battery frame. Highest references. Address L. W, 509 Kearny street, room 2, first floor, San Francisco Cal.

SITUATION WANTED by a first-class miner with years of experience; up to date in timbering and working a mine; handles men with skill and economy; understands modern milling and concentrating; with business ability; best of references Address Superintendent or Foreman, care this office.

MINING ENGINEER (technical training), twenty years' experience as surveyor, assayer, superintendent and manager of mines and mills; business qualifications; linguist; at present general manager mining and milling proposition in Mexico; desires to make a change on account of health; best references. Address S. O., Mining and Scientific Press.

WANTED.—A SITUATION AS MANAGER OF A gold quartz mine in Colorado or California; understand assaying and chlorination; salary, one-half in mining stock and one-half in cash. $200 per month. Reference as to ability: L. X Smith, manager of Gillett Gold Extraction Co. Address L. W. THIELE, Altman, Colorado.

WANTED SITUATION
AS MILLMAN, FOREMAN, OR ASSISTANT.
Have had eight years' experience with one of the largest mining companies in Idaho, in pan amalgamation, cyaniding and refining of bullion. Ability to do assaying. Refer to De Lamar Mining Co., De Lamar, Idaho. Address W. H., this office.

Quicksilver
For Sale in Lots to Suit.
REDINGTON & COMPANY, Wholesale Druggists, 23-25-27 Second Street, San Francisco.

THE ERICSSON SWEDISH
TELEPHONES
HAVE BEEN IN USE OVER 20 YEARS.
THEY ALWAYS TALK. GIVE THEM A CHANCE TO TALK TO YOU.
CATALOGUES FREE.
ERICSSON TELEPHONE CO
20 WARREN ST. NEW YORK. N.Y.

THE CALIFORNIA DEBRIS COMMISSION, HAVING received applications to mine by the hydraulic process from the Dewey Consolidated Gravel Mining Co., in the Homeward Bound, Evening Star and Morning Light Mines, near Iowa Hill, Placer Co., to deposit tailings in Indian Canyon; from Mary E. Ruth et als., in the Buckeye Mine, near North San Juan, Nevada Co., to deposit tailings in a worked-out pit; from the Ralston Divide Gold Mining Co., in the Pat Goggins and Blacksmith Flat Mines, near Virner, Placer Co., to deposit tailings in Long Canyon; from Nathan Gardiner, in the Sidney Placer Mine, near Igo, Shasta Co., to deposit tailings in Sidney Gulch; and from A. W. Whitney and C. Y. Hepler, in the Miocene Mine, near Crescent Mills, Plumas Co., to deposit tailings in Rush Creek, gives notice that a meeting will be held at Room 59, Flood Building, San Francisco, Cal., on October 15, 1900, at 1:30 P. M.

HEALD'S
BUSINESS COLLEGE.
24 Post Street, - - - San Francisco.

MINING AND CIVIL ENGINEERING DEPARTMENT: Mathematics, Draughting, Strength of Material, Chemistry, Assaying, Blow-Pipe Analysis, Geology, Mineralogy, Surveying, etc., under the direction of Prof. O. H. Packer, an engineer of national reputation.

ELECTRICAL DEPARTMENT: Theory and Practice; Construction,

BUSINESS: Bookkeeping, Shorthand, Typing, Modern Languages, etc.

Twenty teachers; individual instruction; can enter at any time; Catalogue and Journal free.

SPIRAL SAND PUMPS.
For Pumping Sand, Slimes, Tailings and Crushed Ores.

The Cheapest and Most Durable Pump on the Market. Manufactured by J. H. Frenier & Son.

Represented by M. S. HAUSER,
12 Front Street, ... San Francisco, Cal.

DEWEY, STRONG & CO.
SCIENTIFIC PRESS PATENTS PATENT AGENCY
330 MARKET ST. S.F.

WANTED.

WANTED.—METALLURGIST CAPABLE OF taking charge of 40-ton copper furnace using charcoal fuel, situated in Mexico. State experience and wages wanted; references. Address "Metallurgist," Mining and Scientific Press.

WANTED.---A NEW OR SECOND-HAND 15 H. P. GASOLINE HOIST.

Keystone Con. Mining Co., Sutter Creek, Cal.

INFORMATION WANTED

regarding whereabouts of John R. Williams, about 70 years old. Last heard of as Supt. of a mine in Copper's Hill, Vermont, in 1866 Has an adopted son about 32 years old. Supposed to be placer mining in the West, possibly California. $25.00 reward at Deseret News Office, Salt Lake City, Utah.

WANTED.

Experienced Promoter and Stock Operators

to handle the sale of stock for an oil company. State previous experience.

For particulars, address

C. J. TALLON,

308 Market Street,........San Francisco, Cal.

Experienced Coal Miners

can secure **steady employment** either on **contract** or by **day's work** at the **TESLA COAL MINES, Tesla, Alameda County, California.** Good wages guaranteed, also good board. Good climate, and also good accommodations and houses for families.

For further particulars, please apply to the Superintendent at the Mines, or to the Company at 328 Montgomery St., San Francisco, Cal.

REFRACTORY ORES WANTED.

1000 TONS or more which will assay $75.00 Gold per ton and over, delivered free of charge at San Francisco, Cal. Correspondence solicited.

C. J. TALLON,

308 MARKET STREET, SAN FRANCISCO, CAL.

WE BUY very rich Ores, Dental Scraps, Tellurium Ores, Mill Wastes, Jewelers' Sweeps, Gold Retorts, Old Iron Retorts, Base Amalgam, Quicksilver, Amalgamated Plates, Gold and Silver, Old Slags.

A. M. DONALDSON & CO.,

ASSAYERS AND WASTE PRODUCT SMELTERS,

1661 Larimer St., Denver, Colo.

Donaldson's Assayers' Slag Hammer { 1 lb......$1.10 / 1 lb. 3 oz. $1.25

FRED C. MILES,

CISCO, PLACER CO., CAL.

COPPER AND GOLD PROSPECTS.

A GOING GOLD PROPERTY.

Samples by Mail or Express Will Receive Prompt Attention.

ALBERT I. GOODELL,

ASSAYER AND CHEMIST,

1430 Stout Street......................DENVER, COLO.

FOR SALE.

FOR SALE.—A MAMMOTH GOLD MINE OF free milling ore. Never before offered for sale. A rare opportunity for large capitalists or a strong syndicate. Apply to E J. FRASER (sole agent for owners), 522 Parrott Building, S. F., Cal.

FOR SALE.

Lease and Bond, Eighteen Months, Easy Terms, Copper Property, New Mexico.

High grade ore with good gold values. Accessible. Plenty wood and water. Strong vein. Three shafts. Will pay from start. Adjoins large producing mine. **H. E. RUNKLE, El Paso, Texas**

FOR SALE OR LEASE.

San Bartola Group of Mines,

PACIFIC COAST, TEPIC, MEXICO.

Three big old mines forming group, with any amount of gold, low grade, in sight Timber and water power close to the mines. Reports and maps sent on application. Address to LIC. ELIAS GALINDO, P. O. Box 26, Tepic, Mexico.

Second-Hand Mining Machinery and Supplies OF ALL KINDS.

Send for Catalogue.

THE S. H. SUPPLY CO.

22nd and Larimer Sts., DENVER, COLO.

CHAS. F. POTTER & CO., MINES AND STOCKS.

FISCAL AGENTS FOR THE

COPPER CROWN OF ARIZONA MINING CO.

425 First Ave. North,

MINNEAPOLIS, MINN.

References: Hennepin County Savings Bank, Bradstreet's Mercantile Agency, R. G. Dun & Co.

N. B.—Copper Crown of Arizona Mining Co. own a rich property near the Black Diamond, in the Dragoons, Cochise county, Arizona. We will be pleased to send "investors" full information as to ore and assays. A limited amount of $1 shares for sale at $50 per 1000, $500 per 10,000 shares.

BENJAMIN T. LLOYD, STOCKS, BONDS AND MINES.

Have immediate customers for well-developed Gold and Copper Properties.

P. O. Box 608, **SALT LAKE CITY, UTAH.**

MILL PLANS.

Cyanide, Concentration, Smelting, Sampling

F. D. BAKER. Mech. Eng., DENVER.

WEST COAST OF MEXICO.

WÖHLER, BARTNING Suc's, Mazatlan (Sinaloa), Mex.

Bankers, Importers, Exporters and Commission Merchants.

Representatives and Agents of the principal Mining Companies in the State of Sinaloa and the dependencies of the Pacific coast in the States of Durango, Chihuahua, Sonora, Lower California and Jalisco.

ORE BUYERS AND EXPORTERS. - MINING SUPPLIES.

TELL US WHERE YOU'RE AT.

4 Cents Per Ton Per Mile

Is what it costs to transport Ore with our systems of Aerial Wire Rope Tramways.

We'd like to send you our book telling you all about it, but we can't do it unless you write us

WHERE YOU'RE AT.

THE J. H. MONTGOMERY MACHINERY CO,

DENVER, COLO., U. S. A.

"CRACK PROOF"

PURE RUBBER BOOTS are the Cheapest because They are the Most Durable.

BEWARE OF IMITATIONS.

GOLD SEAL, BADGER AND PIONEER Belting, Packing and Hose.

Rubber Factory in San Francisco. Valves, Gaskets, Etc., Made to Order.

Goodyear Rubber Co., R. H. PEASE, President and Manager.

Nos. 573, 575, 577, 579 MARKET ST., San Francisco. Nos. 73, 75 FIRST ST., Portland, Or.

Globe Engineering Company,

(INCORPORATED.)

STIRLING WATER-TUBE BOILERS.

Unequaled for Mines and Mills.

Easily Transported. Quickly Cleaned.

EXETER HOISTING ENGINES; CORLISS, SLIDE VALVE AND AUTOMATIC CUT-OFF ENGINES; BOILERS; STEAM PUMPS; SINKING PUMPS; HIGH DUTY PUMPING ENGINES; AIR COMPRESSORS; FEED WATER HEATERS AND PURIFIERS; JET AND SURFACE CONDENSERS; WALKER'S METALLIC PISTON ROD PACKING; LOCKE DAMPER REGULATORS; REFRIGERATING MACHINERY.

STEEL MILLS, ROCK AND SHAFT HOUSES.

OTTO AERIAL ROPEWAYS.

COMPLETE DESIGNS for STEAM PLANTS for MINES and MILLS.

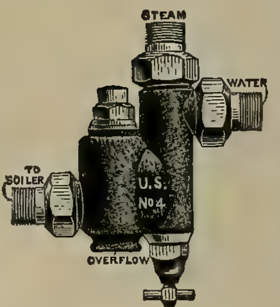
GLOBE ENGINEERING COMPANY,

Mechanical, Civil and Mining Engineers, 509 Mission St., San Francisco, Cal.

There are 500 Points to be Gained

from consulting our little "ENGINEERS' RED BOOK." In addition to answering that many problems of interest to the engineer, it tells you the good points of the

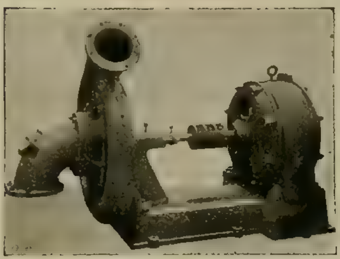
U. S. AUTOMATIC INJECTOR.



Let us mail you one of the books.

AMERICAN INJECTOR CO.,

Detroit, Mich., U. S. A.



CENTRIFUGAL PUMPS

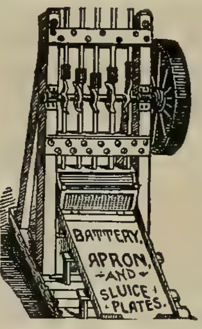
—FOR—

Mine Draining or Hydraulicking.

WE DESIGN PUMPS FOR ALL CONDITIONS.

WRITE FOR CATALOGUE.

BYRON JACKSON MACHINE WORKS, - SAN FRANCISCO, CAL.


BATTERY, APRON, AND SLUICE PLATES.

To Gold Miners!

Silver Plated Copper Amalgamating Plates

For Saving Gold in Quartz and Placer Mining.

ONLY BEST COPPER AND REFINED SILVER USED. OLD MINING PLATES BOUGHT OR TAKEN IN EXCHANGE FOR NEW PLATES. GOLD EXTRACTED FROM OLD PLATES AT A MODERATE COST. OLD PLATES REPLATED. GOLD, SILVER, NICKEL, COPPER AND BRASS PLATING.

Denniston San Francisco Plating Works,

652 Mission Street, Cor. Annie, San Francisco, Cal.

E. G. DENNISTON, ... Proprietor.

—:Send for Circular.:—

C. H. EVANS & CO., Machine Works,

183-185-187 FREMONT STREET,

Where, with Enlarged and Increased Facilities, they are better than ever prepared to do

First-Class Machine Work

Promptly, and at Reasonable Prices, and will continue the manufacture of

Thomson & Evans Steam Pumps,

Deep Well Pumps, Power Pumps, Etc.,

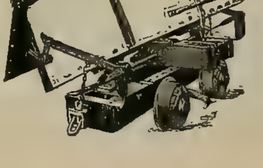
Also Marine Engines, Ship and Steamboat Work, Pipe Cutting, General Jobbing and Repairing.

OUR CARS HAVE BEEN IN USE FOR NINE YEARS.

TRUAX

CARS ALWAYS IN STOCK TO FILL RUSH ORDERS.

ORE



CARS

CUT REPRESENTS OUR SIDE DUMP CARS.

SEND FOR PAMPHLET.

TRUAX MFG. CO.

CARS MADE FOR ALL KINDS OF WORK.

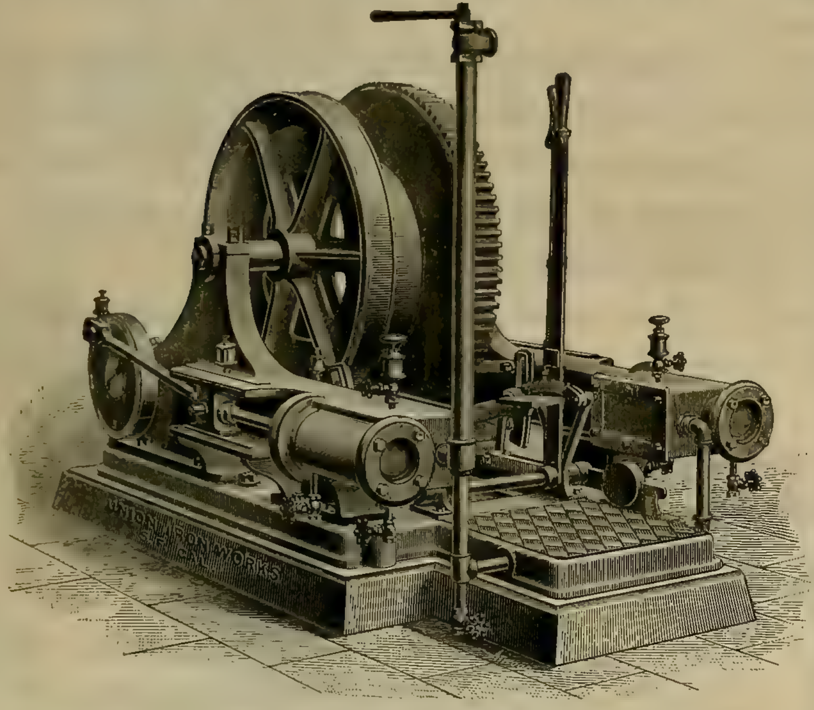
69 Stevenson St., S.F.

UNION IRON WORKS,

★ ★ **222 Market Street, San Francisco, Cal.** ★ ★

MAKE THIS SMALL

DOUBLE CYLINDER SINGLE DRUM HOIST



HOIST FOR PROSPECTING.

For Prospecting Purposes or Underground Work,

USING COMPRESSED AIR.

The entire hoist is self-contained, being mounted on an iron sole plate or bed which carries all the operating levers and provides a footboard for the operator. The engines are provided with reversible link motion and the drum with a broad strap brake, insuring safe and rapid work.

The general lines upon which this hoist is designed are neat, strong and substantial and all the operating parts are conveniently arranged.

The size herewith illustrated is the 4 in. x 10 in., rated at 15 horse power. The larger sizes, 8 in. x 12 in. and upwards are provided with post brakes.

Finlayson {Patent Aerial} {WIRE ROPE} TRAMWAY

Star Eng. Co. St. L.

FOR TRANSPORTATION OF ORE, COAL, DIRT, TIMBER, ETC.

Perfect Grip Clip,
Absolutely Safe,
Loads Automatically,
Unloads Automatically,
Operated by One Man,
Cost of Maintenance Low,
Capacity Largest Obtainable.

ALSO SOLE MANUFACTURERS
PATENT FLATTENED STRAND

[TRADE MARK REGISTERED.]

—AND—

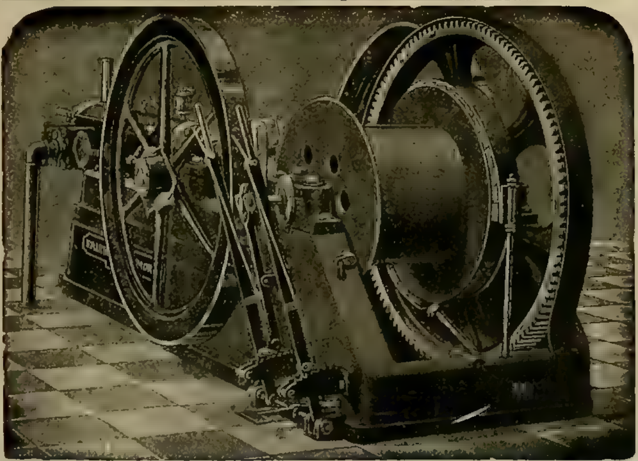
Wire Rope

OF EVERY DESCRIPTION.

MANILLA, SISAL, BLOCKS, ETC.

A. LESCHEN & SONS ROPE CO.,

Home Office: 920-922 North Main St., ST. LOUIS, MO. Branch Office: 47-49 South Canal St., CHICAGO, ILL.



FAIRBANKS-MORSE GASOLINE-DISTILLATE GEARED HOISTER.

An efficient and reliable combination of a Fairbanks-Morse Gasoline-Distillate Engine on the same base with a Friction Hoist. Modern and up to date. We publish a special catalogue describing our Hoister which we gladly mail prospective purchasers.

FAIRBANKS-MORSE GASOLINE-DISTILLATE ENGINES.

ALL SIZES UP TO AND INCLUDING 54 HORSE POWER.
For Pumping, Milling, Lighting, Air Compressors, Etc.

FOR CATALOGUES AND FULL INFORMATION, ADDRESS

FAIRBANKS, MORSE & CO.,

310 MARKET ST., SAN FRANCISCO, CAL.
201 N. LOS ANGELES ST., LOS ANGELES, CAL.
FIRST AND STARK STS. PORTLAND, OGN.
1600 SEVENTEENTH ST., DENVER, COL.
FRANKLIN AND MONROE STS., CHICAGO, ILL.

THE CAL. ANTI-CALORIC COMPANY,

Tel. Main 5752. Office, 217-219 Mission St., San Francisco, Cal.

Sole Manufacturers of CAL. ANTI-CALORIC SECTIONAL COVERINGS AND BLOCKS FOR BOILERS. PLASTIC (dry) for Steam Domes, Etc. Sole Agents for the Boston Asbestos Paper Co. Asbestos Goods of All Kinds. Send for Information. Factory, Potrero.

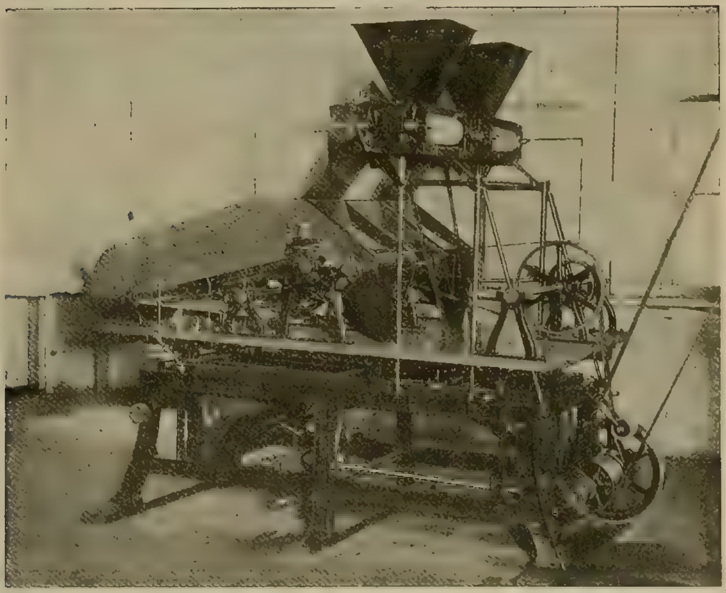
Dewey, Strong & Co., Patent Agents.

330 Market St., San Francisco, Cal.

CROWN GOLD MILLING CO.

Manufacturers of the "CROWN" CONCENTRATOR and CROWN ORE SIZER. A dry process of sizing and concentrating ore, sand or gravel. Designed to accord fully with the laws of specific gravity, and especially adapted to refractory ore or localities where there is no water.

The chief claims for the Crown Concentrator are that it occupies less floor space and has nearly four times the capacity of any wet concentrator; that it will concentrate ores containing base and refractory metals that ordinarily slime and carry off values; that it effects a saving of values far above the ordinary methods of concentration.



We have, now in operation, a complete plant for crushing, sizing and concentrating ores by the

Crown Dry Milling Process.

Mine owners desiring tests made can forward us, freight prepaid, not less than 1000 lbs. nor more than 4000 lbs. of sample, for which a charge of $20 will be made. (This amount includes assaying, etc.)

Ores for which this process is adapted and of which consignments are solicited are any concentratable ores, pulps, tailings, or sands, carrying sufficient values, whether they have heretofore been profitably concentrated or not.

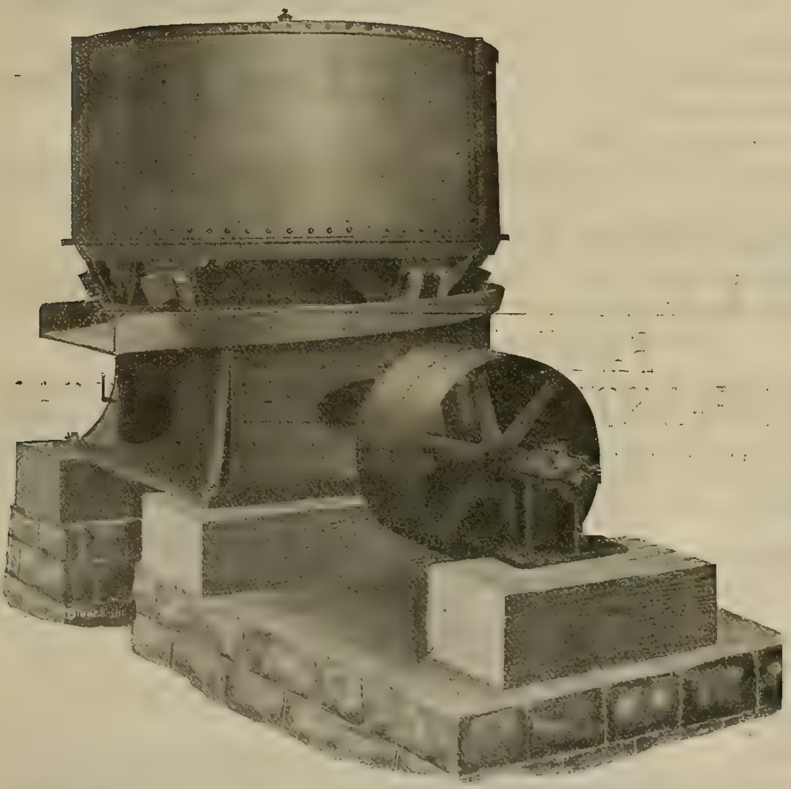
* * * *

Office,..............................**230 Post St.**
Works,..................**23 Stevenson St.**
SAN FRANCISCO, CAL.

GATES IRON WORKS,

SOLE MANUFACTURERS OF THE

BRADLEY CHILIAN MILL,



Unsurpassed for regrinding tailings or for other fine pulverizing.
ALL KINDS OF HIGH GRADE MINING MACHINERY.
650 Elston Ave., CHICAGO.

TANKS!

AND COMPLETE

CYANIDE PLANTS.

ILLUSTRATED CATALOGUE

MAILED FREE.

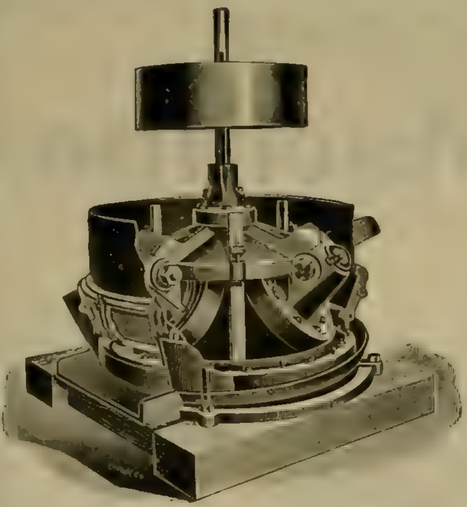
Zinc Lathes with Automatic Feed

FOR CUTTING ZINC SHAVINGS.

Pacific Tank Co., Manufacturers.

348 East Second Street,
Los Angeles, Cal.

35 Beale Street,
San Francisco, Cal.

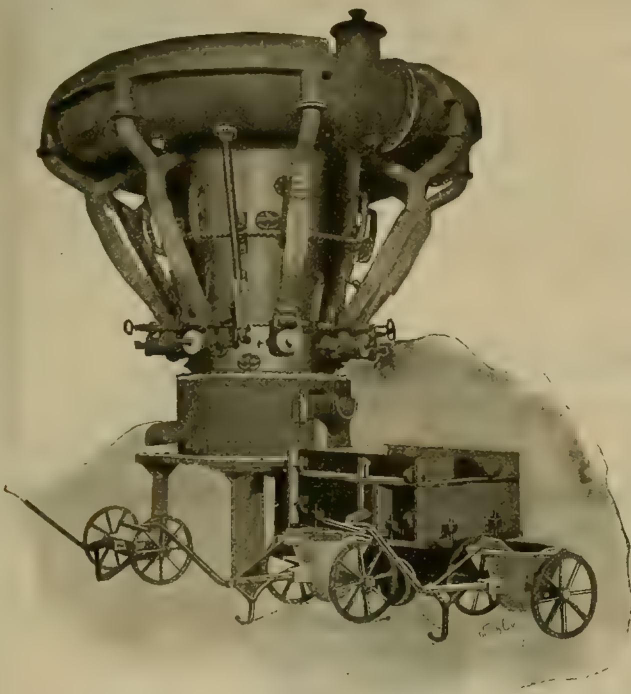


THE GRIFFIN
THREE ROLLER
ORE MILL.

The Griffin Three Roller Ore Mill is a simply constructed Mill, suitable for working all kinds of ores that require uniformly fine crushing by the wet process. This Mill is a modification of the well-known Chilian Mill, but the rollers run upon a crushing ring or die, which is inclined inwardly at an angle of about 30 degrees, the rollers themselves also being inclined to the central shaft of the Mill, thus utilizing the centrifugal force, as well as the weight of the rollers themselves as a crushing agent. The Griffin Three Roller Ore Mill is therefore a Mill of great strength, and has few wearing parts. We construct these Mills with extreme care, using only the best of raw materials, which are most carefully worked by men who are specialists as mill builders. We sell the Griffin Ore Mill on its determined merits, and will gladly supply full information regarding it to any one.

SEND FOR FREE ILLUSTRATED AND DESCRIPTIVE CATALOGUE TO

Bradley Pulverizer Co., Boston, Mass.



THE COPPER FURNACE

Here illustrated has OUR PATENT

WATER VAPORIZING ATTACHMENT.

Experience has proven this to be the best of all methods for applying water for the cooling of jackets. It has the further great advantage of using only about one-eighth the usual amount of water needed for that purpose, and all jackets are kept at the same temperature.

We Manufacture Smelting Furnaces and Equipments

FOR THE TREATMENT OF

GOLD, SILVER, LEAD, COPPER and NICKEL ORES.

of any desired tonnage capacity above forty tons per day, and put them into successful operation under guarantee. Write for catalogue showing different styles of furnaces.

We also design, manufacture and erect Smelter Sulphide Mills for crushing and sampling ores. We are the originators of the Narrow Face, Large Diameter, High Speed Crushing Rolls. A full description of our Crushing Machinery is given in a special catalogue, which will be sent on application.

THE COLORADO IRON WORKS CO.

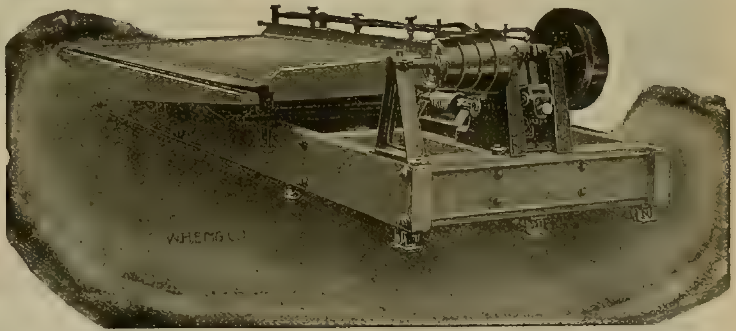
ESTABLISHED 1860. DENVER, COLO., U. S. A.

THE : CAMMETT : CONCENTRATOR.

Designed with some Regard for the Laws of Concentration.

From **The Denver Evening Post,** July 15th, 1900.

* * * "Now about concentrating tables. Here's a fellow who says there's nothing equal to the Wilfley, and I am trying to convince him that old man Woodbury over in California makes the finest table in the world." "No, sir," said his comrade, "you're way off. I've tried the CAMMETT too thoroughly to believe there's anything made to equal it."



Manufactured Under U. S. Patent No. 632,892; Dated Sept. 12, 1899.

Denver Engineering Works,---Shepard & Searing,---Sole Manufacturers,

30th and Blake Streets, - - - - DENVER, COLORADO.

CHAS. C. MOORE & CO.,

—ENGINEERS AND DEALERS IN—

MAGNOLIA ANTI-FRICTION METAL,

HAMILTON CORLISS ENGINES, N. Y. SAFETY AUTOMATIC ENGINES,
BABCOCK & WILCOX BOILERS, McINTOSH & SEYMOUR ENGINES,
GREEN'S ECONOMIZERS, HOPPES LIVE STEAM PURIFIERS,
WHEELER CONDENSERS, BARNARD-WHEELER COOLING TOWERS,
EDMISTON FEED WATER FILTERS, BUNDY STEAM TRAPS,
SNOW STEAM PUMPS, QUIMBY SCREW PUMPS,
GOUBERT FEED WATER HEATERS, STRATTON STEAM SEPARATORS,
SPENCER DAMPER REGULATORS, HYATT ROLLER BEARINGS.

Contracts for Installation of Power Plants,
Any Capacity.

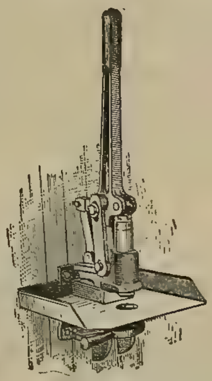
SEND FOR CATALOGUES AND FULL INFORMATION.

32 FIRST STREET, SAN FRANCISCO, CAL.

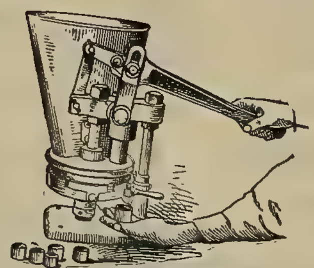
SEATTLE BRANCH..............313 FIRST AVE. SOUTH.
LOS ANGELES BRANCH........103 SOUTH BROADWAY.

ONE OF OUR MANY SPECIALTIES FOR ASSAYERS.

The Calkins Cupel Machine.



WALL PATTERN.
In position for filling mold.



THE AUTOMATIC.
Showing finished cupel being expelled.

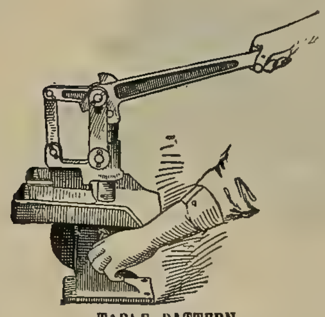


TABLE PATTERN.
Showing position of lever when greatest compression is obtained.

To Assayers:

With these machines perfect cupels can be made by anyone with great ease and rapidity.
They are the greatest labor-saving machine of the Assayer that can be had.
Compact, easily operated, can't get out of order, everlasting.

WRITE FOR OUR NEW, DESCRIPTIVE PAMPHLET IN WHICH ALL OUR SPECIALTIES ARE FULLY DESCRIBED.

F. W. BRAUN & CO.,
Manufacturers of Modern Appliances for Assayers,
LOS ANGELES, CAL.

ADAMANTINE SHOES AND DIES.

CHROME CAST STEEL.

CANDA Improved Self-Locking CAMS.

TAPPETS, BOSSES, ROLL SHELLS AND CRUSHER PLATES.

These castings are extensively used in all the mining States and Territories of North and South America. Guaranteed to prove better and cheaper than any others. Orders solicited subject to the above conditions. When ordering, send sketch with exact dimensions. Send for Illustrated Circular.

Manufactured by **CHROME STEEL WORKS,** Brooklyn, N. Y.

H. D. & H. W. MORRIS,
AGENTS,
Room 194 Crocker Building, San Francisco, Cal.

Canda Cam.

OUR 24-INCH WRENCH IS ESPECIALLY ADAPTED FOR MINE WORK.

The Johnston Patented Pipe Wrench.

A Strictly High-Grade Tool---Drop-Forged---Warranted.

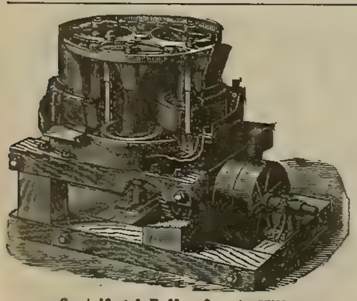
THE STRONGEST, SIMPLEST AND BEST.
Never Jams, Self-Adjusting, Self-Releasing.

MADE IN 3 SIZES:

	10 in.	16 in.	24 in.
Pipe	⅛ to 1 in.	¼ to 1½ in.	½ to 2½ in.
List	$2 25	$3.00	$6.00

WM. B. VOLGER,
SOLE MANUFACTURER,
88 Chambers St., NEW YORK.

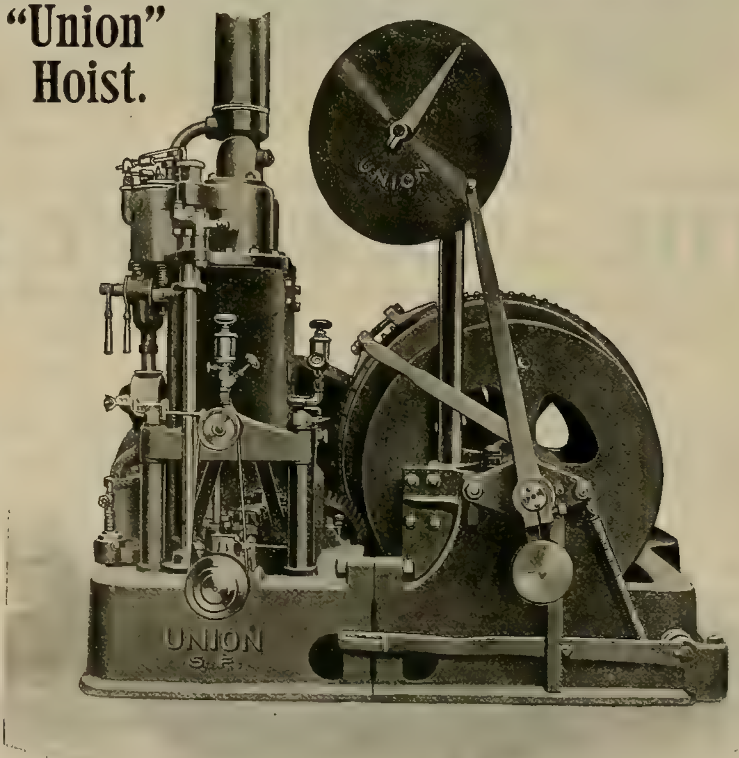
Agencies: THE MINE & SMELTER SUPPLY CO., Denver and Salt Lake City.



Centrifugal Roller Quartz Mill.

F. A. HUNTINGTON,
—Manufacturer of—
CENTRIFUGAL
Roller Quartz Mills.
CONCENTRATORS and ORE CRUSHERS.
Mining Machinery of Every Description
Steam Engines, Shingle Machines.
Room 1, 3d Floor, Mills Building
SAN FRANCISCO, CAL.

"Union" Hoist.



The above illustrates the 25 H. P. double cylinder, single drum "Union" hoist, with all the latest improvements.

THE UNION GAS ENGINE CO.
—BUILD THE—
"Union" Gas Engines,
Which use either MANUFACTURED or NATURAL GAS, ORDINARY STOVE GASOLINE (NAPHTHA or BENZINE), DISTILLATE or KEROSENE.
STATIONARY ENGINES for All Kinds of Work in Sizes from 3 to 300 h. p. in actual use.
"UNION" COMBINED HOISTS in Sizes from 2 to 130 h. p. in actual use.
"UNION" COMBINED COMPRESSORS—20, 30, 40 h. p.
HOISTS and COMPRESSORS Can Be Built in Larger Sizes to Order.
"UNION" MARINE ENGINES, 4 to 200 h. p., of Single, Double and Four-Cylinder Types.
FIFTEEN YEARS' EXPERIENCE Building Gas and Oil Engines.
"UNION" ENGINES Are In Use All Over the United States.
"UNION" ENGINES Are Simple, Durable and Economical.
Office, 248 First Street. Works, Corner First and Clementina Streets. SAN FRANCISCO, CAL

SELBY SMELTING AND LEAD CO.,

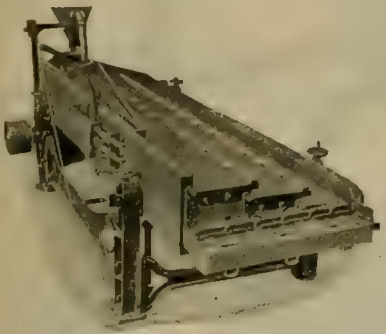
REFINERS OF GOLD AND SILVER BARS, GOLD DUST, ETC.

Buyers of Gold, Silver, Lead and Copper Ores, Gold Concentrates, Lead Bullion, Cyanide Product, Etc.

ORE AND BULLION ASSAYERS.

Works at VALLEJO JUNCTION, CAL. Office, 416 MONTGOMERY ST., SAN FRANCISCO, CAL.

THE IMPROVED BARTLETT CONCENTRATING TABLE.



The BARTLETT CONCENTRATING TABLE has been GREATLY IMPROVED recently by the substitution of iron in place of wood wherever possible. It is now built with SOLID IRON TOP, PLANED TO A TRUE SURFACE AND POLISHED; all parts are made by template and EACH PART BEING INTERCHANGEABLE. As now constructed, the table has no special wearing parts and will last for many years. It has a CAPACITY OF FROM FIFTEEN TO FORTY-FIVE TONS IN TWENTY-FOUR HOURS, according to the class of ore worked. It is the only table in the world which will take the place of jigs and do away with all costly and complicated machinery.

It is Especially Designed for Separating Zinc from Lead.

Send for our illustrated catalogue, containing all the latest information on the concentration of ores.

THE COLORADO IRON WORKS CO.,

Established 1860. DENVER, COLO., U. S. A.

Westinghouse

Polyphase Induction Motors

Adapted to the peculiar requirements of mining machinery and operating in all the principal mines.

Minimum cost of maintenance and attendance.

Westinghouse Electric

& Manufacturing Co.

Mills Building,
San Francisco.

Pittsburg, Pa.

All Principal Cities
in U. S. and Canada.

65k

THE WM. HAMILTON MANUFACTURING CO.,
LIMITED,

MINING MACHINERY,

PETERBOROUGH, ONTARIO,

CANADA.

CARY SPRING WORKS,

240 & 242 WEST 29th STREET, NEW YORK, U. S. A.

Telephone, 3346—38th St.

WIRE SPRINGS OF EVERY DESCRIPTION.

MANUFACTURERS OF All kinds of ROUND AND FLAT WIRE, TEMPERED AND UNTEMPERED.

SPRINGS For Machinery, Rolling Shutters, Motors Etc.

MUSIC BOX AND FINE SPRINGS OUR SPECIALTY.

PIPE BARGAINS.

Suitable for Water Mains, Mining, Irrigation, Air, Oil, etc , etc. New Spiral Welded Asphalted Steel Pipe with any style coupling desired.

460 ft. 6-in. 3,480 ft. 10-in. 1,828 ft. 14-in. 1,077 ft. 18-in.
50,000 " 8 " 2,428 " 12 " 520 " 16 " 1,623 " 24 "

All Sizes Wrought Pipe, Well Casing and Straight Riveted Pipe in Stock. Equipment of All Kinds for Mine, Railroad and Contractors' Outfits. Write for Prices and Particulars.

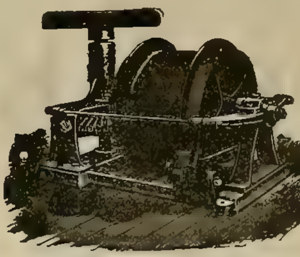
BOWES & CO., 23 Lake St., Chicago, Ill.

JOSHUA HENDY MACHINE WORKS,

No. 42 FREMONT STREET, SAN FRANCISCO, CAL.

—BUILDERS OF—

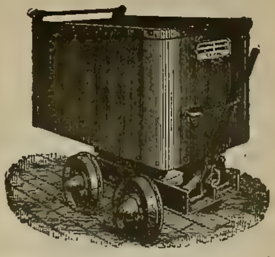
"Davis" Horse Power Whims. Ore and Rock Cars.



Specialty of
PROSPECTING,
MINING and
MILLING
PLANTS.

ORE and WATER
BUCKETS.

"T" RAIL OF
USUAL WEIGHTS,
EITHER NEW
OR SECOND-HAND,
FOR SALE
CHEAP.



McFARLANE & CO.,

1734 FIFTEENTH ST., DENVER, COLO.

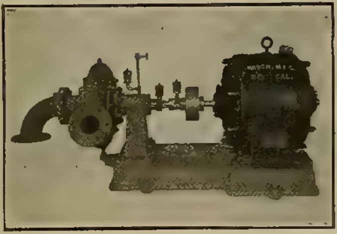
Mining and Milling Machinery.

STAMP AND CONCENTRATING MILLS BUILT AND ERECTED.

STEAM AND ELECTRIC HOISTS, CRUSHERS, ROLLS, REVOLVING SCREENS, JIGS. ORE CARS, CYANIDE TANKS, CORNISH PUMPS, CORLISS ENGINES.

DEWEY, STRONG & CO., Patent Solicitors, 330 Market St., San Francisco, Cal.

MODERN MINING MACHINERY.



QUARTZ MILLS of any capacity,
IN UNITS OF TWO AND FIVE STAMPS.
Acme Amalgamators for CAPE NOME
and other placer mining. Successfully applied to quartz mills in addition to or displacing plates.
Successful Gravel Mill Recently Improved.
Special Gold Dredging Pumps and Machinery.
Concentrators, Feeders, Rock Breakers and Power Plants.
Largest manufacturers of Irrigation and Reclamation Pumps in the United States.
Catalogues: No. 20, Pumps; No. 22, Cape Nome; No. 25, Mining.

KROGH MANUFACTURING CO., 9-17 Stevenson St. and 134-136 Main St., San Francisco, Cal.

W. H. BIRCH & CO.

OFFICE AND WORKS:
127-129-131-133-135 First St., San Francisco, Cal.
WRITE FOR A CIRCULAR ON THE

"BIRCH" Improved Two-Stamp Mill.

IRON FRAME. TRIPLE DISCHARGE. 850-LB. STAMPS. FORGED STEEL SHOES AND DIES.

Price, $450 f. o. b.

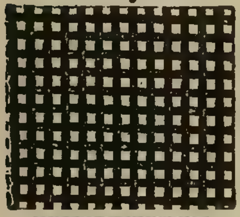
Manufacturers of the LIGHTNER QUARTZ MILL.

STEEL RAILS, TRACK FIXTURES,
PRODUCT PENNSYLVANIA STEEL COMPANY.

BAR, SHEET AND BOILER STEEL,
STRUCTURAL MATERIAL,
Cold Rolled Shafting.

GEORGE W. GIBBS COMPANY,
33-39 Fremont Street, 38-40 Beale Street,
CORRESPONDENCE SOLICITED. SAN FRANCISCO, CAL.

"The Perfect"



DOUBLE CRIMPED STEEL MINING CLOTH

USE "THE PERFECT"
Double Crimped Mining Cloth,
MANUFACTURED BY
THE LUDLOW-SAYLOR WIRE CO.,
Fourth and Elm Sts., ST. LOUIS, MO.

MINERS' STEEL CANDLESTICKS.

FRANCIS SMITH & CO.,
—MANUFACTURERS OF—

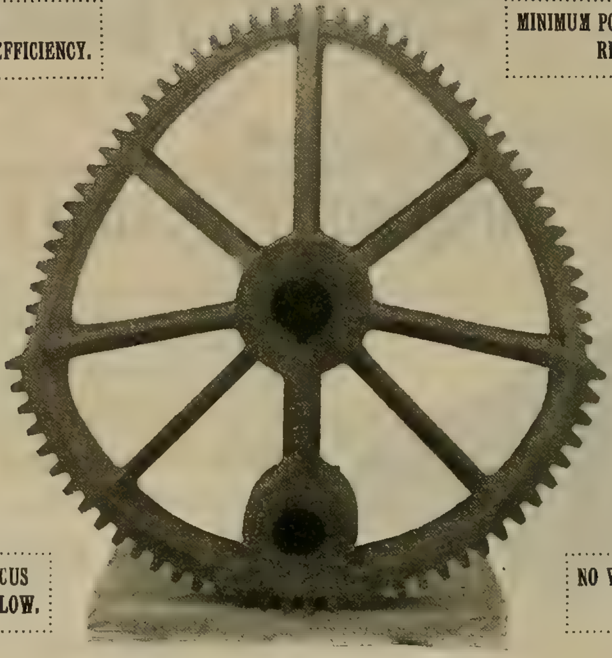
FOR TOWN WATER WORKS.
Hydraulic, Irrigation and Power Plants, Well Pipe, Etc., all sizes.
46 FREMONT STREET, - - - - SAN FRANCISCO, CAL.

Iron cut, punched and formed, for making pipe on ground where required. All kinds of Tools supplied for making Pipe. Estimates given when required. Are prepared for coating all sizes of Pipes with Asphaltum.

THE GEAR THAT MADE THE
FULTON PUMP
RENOWNED.

HIGHEST EFFICIENCY.

MINIMUM POWER REQUIRED.



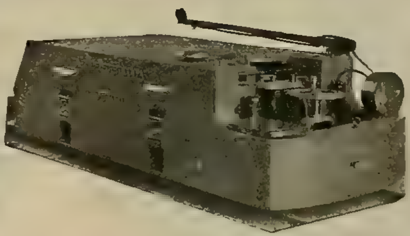
CONTINUOUS FLOW.

NO WATER HAMMER.

If your LIFT PUMP is not a
FULTON PUMP
you haven't a continuous flow Pump.

Manufactured by A. T. AMES, GALT, CAL.

General Electric Company's
Mining Locomotives



are compact, efficient and durable. Their economy in cost of operation over other forms of mechanical power or horse traction is a part of the profit.

General Office: Schenectady, N. Y.
San Francisco Office: Claus Spreckels Bldg. Denver Office: Kittredge Building.

The Copper King, Limited.
Pacific Coast Smelting and Refining Works.

Works:
Seal Bluff Landing,
Cal.

Mines:
Fresno County,
Cal.

Purchasers, Samplers and Smelters
of
Gold, Silver and Copper Ores, and Furnace Products.

Offices:

222 Sansome St.,
San Francisco, California.

Basildon House, 7-11 Moorgate St.,
London, E. C., England.

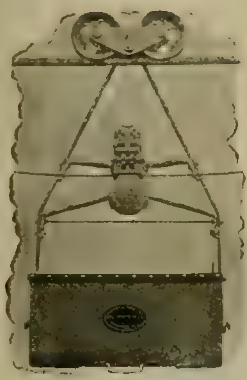
Fraser & Chalmers,
CHICAGO, ILL., U. S. A.

The accompanying cut shows curb and jackets of our Standard 36″ Steel Water Jacketed Blast Furnace of the Round Type for Lead Ores.

We make also Copper Matting, and every description of approved smelting and roasting furnace plant.

Our Catalogue No. 3 gives particulars, and we will be glad to have you write us for estimates.

FRASER & CHALMERS,
CHICAGO, ILL.



Webber Patent Compression Grip
IS USED ONLY ON THE PATENT
Bleichert Wire Rope Tramway,
And Others Manufactured by the
TRENTON IRON COMPANY,
TRENTON, N. J.

ENGINEERS AND CONTRACTORS, and Sole Licensees in North America for the Bleichert System.
Also, Wire Rope Equipments for Surface and Underground Haulage, Transmission of Power, Etc.

No lugs or knots of any kind required on the traction rope, giving longer service, and saving in repairs. . . .

Illustrated book upon application.

For Particulars, Address . . .
NEWTON M. BELL, Agent, 308 Market Street, San Francisco.

A full stock of the Trenton Iron Co.'s Wire Ropes, made from "SPECIAL" Crucible and Plough Steel, carried in San Francisco.

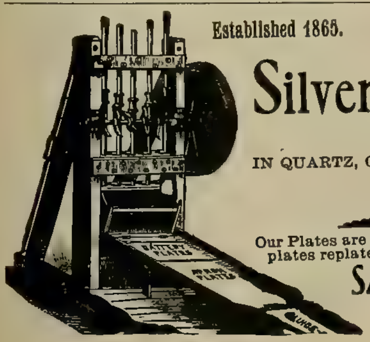
HARD TOUGH

TAYLOR IRON AND STEEL COMPANY,
HIGH BRIDGE, NEW JERSEY, U. S. A.

Sole Licensees in America under the HADFIELD System and Patents for **MANGANESE STEEL,**

Best Metal Known for Roll Shells, Stamp Shoes and Dies, Crusher Plates and Side Liners, Toggles and Toggle Bearings, Gyratory Cones and Concaves, or Liners, Mine Car Wheels, Coal Crushing Rolls, Etc.

PACIFIC COAST PARTIES INTERESTED PLEASE ADDRESS PARKE & LACY CO., SAN FRANCISCO, CAL.
WRITE FOR INFORMATION AND PRICES.



Established 1865. NOTICE TO GOLD MINERS. Incorporated 1890.

Silver-Plated Copper Amalgamated Plates
FOR SAVING GOLD
IN QUARTZ, GRAVEL OR BEACH MINING. MADE OF BEST SOFT LAKE SUPERIOR COPPER.
AT REDUCED PRICES.

Our Plates are guaranteed, and by actual experience are proved, the best in weight of Silver and durability. Old Mining plates replated, bought, or gold separated. THOUSANDS OF ORDERS FILLED.

SAN FRANCISCO NOVELTY AND PLATING WORKS,
SEND FOR CIRCULARS. Telephone Main 976. 68, 70, 72, 74 and 76 FIRST STREET, COR. MISSION, SAN FRANCISCO, CAL.

LARGE VARIETY.
Perforated Metal
THE ROBERT AITCHISON PERFORATED METAL Co
303-305 DEARBORN ST. CHICAGO ILLS.
SUPERIOR WORK.

QUARTZ SCREENS
A specialty. Round, slot or burred slot holes. Genuine Russia Iron, Homogeneous Steel, Cast Steel or American planished Iron, Zinc, Copper or Brass Screens for all purposes. CALIFORNIA PERFORATING SCREEN Co., 145 and 147 Beale St., S. F

Mining Screens
A SPECIALTY.

Diagonal Slot,
Straight "
Burred "
Round Holes.

In American planished or Russian iron or steel for all purposes. GEO. WIMMER, 312 Iowa Street, San Francisco. Telephone Mint 1332.

—EASTERN PRICES BEATEN.—

SAN FRANCISCO Pioneer Screen Works,
JOHN W. QUICK, Prop.
Improved Facilities! Finest Work! Lowest Prices!
Perforated Sheet Metals, Steel, Russia Iron, American Planish, Zinc, Copper and Brass Screens for All Uses.
MINING SCREENS A SPECIALTY.
221 and 223 First Street, San Francisco, Cal.

For Best Satisfaction and Lowest Prices
— IN —
PERFORATED METALS
— AND —

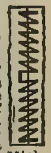
MINING SCREENS
PLACE YOUR ORDERS WITH
Fraser & Chalmers,
CHICAGO, ILL., U. S. A.
SEND FOR SAMPLES, MENTIONING THIS PAPER.

COLORADO'S GOLD
Output for 1899 is unequaled by any State in the Union. Cripple Creek, Leadville, and all the important mining towns are reached by
THE COLORADO & SOUTHERN RY...

For copies of our publications on the Swandyke and Pine Creek Gold Districts, or our pamphlet "Hints to Prospectors," address
T. E. FISHER, GEN. PASS. AGT.,
DENVER, COLO.

Notice the Shape of
GLOBE BOX---THE BEST BABBITT.
Send for trial order, Ladle free.
The Globe wire lace makes the smoothest joint, runs the stillest and lasts the longest of any lacing. Sent on approval. Write us for booklet with instructions, etc. J. M. HAYDEN & Co., 58 Pearl St., Grand Rapids, Mich.

J. M. HAYDEN & CO.
GLOBE BOX METAL
GRAND RAPIDS MICH.
THE BEST BABBITT



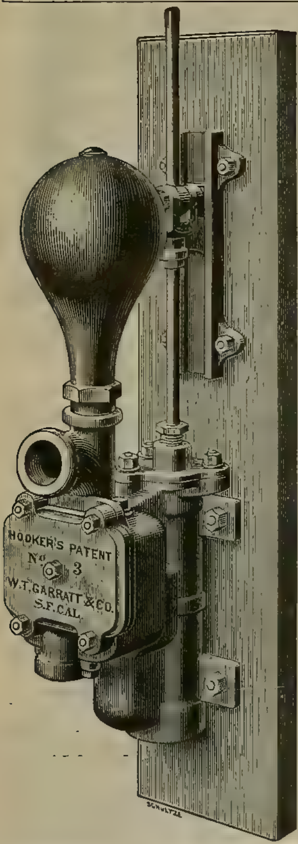
THE IDEAL CONVEYOR BELT

Is the one that will carry stone, ore, coal, wet or dry material, holding buckets firmly and securely; will stand all kinds of exposure, and resist the heaviest strains during a long period of service. This is what the **LEVIATHAN BELT** has done, and we quote the following from a letter from the New York Steam Co.:

"We have used Leviathan Belting for four years, up to 24-inch by 8-ply, elevating and conveying coal. Some of the Belting is outside, exposed to freezing weather; some in a steam bath. In both conditions the results have been very gratifying, over 500 tons having been handled in ten hours time."

MAIN BELTING COMPANY,

1225-41 Carpenter Street, Philadelphia.
55-57 Market St., Chicago. 120 Pearl St., Boston.
SEND FOR PRICE LISTS AND SAMPLE.


HOOKER'S PATENT
No 3
W.T. GARRATT & CO.
S.F. CAL.

A GOOD MINING PUMP.

The Hooker Double Acting Pump.
Well Built, Simple, Durable, Efficient.
All Working Parts Easy of Access.
Duplicate Parts in Stock.
We furnish these pumps with suction pipes, hose and strainers complete. Estimates on application.
Can furnish up to number three with double brake for hand power.
Just the pump for a small mine. Larger sizes, larger capacities.
Send for our catalogue on pumps.

W. T. GARRATT & CO.,

Cor. Fremont and Natoma Sts.,
SAN FRANCISCO, CAL.

Small Portable Saw Mills and DRAG SAWING MACHINES FOR RANCHES AND MINES.

Woodworking Machinery.

LINK BELTING, SPROCKET WHEELS, ELEVATOR BUCKETS & BOOTS, TAKEUPS, FRICTION CLUTCH PULLEYS, ETC.

ALL STYLES AND SIZES IN STOCK FOR IMMEDIATE DELIVERY.

JNO. D. EBY,

17 & 19 MAIN STREET, - SAN FRANCISCO, CAL.

For handling Ore, Coal, Tailings and Dredgings. Catalogue mailed on application

ROBINS CONVEYING BELT CO., Park Row Building, NEW YORK.

P. T. TAYLOR & CO.,

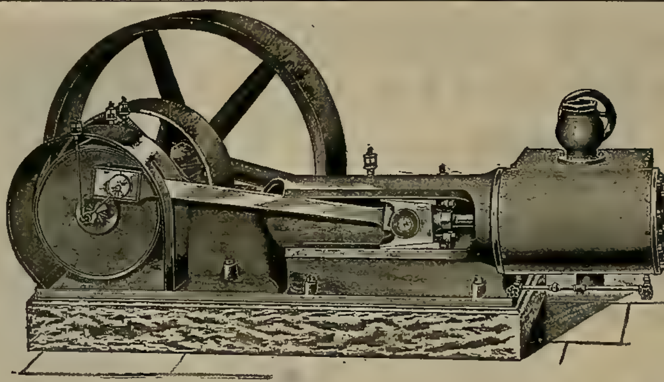
525 MISSION ST., SAN FRANCISCO, CAL.

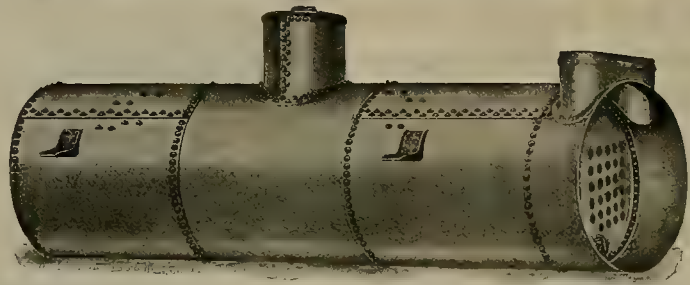
GEAR WHEELS, GEAR CUTTING,

ALL DESCRIPTIONS UP TO 50 INCHES.

GEARS FOR AUTOMOBILES A SPECIALTY.

FULL INFORMATION BY MAIL.





ENGINES, BOILERS,

UP-TO-DATE MACHINERY.

WRITE US FOR PARTICULARS.

THE COMPRESSED AIR MACHINERY CO., 11-13 First St., San Francisco, Cal.

SHOES and DIES

of **SUPERIOR** quality and at prices 20 to 30% lower than any other maker.

FURNISHED BY
ARTHUR KOPPEL, 66 Broad St., N. Y. City.
WRITE FOR PARTICULARS.

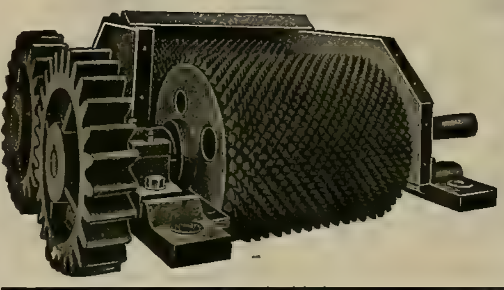
MINING CARS of every description.

PORTABLE RAILWAYS, Rolling Stock, Railway Outfits for Mines of every description. Export Work a specialty.

ARTHUR KOPPEL, 66 Broad St., N. Y. City.
SEND FOR CATALOGUE AND ESTIMATES.

Pacific Coast Agents, Baker & Hamilton, San Francisco and Sacramento.

LINK-BELT ELEVATORS —AND— CONVEYORS.



BREAKER ROLLS,
PICKING TABLES,
MALLEABLE IRON BUCKETS,
SHAFTING, PULLEYS,
GEARING, CLUTCHES, Etc.

Catalogue Upon Application.

LINK-BELT MACHINERY CO.,
Engineers, Founders, Machinists,
CHICAGO, U. S. A.
DENVER, 1328 17th St.,
A. E. LINDROOTH, Manager.

THE BUCYRUS COMPANY,

DESIGNERS AND BUILDERS OF

DREDGES, STEAM SHOVELS, EXCAVATING MACHINERY, WRECKING CARS, LOCOMOTIVE CRANES, PILE DRIVERS, CENTRIFUGAL PUMPS, WITH SIMPLE, COMPOUND OR TRIPLE EXPANSION ENGINES,

MACHINERY FOR PLACER MINING.

SOUTH MILWAUKEE, WISCONSIN.

GENERAL PHOTO-ENGRAVING CO.

[SUCCESSORS TO DEWEY ENGRAVING CO.]

FINE ZINCOGRAPHS, HALF-TONES, AND DESIGNING.

ENGRAVINGS OF MACHINERY OUR SPECIALTY.

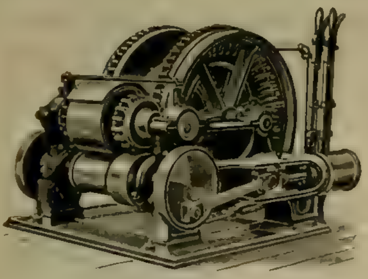
SEND FOR SAMPLES AND PRICES.
TELEPHONE BLACK 1466.

NO. 536 CLAY STREET,
SAN FRANCISCO, CAL.

WE MAKE A SPECIALTY OF

HIGH GRADE HOISTING MACHINERY

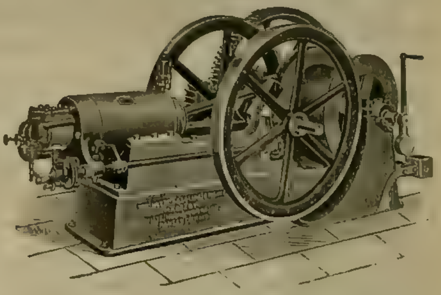
DESIGNED FOR



STEAM, COMPRESSED AIR,

ELECTRICITY AND GASOLINE.

ALL STYLES. ALL SIZES.



Our Line of Patterns Contains Something Exactly Suited to Your Requirements.

WE SOLICIT YOUR CORRESPONDENCE.

The Hendrie & Bolthoff M'f'g & Supply Co.

No. 38. DENVER, - - - - - - COLORADO.

THE MINE AND SMELTER SUPPLY CO.,

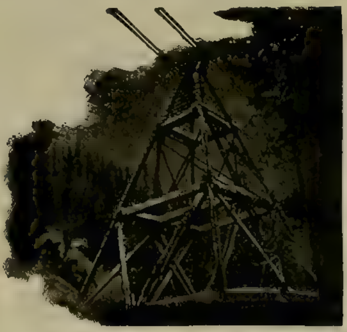
DENVER, - - COLORADO.

Mining and Milling Machinery and Supplies.

We beg to call your attention to

THE FINLAYSON PATENT
WIRE ROPE TRAMWAY—

the latest and best system of double-rope automatic aerial tramway in the market.
If interested in the most economical system of transporting ores from mine to mill and to shipping stations, send for our special tramway catalogue.



We carry a complete stock of Machinery and Supplies for immediate delivery.

Send for our special catalogues on Mining Machinery, Milling Machinery, Wilfley Concentrators, Tramways, Power Transmission Machinery, Machine Tools, Etc.

THE MINE AND SMELTER SUPPLY CO.,......................Denver, Colorado
THE MINE AND SMELTER SUPPLY CO.,..................Salt Lake City, Utah
THE MEXICO MINE AND SMELTER SUPPLY CO.,
No. 16 San Francisco St., City of Mexico.

BOILERS, ENGINES, STEAM HOISTERS, ELECTRIC HOISTERS, ROLLS, CRUSHERS, WILFLEY TABLES, CARS, CAGES, ORE BUCKETS, RAIL, PIPE, FITTINGS, BELTING, ETC., ETC.

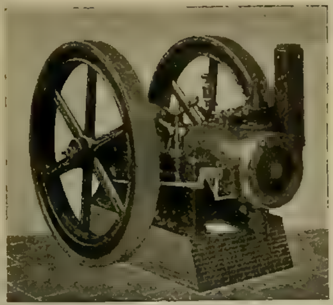
ATTENTION! USERS OF PIPE WRENCHES.

THE LATEST, BEST AND CHEAPEST PIPE WRENCH.

No Threads to Strip. No Nuts to Jam.
Made of Special Wrench Steel, and Drop Forged.

The good qualities of Chain Pipe Wrench and Screw Pipe Wrench combined, without the faults of either. Quick, effective and positive in adjustment. Cannot slip, crush or lock on the pipe. Made in four sizes: 10, 18, 24 and 36 inches. Handling from ⅛ of an inch wire to 4½-inch pipe. Price no higher than other pipe wrenches on the market.

ATLAS PIPE WRENCH CO.,
Flood Building, San Francisco.
NEW YORK OFFICE, 121 LIBERTY ST. WORKS, NEW HAVEN, CONN.



WE CAN SHOW YOU A

HERCULES Gasoline Engine

Running on less than ⅛-gallon of fuel per H. P. hour, with a speed regulation of 2½%.

JOHN WIGMORE & SONS CO.,
117-123 S. LOS ANGELES ST.,
LOS ANGELES, CAL.

MACHINERY BARGAINS.

I have some splendid Air Compressors, Hoisting Engines, Rock Drills, Rock Crushers, Channeling Machines, Steam Pumps, Boilers, Steam Shovels, Locomotives and Relaying Rails, all in splendid condition. Send for printed list and specify your requirements. I can save you money. WILLIS SHAW, 627 New York Life Building, CHICAGO.

P & B Building Paper..

A perfect insulation for cold storage houses and refrigerators.
Unequaled in residence construction.
A protection against heat, cold, dampness, dust, draught and vermin.
Demand it of your dealer — you need it in your buildings.
Paraffine Paint Co—116 Battery, San Francisco

MINE BELL SIGNALS. Adopted, Used and in Force in Accordance with Law.

We print in legal size, 12x36 inches, the Mine Bell Signals and Rules provided for in the Voorhies Act passed by the California Legislature. The law is entitled "An Act to Establish a Uniform System of Bell Signals to Be Used in All Mines Operated in the State of California. for the Protection of Miners." We furnish these Signals and Rules, printed on cloth so as to withstand dampness. 50 Cents a Copy.

MINING AND SCIENTIFIC PRESS, 330 Market St., San Francisco, Cal.

PROFESSIONAL CARDS.

R. H. POSTLETHWAITE, M.I.E.E.
❧ **Hydraulic Mining Engineer.** ❧
River Dredging for Gold a Specialty.
1315 Leavenworth St........San Francisco, Cal.

THEO. F. VAN WAGENEN, E. M.
Consulting Mining and Hydraulic Engineer.
1508 Fillmore St., DENVER, COLO.

D. B. HUNTLEY,
Mining Engineer and Metallurgist,
De Lamar, Owyhee Co., Idaho.

BERNARD MACDONALD,
Consulting Mining Engineer.
General Manager British America Corporation, Ltd., Rossland, B. C.

A. F. WUENSCH, M. E.
Inspection and Valuation of Mines.
Ref. D. H. Moffat, Pres. 1st Nat'l Bank, Denver.
827 Equitable Bldg.................Denver, Colo.

Established 1879.
CHAS. B. GIBSON,
Chemist, Metallurgist and Mining Engineer,
81 CLARK ST., CHICAGO, ILL.

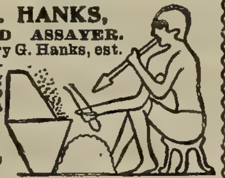
W. C. WYNKOOP, M. E.
Woodbury (Cochiti District),
New Mexico.
Economic Geology and Mine Examinations.

WM. VAN SLOOTEN,
Consulting Mining Engineer and Metallurgist.
Cable address: "Yadoplata."
35 WALL STREET........... ....NEW YORK, N. Y.

E. H. BENJAMIN, Mining Engineer.
A. M. HUNT, Mechanical & Hydraulic Engineer.
WYNN MEREDITH, Electrical Engineer.
C. L. CORY, Electrical & Mechanical Engineer.
EXPERT EXAMINATIONS. ADVISORY REPORTS.
CONSTRUCTION SUPERVISION.
331 Pine Street,...........San Francisco, Cal.
Telephone Main 1870. Cable Address "Edben."

DANIEL G. JEWETT.
Specialty: The Mining and Smelting of Copper or Lead Ores.
General Manager of Boston G. M. & M. Co., Venture G. M. & M. Co., The Boston Tunnel.
P. O. BOX 5, GUFFEY, PARK CO., COLO.

ABBOT A. HANKS,
CHEMIST AND ASSAYER.
Successor to Henry G. Hanks, est. 1866. The supervision of sampling of ores shipped to San Francisco a specialty.
—531—
California Street,
San Francisco.



RICHARD A. PEREZ, E. M.
Assayer and Analytical Chemist,
120 North Main St., - Los Angeles, Cal.

S. W. TYLER,
Mining and Metallurgical Engineer,
6 Windsor Hotel Block.
Cable: Retyl, Denver. DENVER, COLORADO.

The SPOKANE BUREAU OF MINING,
N. E. LINSLEY, Manager.
SPOKANE, : : WASHINGTON.
Consulting Mining and Milling Engineer.
Will Examine and Report on Mines.

FRANK C. MANDELL,
MINING ENGINEER,
U. S. Deputy Mineral Surveyor for Idaho and Oregon.
Mine Examinations, Surveys and Reports.
HAILEY, IDAHO.

CLARENCE HERSEY,
Assayer and Chemist,
(Established 1879.) LEADVILLE, COLO.
Gold, Silver and Lead..................$1.00.
Any two of above 75c; any one of above 50c.
Copper analysis..............................$1.00.
Platinum, Nickel or Tin, each..............$5.00.
Twenty-one years successful experience in the mining metropolis of Colorado.
Write for mailing envelopes and price list.

ALMARIN B. PAUL, M. E.,
ROOM 27, CROCKER BUILDING, SAN FRANCISCO.
Will act as AGENT for the sale of RELIABLE Mining Property. SPECIAL AGENT FOR
MacArthur-Forrest Cyanide Process
for California north of and including Mono, Madera and Merced counties; also for State of Nevada. Will act as agent for Eastern parties owning mining interests in California.

F. H. HARVEY,
GALT, CAL.,
Mining and Metallurgical Work in All Branches.
Assays, Chemical Analysis of Ores and experiments on rebellious ores for treatment by cyanide or other processes. Surveys and reports upon mining properties.

Simonds & Wainwright,
Mining Engineers,
Assayers and Chemists,
159 Front Street,
NEW YORK.

HUDSON H. NICHOLSON,
Consulting Mining Engineer,
Rooms 216 and 217, Boston Building,
DENVER, COLO., U. S. A.
Cable address: Aichen, Denver.
Expert examinations of and advisory reports on mining propositions.
Specialty: The chemical treatment of ores

DAVIDGE & DAVIDGE, Attorneys and Counsellors at Law, Corcoran Building, Washington, D. C. Practice in the Supreme Court of the United States, the Court of Claims, the Courts of the District of Columbia, and the General Land Office. Western Union Code.

W. J. ADAMS, E. M.,
Mining Engineer and Metallurgist.
Graduate of Columbia School of Mines.
Author of "Hints on Amalgamation," etc., etc.
ROOM 14, 434 CALIFORNIA STREET,
SAN FRANCISCO, CAL.

EDWARD L. HAFF,
MINING ENGINEER,
U. S. DEPUTY MINERAL SURVEYOR.
Mine Examinations and Reports.
National Annex Block,
P. O. Box 21. CRIPPLE CREEK, COLO.

RALPH E. STEVENS,
ATTORNEY AND COUNSELOR,
43-44 Jacobson Building, DENVER, COLO.
Special attention to examination of titles. Corporation, commercial, mining law. Collections receive prompt attention. Notary in office. Refers to Denver representative of Mining and Scientific Press.

ERNEST H. SIMONDS,
Late Instructor in Assaying, University of California.
ASSAYS AND ANALYSES.
LABORATORY TESTS OF ORES.
Special Attention Given to the Instruction of Students.
521 Sacramento St., Cor. Leidesdorff, S. F., Cal.

School of Practical Mining, Civil,
Mechanical and Electrical Engineering.
Surveying, Architecture, Drawing, Assaying, Cyanide Process and Metallurgy.
933 Market St., S. F., Cal. OPEN ALL YEAR.
A. VAN DER NAILLEN, President
Assaying of Ores, $25; Bullion and Chlorination Assay, $25; Blowpipe Assay, $10. Full course of Assaying, $50. Established 1864.
☞ Send for Circular.

LOUIS FALKENAU,
STATE ASSAY OFFICE,
538 Sacramento St., below Montgomery.
Analysis of Ores, Metals, Soils, Waters, Industrial Products, Foods, Medicines, etc., etc.
Court Experting in all branches of Chemical Technology. Working Tests of Ores and Investigation of Metallurgical and Manufacturing Processes. Consultations on all questions of applied chemistry. Instructions given in assaying and all branches of chemistry.

FRED H. BROWN,
Electrical Mining Expert.
Inventor of the Electro-Geodetic Mineral Locator. Patented March 20, 1900.
Will electrically survey mines and lands for mineral; furnish charts showing run of ore, extensions, pay streaks, and their approximate depth from surface.
References include scientific men, and miners for whom we have located rich mines.
Address, 1025 West 7th St.,
LOS ANGELES, CAL.

WM. A. AKERS,
Consulting Mining Engineer,
521 Dooly Block, SALT LAKE CITY, UTAH.

R. J. WALTER,
1452 Blake St., DENVER, COLO.
Mining Engineer and Metallurgist.
Reports on mining properties.
Assay office and chemical laboratory. Established in Colorado 1879.

SAM'L A. RANK,
MINING ENGINEER,
U. S. DEPUTY MINERAL SURVEYOR.
Mine Examinations and Reports.
514 Cooper Building,
DENVER........................COLORADO.

MINERS' ASSAY OFFICE.
(JNO. HARRIGAN)
10 Stevenson Street, - San Francisco, Cal.
Telephone Clay 972.
Assaying, Analyses, Sampling, Grinding and Pulverizing of all kinds.
Practical Working Tests of Ore by all Processes. Mining Machinery Bought and Sold. Check Assays. Instructions given in Assaying. All Work Guaranteed. Mines Examined, Sampled and Reported on by M. P. BOAG, M. E. and Cyanide Expert.

J. W. RICHARDS,
(Late of Aspen, Colo.)
ASSAYER AND CHEMIST. 1754 Champa Street, DENVER, COLO.
Ore Shippers' Agent. Write for Terms.

JAMES ANGUS SNEDAKER,
Mining Engineer,
721–722 Equitable Building, Denver, Colo., U. S. A.

RELIABLE ASSAYS.

Gold	$ .50	Gold and Silver	$ .75
Lead	.50	Gold, silver, copper	1 50

Samples by mail receive prompt attention.
Rich Ores and Bullion Bought.
OGDEN ASSAY CO.,
1429-16th St., Denver, Colo.

Independent Assay Office.
ESTABLISHED 1888.
D. W. Reckhart, E. M., Proprietor.
Agent for Ore Shippers.
Assays and Chemical Analysis.
Mines Examined and Reported Upon.
BULLION WORK A SPECIALTY
P. O. Box 88. Office and Laboratory:
Cor. SAN FRANCISCO & CHIHUAHUA Sts.
EL PASO, TEXAS.

HERMANN J. VAN DIEREN,
Assayer and Metallurgist,
1407 Seventeenth St., DENVER, COLO.
Stamp Mill and Reduction Works: 19th St. and Platte River.
Buyer of every description of Ores and Precious Stones. Rights for sale for process of treating refractory gold ores; also process for treating low grade copper ores. Write for particulars.

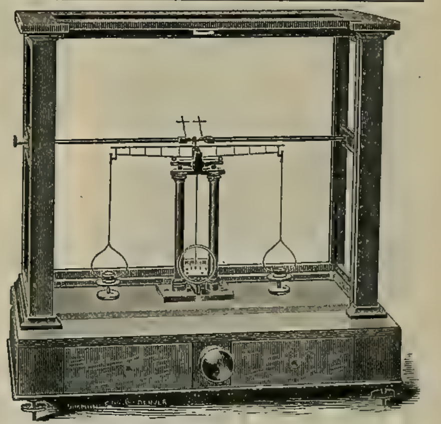
CHAS. BUTTERS & CO., Limited.
E. S. LEAVER, Manager.
Ore Testing Works, ❧ ❧ ❧
Chemical and Metallurgical Laboratory,
Assay Office, ❧ ❧ ❧ ❧
DOOLY BLOCK, - SALT LAKE CITY, UTAH.

Telephone, MAIN 5104. —◆ ESTABLISHED 1869. ◆— A. H. WARD.
Cable Address, LUCKWARD.
C. A. LUCKHARDT CO.,
NEVADA METALLURGICAL WORKS,
71 & 73 STEVENSON STREET, - - - - SAN FRANCISCO, CAL.
Assaying, Analyses, Sampling.
PRACTICAL WORKING TESTS OF ORE BY ALL PROCESSES.
STAMP MILL AND CONCENTRATOR IN OPERATION ON PREMISES.

Thomas Price & Son,
Assay Office, Sampling Works
And Chemical Laboratory.
526 Sacramento Street, San Francisco, Cal.

E. E. BURLINGAME & CO.,
ASSAY OFFICE AND CHEMICAL LABORATORY
Established in Colorado, 1866. Samples by mail or express will receive prompt and careful attention
Gold & Silver Bullion Refined, Melted and Assayed OR PURCHASED.
Concentration Tests—100 lbs. or car load lots. Write for terms.
1736-1738 Lawrence St., Denver, Colo.

HENRY E. WOOD,
ASSAYER,
1734 Arapahoe St., DENVER, COLO.
Ore Tested in Carload Lots.
Write for Circular.



The above illustration shows an operator taking an incline above the horizontal with BRUNTON'S PATENT POCKET MINE TRANSIT. The instrument is made especially for mining engineers, mine managers and superintendents, but its light weight and the ease with which it can be handled render it admirably adapted to the taking of topography and for geological field work. Write for catalogue B, giving full description of the instrument and all its uses, to

No. 043 BUTTON BALANCE, 10-inch beam. Sensitive to 1-100 Milligramme. This is a double-column button balance with all latest improvements, including our new adjusting device and rider rod lock. It is accurate and as rapid as a beam of this length can be. For an office doing a moderate amount of work, it is the best balance to be had for both gold and silver. For complete description and prices of this and other balances send for catalogue A to

Wm. Ainsworth & Sons,
(Successors to Wm. Ainsworth.) Denver, Colo., U. S. A.

F. W. Braun & Co., Los Angeles, Cal., Agents for balances and the Brunton Patent Pocket Transit.
John Taylor & Co., San Francisco, Cal., Agents for balances and the Brunton Patent Pocket Transit.
H. S Crocker Co., San Francisco, Cal., Agents for the Brunton Patent Pocket Transit.
Pacific Optical Co., Los Angeles, Cal., Agents for the Brunton Patent Pocket Transit.

Ammonia Process.

The practical success of this process is well known and is demonstrated chemically, technically and mechanically in every detail on a large scale. Refractory ores and tailings containing gold, silver, copper and zinc are extracted successful and profitable. Mail average sample and $10 and receive full report about the extraction.

Pocketbook, Ammonia Process, full description, $1.

Instructions in Chemistry and all successful and practical Lixiviation Processes.

Office and Laboratories :

334 KEARNY STREET, SAN FRANCISCO, CAL.
H. HIRSCHING,
Mining Engineer and Chemist.

SMITH & THOMPSON,
Manufacturers of Fine
ASSAY BALANCES.
Write for Catalogue.
2219 Stout St.,
Denver, Colo.

ALVIN PHILLIPS & CO.,
Chemists, Mining and Metallurgical Engineers,
1761 MARKET STREET,
DENVER, - COLO.

Complete Ore-Testing Works — capacity ten pounds to two tons. Modern Methods of Lixiviation, Cyanide and Chlorination. Concentration on Bartlett Table. Assaying and Bullion Refining. Chemical Analyses of Oils, Coal, Water, and all solutions. WRITE FOR PRICES.

THE LITTLE ALASKA GOLD WASHER.

Price $6. Saves the Gold. *Weighs only* 7 1-2 Lbs.

After several years' practical use in different fields, our washer has established its superiority over all placer or beach washers. It is just the washer for Cape Nome; it was used extensively in Alaska last year with every success. In working the operator does not have to wet his hands and can stand in an upright natural position. It is just the washer for the poor man who has not the money to put in expensive machinery. It will do the work of ten men with gold pans. It is just the washer for the prospector, being light and easy to pack. Don't fail to write us if in need of a washer; we can save you *time*, *labor* and *money*. RUSSELL & KINSEY, 1237 Magnolia Ave., Los Angeles, Cal.

Hoskins' Patent Hydro Carbon Blow-Pipe and Assay Furnaces.

No dust. No ashes. Cheap, effective, economical, portable and automatic.

SEND FOR PRICE LIST TO
W. HOSKINS, 81 South Clark St., Room 55, CHICAGO, ILL.

THE ROESSLER & HASSLACHER CHEMICAL CO.,
100 William Street, New York.

CYANIDE

Peroxide of Sodium

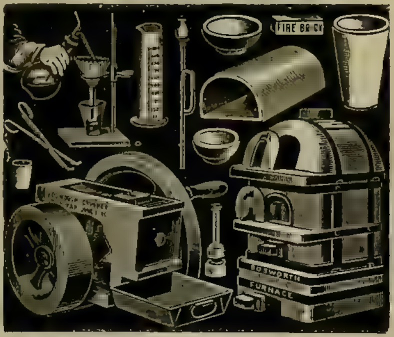
Hyposulphite of Soda

Chloride of Lime

Sulphide of Iron

And Other Chemicals for Mining Purposes.

THE DENVER FIRE CLAY CO.,
1742 to 1746 Champa St., DENVER, COLO.



Manufacturers, Importers and Dealers in
Chemicals, Apparatus and Assayers' Supplies, Fire Brick and Tile.
Sole Agents for the "AINSWORTH BALANCES."
WRITE FOR CATALOGUES.

EFFECTING ECONOMY IN
Steam and Power Plants
IS MY BUSINESS.
DOES IT INTEREST YOU?
Howard H. Fielding,
1328 Seventeenth St., DENVER, COLO.

IMPROVED BONE ASH.

It is 100% better than Bone Ash now being used; will absorb more lead, will never crack or split in the Muffle, can be dropped before or after using without breaking. Cupels can be made and used at once; no drying required. Excessive heat has no effect on them. Will stand shipping any distance. It takes up none of the precious metals in cupeling. Cupels much quicker. Once used always used. Sold under a positive guarantee or money refunded. Now being used by all smelters and assayers who have tried it.

Correspondence solicited.
Samples given if required.

J. J. CUMMINGS & CO., Sole Mfrs.,
Telephone Clay 972. 10 STEVENSON ST., SAN FRANCISCO, CAL.
For Sale also by Justinian Caire Co., Dealers in Assay Goods and Mining Supplies, 521-523 Market St.

ESTABLISHED 1856.

Controls and Check Assays
(A SPECIALTY.)

MARINER & HOSKINS,
ASSAYERS AND CHEMISTS,
Mining Engineers and Metallurgists.
81 South Clark Street.
Rooms 51-55,
CHICAGO, ILLINOIS.

SEND SAMPLES BY MAIL OR EXPRESS.
MAILING SACKS ON APPLICATION. : :

ST. LOUIS SAMPLING & TESTING WORKS,
1225 and 1227 Spruce St.,
ST. LOUIS, MO.

The Largest and Most Complete Ore Testing Works in Existence for Making all Kinds of Practical Working Tests of Ore, etc., to Determine the Most Suitable Method of Treatment.

PLANT FOR COAL WASHING, COKING AND STEAMING TESTS OF FUELS. ASSAYS, ANALYSES, CHEMICAL AND PHYSICAL INVESTIGATIONS OF ALL KINDS. MINERAL PROPERTIES, MINES AND METALLURGICAL PROCESSES EXAMINED AND REPORTED UPON. CORRESPONDENCE SOLICITED.

Are You Confronted With a Difficult Ore-Separating Problem?

THE WETHERILL MAGNETIC SEPARATING PROCESS

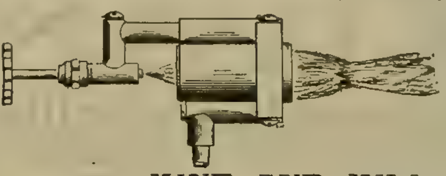
may prove the solution. Apply to Wetherill Separating Company, 52 Broadway, N. Y.

10,000 Boiler Feed Waters Are Being Treated by Dearborn Methods.

Send us a jug of your feed water for analysis and let us prepare you a compound to suit.

DEARBORN DRUG & CHEMICAL WORKS,
Manufacturing and Analytical Chemists. Makers of Boiler Compounds.
29, 30, 31, 32 and 33 Rialto Bldg. - - - CHICAGO, ILL.

Taylor's Coal Oil and Gasoline Burner
(PATENTED)



A new heating burner for Assayers and Chemists, or for brazing, in which coal oil at 33 deg. to 45 deg., Beaume and 150 deg. fire test, or gasoline at 74 deg. test can be used for fuel. Adapted to crucible, muffle and brazing work. Price $6. For sale by

JOHN TAYLOR & CO.,
63 FIRST STREET,
SAN FRANCISCO, CAL.

MINE AND MILL SUPPLIES.
Importers and Manufacturers of Assayers' Materials, Chemicals and Acids, Etc.
CATALOGUE ON APPLICATION.

TRADE MARK.
(M'ARTHUR-FORREST PROCESS.)

CYANIDE PROCESS.
The MacArthur-Forrest Cyanide Process is the Best

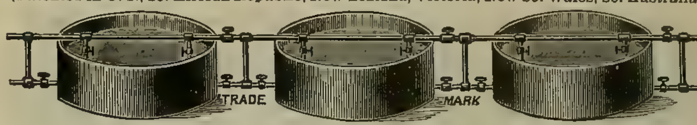
For the Treatment of Refractory and Low Grade Gold and Silver Ores and Tailings. We are the Originators of the Cyanide Treatment, and have kept up with the times in all Improvements in Cyanide Methods.

Successful Plants in Operation in all Western Mining States.

Samples Assayed and Fully Reported Upon. Properties Examined. Designs Furnished. For Terms and Particulars, Address

The Gold and Silver Extraction Co. of America, Ltd.
GEO. A. ANDERSON, General Manager,
Testing Works: 1716 Blake Street, Denver, Colo. 208-210 McPhee Building, Denver, Colo.
ALMARIN B. PAUL, Agent, 27 Crocker Building, San Francisco, Cal.

"PNEUMATIC" CYANIDE PROCESS.
(Patented in U. S., So. African Republic, New Zealand, Victoria, New So. Wales, So. Australia.)

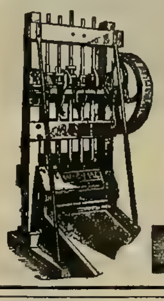


WILL DO IN 7 HOURS WHAT REQUIRES FROM 2 TO 6 DAYS BY OLDER METHODS.
SEND FOR PAMPHLET.
THE PNEUMATIC CYANIDE PROCESS CO., 306 Boston Bldg., Denver, Colo.

New Process of Copper Extraction.
CHEAP, CLEAN AND EFFECTIVE.
THE GARDINER LEACHING PROCESS
FOR COPPER ORES.

TESTS MADE ON ANY QUANTITY OF ORES AT REASONABLE RATES.
FULL PARTICULARS ON APPLICATION.

THE AMERICAN COPPER MINING & EXTRACTION CO., DENVER, COLO.



HYDRAULIC, MINING AND DREDGING MACHINERY, RIVETED STEEL PIPE,

WRITE FOR PRICES AND ESTIMATES

AMERICAN IMPULSE WATER WHEELS, ETC.

WOLFF & ZWICKER IRON WORKS

PORTLAND
OREGON

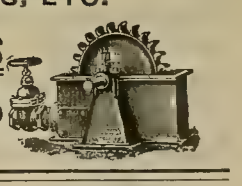
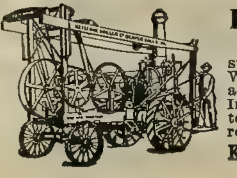


Figure 152 represents our
DUPLEX STEAM ACTUATED
AIR COMPRESSOR.
Steam Cylinder Outboard and Detachable.
Can be run as a Power Machine also.
We also build Steam and Power Pumps for Mines.
If interested, address
THE STILWELL-BIERCE & SMITH-VAILE CO.,
276 Lehman St., DAYTON, OHIO, U. S. A.



Prospecting Machinery.

Multitudes in use for testing for minerals. Sizes and equipments to suit any and all conditions. Unexcelled for Placer Testing, Oil Wells, Water Wells, testing for Lead and Zinc, Iron and Coal; goes through anything; brings up everything. Large sizes drill as much as 1500 feet. In use all over the world. Every purchaser pleased. Used on boats for testing river and lake beds. Water no hindrance. No skilled labor required.

KEYSTONE DRILLER CO., Beaver Falls, Pa., U. S. A.

THE RAND DRILL COMPANY,
PIONEERS IN ROCK DRILLING AND AIR COMPRESSING MACHINERY,
100 BROADWAY, NEW YORK,
Has been awarded
THREE GOLD MEDALS
at the
PARIS EXPOSITION
for
AIR COMPRESSORS AND ROCK DRILLS.

SULLIVAN

Diamond Core Drills
FOR PROSPECTING. Catalogue 29.
The most extensive line of sizes and styles ever offered.
CONTRACTORS FOR PROSPECTING WITH DIAMOND DRILL.
ROCK DRILLS
FOR MINING. Catalogue 30.
Superior valve and ratchet motions. The highest possible grade.
Send for Our New Catalogues.
Sullivan Machinery Co.,
New York. Pittsburg. Claremont, N. H.
Main Office, CHICAGO.....................54 to 60 N CLINTON ST.
Western Office, DENVER.................332 SEVENTEENTH ST.
Pacific Agency, SAN FRANCISCO, HENSHAW, BULKLEY & CO.
Cable Address, Diamond, Chicago. Codes: A. B. C. 4th Edition, Postal Directory, Western Union, Liebers.

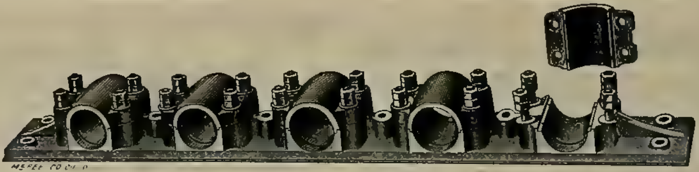
CANTON STEEL COMPANY,
—— Manufacturers of ——

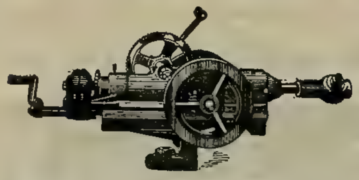
CANTON DRILL STEEL.
UNEQUALED FOR TOUGHNESS AND ROCK-CUTTING QUALITIES. WRITE FOR 1900 STEEL LIST, CONTAINING ENDORSEMENTS AND USEFUL INFORMATION.
Works: CANTON, OHIO. Branch Warehouse: DENVER, COLO.

Established 1837.
I. C. Yawger,
Successor to VICTOR BISHOP & CO.
IMPORTER OF CARBONS FOR DIAMOND DRILLS.
21 Maiden Lane, - NEW YORK.

DIAMOND DRILLS
FOR PROSPECTING.
AMERICAN DIAMOND ROCK DRILL CO.
120 LIBERTY ST N.Y.

THEODOR LEXOW, 14 JOHN STREET, N. Y.
......Importer of......
CARBONS
(BLACK DIAMONDS)
For DIAMOND DRILLS and all Mechanical Purposes.
HENRY DEMMERT.


Globe Battery Stem Guide.
PATENTED AUGUST 24, 1897.
RIGID. SIMPLE. DURABLE. EFFICIENT. ECONOMICAL.
Effect a Saving in Friction Losses. No Trouble to Install.
No Alterations of Mill Necessary. No Keys or Wedges to Adjust.
—— MANUFACTURED ONLY BY ——
GLOBE IRON WORKS, STOCKTON, CAL., U. S. A.
Manufacturers of All Classes of Mining Machinery. Estimates Furnished.

THE JACKSON HAND POWER ROCK DRILL.
Works in Any Rock, in Any Position.
Write for Circulars and References.

THE JACKSON DRILL & M'F'G CO.,
1756 Larimer Street, DENVER, COLO.
Sole Licensees for all Foreign Countries and Eastern United States: THORNTON N. MOTLEY COMPANY (INC.), 43 John St., New York.
AGENTS: CHAS. B. BOOTHE & CO., 126 SO. LOS ANGELES ST., LOS ANGELES, CAL.

FIRTH'S DRILL STEEL.
USE THE BEST.
Has no equal in Hard Rock Drilling.
ABNER DOBLE COMPANY, GEN. AGTS.,
FREMONT AND HOWARD STS, SAN FRANCISCO.
Sold by Seattle Hardware Co., Seattle, Wash.

TO SECURE GOOD RESULTS BUY
JESSOP'S STEEL
FOR TOOLS, MINING DRILLS, ETC.
Chief American Office, 91 John St., New York, N. Y.
Wm. Jessop & Sons, Ltd. Manufactory, Sheffield, England.
I. WILLARD BEAM, Agent, 29 MAIN STREET, SAN FRANCISCO, CAL.

The Best MINE PUMPS in the World.
COMPOUND CONDENSING AND TRIPLE EXPANSION STATION PUMPS.
We carry in our Denver store a stock of Improved Pattern Sinkers and Duplex Station Pumps, with duplicate parts for repairs.

Write for Catalogue and Estimates.
Jeanesville Iron Works Co.,
JEANESVILLE, PA
Western Office,
Columbia Hotel Building,
1328 17th St.
Denver, Colo.
Telephone 2298 A.
A. MIDDLEBROOK, Manager.

TELEPHONE MAIN 5303
Union Photo-Engraving Co.
DESIGNING HALF-TONES ZINC ETCHING
523 MARKET ST
SAN FRANCISCO, CAL.

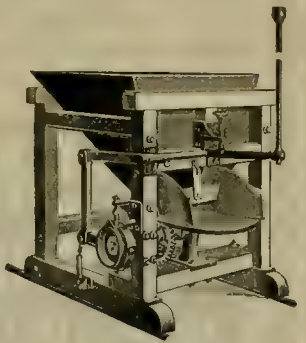
BULLOCK DIAMOND DRILLS
If you are interested in prospecting send for our new Diamond Drill Catalogue (No. 33).
BULLOCK MINING MACHINERY
PORTABLE HOISTS—Send for our new Catalogue (No. 40). CHAMPION MINE VENTILATORS—Send for our new Catalogue (No. 35).
HOISTING AND HAULAGE PLANTS, ORE CARS, SKIPS, CAGES, ETC., ETC.
PARKE & LACY CO., Agent,
21 & 23 Fremont St., San Francisco, Cal.
M. C. BULLOCK MFG. CO.,
1172 West Lake St., Chicago, Ill., U. S. A.

THE EDWARD P. ALLIS COMPANY,

RELIANCE WORKS,
MILWAUKEE, - WIS.

BLAST FURNACES.

AMALGAM CARS,
SILVER RETORT FURNACES,
REFINING FURNACES,
DESILVERIZING PLANTS,
SLAG POTS AND TRUCKS.



ORE FEEDER.

BLAST FURNACES
— FOR —
SILVER, LEAD AND COPPER ORES.

REYNOLDS CORLISS ENGINES.

WRITE FOR PRICES.

THE

Pelton Water Wheel Company

Gives exclusive attention to the development and utilization of water powers by the most modern, economic and improved methods. An experience of more than fifteen years, involving both the theory and practice of hydraulic engineering as relates to power development in its widest range of application, is at the service of its customers.

Nine Thousand Wheels Now Running,
Averaging some 700,000 H. P.

ELECTRIC POWER TRANSMISSION.

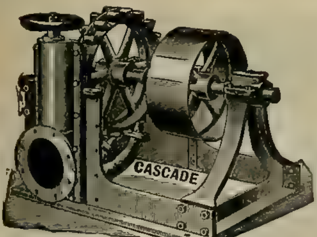
Pelton wheels afford the most reliable and efficient power for such service and are running the majority of stations of this character in the United States, as well as most foreign countries. Highest efficiency and absolute regulation guaranteed under the most extreme variations of load.

The Pelton Water Wheel Company,
121 & 123 MAIN STREET, SAN FRANCISCO, CAL.

TURBINE AND CASCADE WATER WHEEL

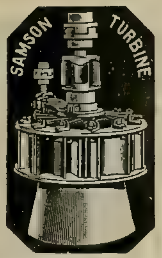
Adapted to all Heads from

3 Feet to 2000 Feet.

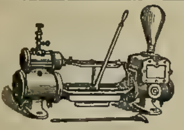


Our experience of 38 YEARS building Water Wheels enables us to suit every requirement of Water Power Plants. We guarantee satisfaction.

State your Head and requirements. Send for pamphlet.



JAMES LEFFEL & CO.
SPRINGFIELD, OHIO, U. S. A.



SOLE AGENCY
Worthington Steam Pumps and Water Meters.
Pumping Plants of any Capacity.

TATUM & BOWEN,
34-36 Fremont Street, San Francisco, Cal. 29-35 First Street, Portland, Or.

MACHINERY—ALL KINDS

Mining Machinery.

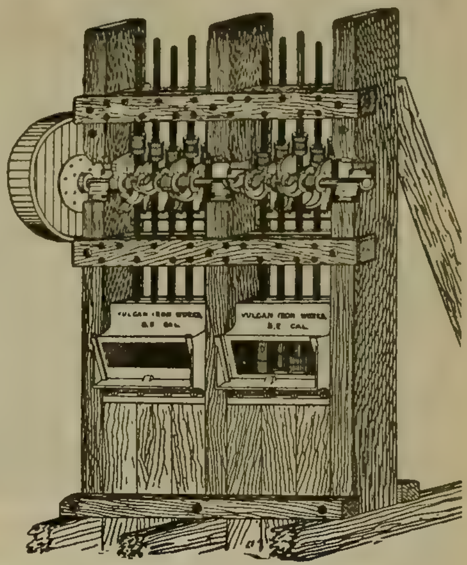
Stamp Mills

Of the Latest Improved
Design for

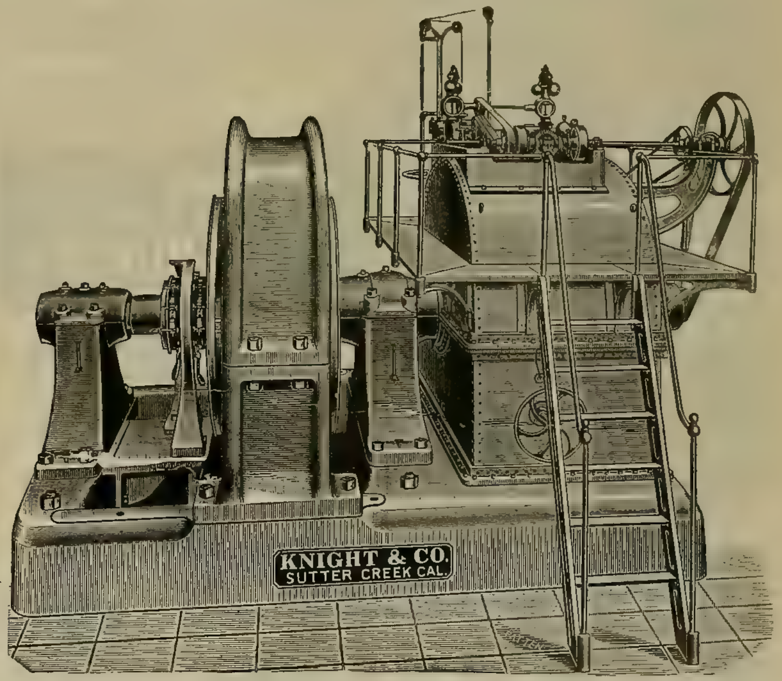
Gold Milling.

VULCAN
WIRE ROPEWAYS
For Conveying Ore, Etc.

Vulcan Iron Works,
Office: 505 Mission Street,
San Francisco, Cal.


VULCAN IRON WORKS S.F. CAL.
VULCAN IRON WORKS S.F. CAL.

KNIGHT'S WATER WHEEL.


KNIGHT & CO.
SUTTER CREEK CAL.

The accompanying cut shows the general arrangement of The Knight Water Wheel, direc-coupled to a 750 kilowatt generator, with governor mounted on top of wheel casing.
These wheels are designed for 100 to 2500 H. P. Highest efficiency and regulation guaranteed.
WHEELS FROM 6 TO 24 INCHES, ENCLOSED IN CAST-IRON CASING.
Wheels for mill and reversible hoisting works a specialty.

KNIGHT & CO., Sutter Creek, Cal.
For full particulars, send for descriptive catalogue.

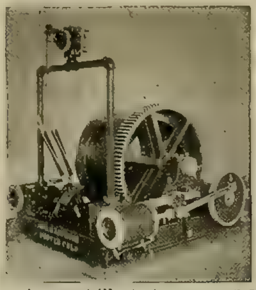
THE HUG WATER WHEEL

has a guaranteed EFFICIENCY OF 86%, as shown by Test Curves from Cornell University.

Most Economical Wheel on the Market.

No Loose Buckets Possible.

Manufactured by D. HUG,
Denver, Colo., U. S. A.



The above cut illustrates my new and improved Hoister.

Hoisting Engines

A SPECIALTY.

REVERSIBLE, LINK-MOTION, GEARED and FRICTION CLUTCH HOISTS carried in stock.

Special Machinery Built to Order.

GEO. G. JACKSON,
1724-34 Wynkoop St., DENVER, COLO.

DEWEY, STRONG & CO., Patent Solicitors, 330 Market St., San Francisco, Cal.

Founded by Mathew Carey, 1785.

HENRY CAREY BAIRD & CO.,
INDUSTRIAL PUBLISHERS, BOOKSELLERS & IMPORTERS,
810 Walnut St., Philadelphia, Pa., U. S. A.

☞ *Our New and Revised Catalogue of Practical and Scientific Books, 92 pages, 8vo; a Catalogue of Books on Steam and the Steam Engine, Machinery, etc.; a Catalogue of Books on Sanitary Science, Gas Fitting, Plumbing, etc., and our other Catalogues and Circulars, the whole covering every branch of Science applied to the Arts, sent free and free of postage to any one in any part of the world who will furnish his address.*

BRANNT'S PRACTICAL TREATISE ON THE MANUFACTURE OF VINEGAR, ETC.

NEARLY READY.

A Practical Treatise on the Manufacture of Vinegar. With special Consideration of Wood Vinegar and other By-Products Obtained in the Destructive Distillation of Wood; Fabrication of Acetates; Cider and Fruit Wines; Canning and Evaporating of Fruit; Manufacture of Catsups, Fruit Butters, Marmalades, Jellies, Pickles and Mustards; Preservation of Meat, Fish and Eggs. By WILLIAM T. BRANNT. Illustrated by Upwards of 100 Engravings. 8vo., 550 pages. Price $5.00.

By mail free of postage to any address in the world.

☞ *An elaborate circular showing the full table of contents of this important book will be sent to any one furnishing his address.*

☞ *Advance orders solicited.*

HENRY CAREY BAIRD & CO.,
INDUSTRIAL PUBLISHERS, BOOKSELLERS & IMPORTERS,
810 Walnut St., Philadelphia, Pa., U. S. A.

ASSESSMENT NOTICES.

MARIPOSA COMMERCIAL AND MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Mariposa County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 31st day of August, 1900, an assessment (No. 18) of Ten ($10) Dollars per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 320 Sansome street, room 24, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 10th day of October, 1900, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on THURSDAY, the 8th day of November, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

JOSEPH H. MOOSER, Secretary.

Office—320 Sansome street, room 24, San Francisco, California.

ALLIANCE EXPLORATION & MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Ophir, Placer County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 3d day of August, 1900, an assessment (No. 3) of five (5) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 236 Sutter street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 11th day of September, 1900, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 2nd day of October, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

S. GOLDSMITH, Secretary.

Office—236 Sutter street, San Francisco, California.

POSTPONEMENT.

By order of the Board of Directors, the day of delinquence in the above assessment has been postponed to October 11th, 1900, and the day of sale to THURSDAY, the 1st day of November, 1900.

S. GOLDSMITH, Secretary.

Office—236 Sutter street, San Francisco, California.

MARINA MARSICANO GOLD MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Sunny Hill, Shasta County, California.

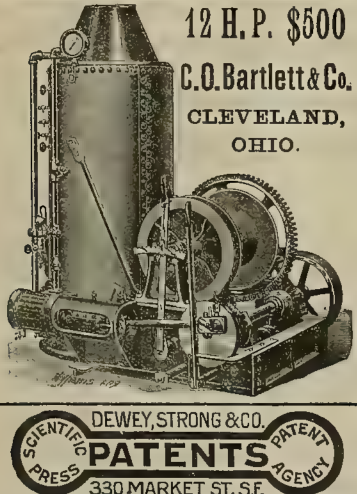
Notice is hereby given, that at a meeting of the Board of Directors, held on the 15th day of September, 1900, an assessment (No. 24) of 2 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, 217 Sacramento street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 23d day of October, 1900, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 12th day of November, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

CHAS. BOVONE, Secretary.

Office—217 Sacramento street, San Francisco, California.



12 H.P. $500
C.O. Bartlett & Co.
CLEVELAND, OHIO.

DEWEY, STRONG & CO.
SCIENTIFIC PRESS PATENTS PATENT AGENCY
330 MARKET ST. S.F.

INVENTORS, Take Notice!

L. PETERSON, MODEL MAKER,

544A MISSION STREET, bet. First and Second Sts., SAN FRANCISCO. Experimental machinery and all kinds of models. Tin and brasswork. All communications *strictly confidential.*

DELINQUENT SALE NOTICE.

MAMMOTH GARFIELD GOLD MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Shasta County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment levied on the 5th day of June, 1900, the several amounts set opposite the names of the respective shareholders, as follows:

Name.	No. Cert.	No. Shares.	Amt.
Andrew Corbin	13	20,000	$3500 00
Philip Corbin	14	20,000	3500 00
Charles Glover	16	1,750	306 25
Jos. S. Silver	5	5	87
J. M. Spring	15	2,000	350 00

And in accordance with law, and an order from the Board of Directors, made on the 5th day of June, 1900, so many shares of each parcel of such stock as may be necessary, will be sold at public auction, at the office of the company, Rooms 54 and 59, No. 120 Sutter street, San Francisco, California, on TUESDAY, the 2nd day of October, 1900, at the hour of 2 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

SAM W. CHEYNEY, Secretary.

Office—Rooms 54 and 59, No. 120 Sutter street, San Francisco, California.

DELINQUENT SALE NOTICE.

EUREKA CONSOLIDATED DRIFT MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Placer County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 26) levied on the 9th day of August, 1900, the several amounts set opposite the names of the respective shareholders, as follows:

Name.	No. Cert.	No. Shares.	Amt.
Geo. W. Carpenter	143	200	$2 00
Geo. W. Carpenter	218	33	33
Guy C. Earl	73	800	8 00
Guy C. Earl	161	320	3 20

And in accordance with law, and an order from the Board of Directors, made on the 8th day of September, 1900, so many shares of each parcel of such stock as may be necessary, will be sold at public auction at the office of the company, room 31, No. 214 Pine street, San Francisco, California, on TUESDAY, the 9th day of October, 1900, at the hour of 1 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of the sale.

GEO. W. DIXON, Secretary.

Office—Room 31, No. 214 Pine street, San Francisco, California.

JEFFREY ELEVATING CONVEYING MACHINERY

NEW ILLUSTRATED CATALOGUE NOW READY.

SEND FOR COPY.

ADDRESS:
THE JEFFREY MFG. COMPANY,
COLUMBUS, OHIO, U. S. A.
BRANCHES: 41 DEY ST., NEW YORK. 544 EQUITABLE BLDG., DENVER.

DENVER & RIO GRANDE R.R.
SCENIC LINE OF THE WORLD

The Mining Man's Favorite Route

BETWEEN

Denver, Colorado Springs, Pueblo and Florence, Cripple Creek, Leadville, Glenwood Springs, Aspen, Gunnison, Lake City, Creede, Durango, Silverton, Telluride and Ouray,

Reaching all the Mining, Milling, Cyaniding, Chlorinating and Smelting centers in Colorado and Utah, and all mining points in California, British Columbia and the Pacific Northwest by close connections and a perfect system of through car service.

Pullman Palace and Tourist Sleeping Cars between Denver and San Francisco and Los Angeles, and Pullman Palace and Tourist Sleeping Cars and Free Reclining Chair Cars between Denver and Portland. : : A Perfect Dining Car Service on All Through Trains. : :

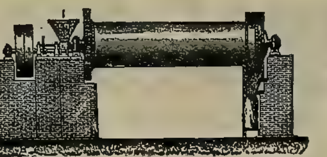
For Illustrated Pamphlet, address

W. J. SHOTWELL,
G. A. D. & R. G. R. R.,
126 California St.,
San Francisco, Cal.

S. K. HOOPER,
G. P. & T. A.,
Denver,
Colo.

THE MINES OF
Eastern Oregon
Which are now attracting so much attention are reached only by the lines of the
OREGON RAILROAD & NAVIGATION CO.
For Descriptive Pamphlets, Through Rates, Etc., Address
E. C. WARD, Gen. Agt.,
630 Market Street, San Francisco.

THE DAVIDSEN PATENT TUBEMILL.



FOR FINE GRINDING,

Uniformity of Output, Effectiveness, Simplicity, or Economy of Operation and Maintenance, "THE DAVIDSEN" HAS NO EQUAL.

ENORMOUS GRINDING SURFACE. ❧ SLOW SPEED. ❧ ANY DEGREE OF FINENESS.

WRITE FOR CATALOGS.

F·L·SMIDTH & CO
ENGINEERS
66 MAIDEN LANE, NEW YORK
COPENHAGEN, VESTERGADE 29.K. LONDON, 9 BRIDGE ST., S.W.

THE SMIDTH BALLMILL

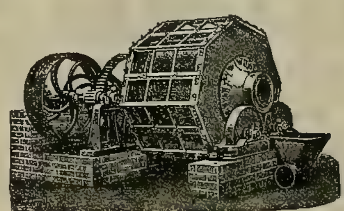
Crushes, Grinds and Sifts in One Operation, Working Continuously.

AMONG ITS SPECIAL FEATURES OF MERIT ARE:

Maximum Output, Slow Speed, Low Horse Power, Absolute Uniformity, Ease of Access, Slight Cost of Repairs.

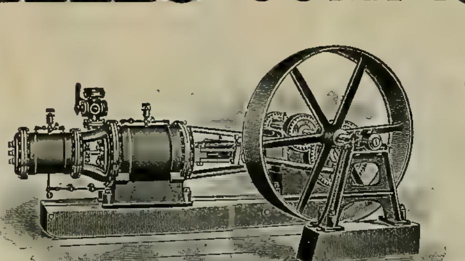
OUR AUTOMATIC FEEDER INSURES REGULARITY AND EFFECTIVENESS.

THE SMIDTH BALLMILL.



BEST. CHEAPEST. MOST SIMPLE.

WHY NOT have our catalogues, specifications and prices before you purchase AIR DRILLS OR COMPRESSORS?



Our guarantees are strong; our customers are satisfied. We can satisfy YOU.

J. Geo. Leyner,
729 Seventeenth St.,
DENVER, COLO.

THE MARION STEAM SHOVEL CO.,

Steam Shovels Dredges and Traction Dredges

Suitable for all kinds of Excavating Work, making a specialty of

PLACER MINING MACHINES,

separate or self-contained, either as a dry land excavator or floating dredge.

The Marion Steam Shovel Co.
MARION, OHIO.

GEO. W. BARNHART, No. 4 Sutter St., San Francisco, Cal.

STRICTLY C. P. ACIDS and C. P. AMMONIA

MANUFACTURED BY
The Western Chemical Co.,
DENVER, COLO.
For Laboratory Use and Fine Chemical Work
PURITY GUARANTEED.
Also COMMERCIAL ACIDS.

Powell's Signal Oiler.

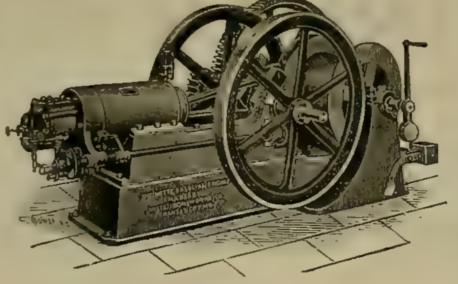
LEVER UP,
Oil
Dropping;
LEVER DOWN,
Oil
Shut Off.

**Doesn't interfere with the adjustment.
Most perfect Oiler in the world.
Haven't you need for such an Oiler?**
In stock by all Jobbing Supply Houses
Manufactured only by
THE WM. POWELL CO.,
Cincinnati, O.

D. Campbell Davies & Co.,
REPRESENTING THE LARGEST
EUROPEAN and AMERICAN
MANUFACTURERS
— OF —
Mills, Mine and Smelting
Machinery Supplies.

EXPORT TRADE A SPECIALTY.

Apartado No. 83,
DURANGO, - - - MEXICO.



WITTE GASOLINE HOISTS
ARE MONEY EARNERS.

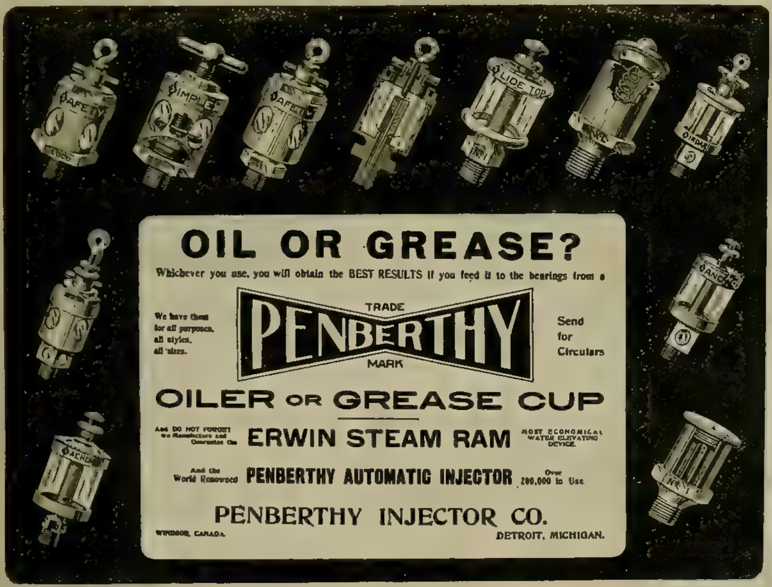
Made for use in places far from factory. Are built in parts and in duplicate. Renewals easy and quick to get. Strong, substantial and reliable.

Operate on GAS, GASOLINE or DISTILLATE.

There Are Others, but None as SAFE AND RELIABLE.

Write for Illustrated Catalogue G.

WITTE IRON WORKS CO.,
Hendrie & Bolthoff Mfg. & S. Co., Denver, Colo.
C. B. Boothe & Co., Los Angeles, Cal.
Tracy Engineering Co., San Francisco, Cal.
515 WEST 5th ST.,
KANSAS CITY, MO., U. S. A.



OIL OR GREASE?
Whichever you use, you will obtain the BEST RESULTS if you feed it to the bearings from a

We have them for all purposes, all styles, all sizes.
TRADE PENBERTHY MARK
Send for Circulars

OILER OR GREASE CUP

And DO NOT FORGET we Manufacture and Guarantee the ERWIN STEAM RAM MOST ECONOMICAL WATER ELEVATING DEVICE.

And the World Renowned PENBERTHY AUTOMATIC INJECTOR Over 200,000 in Use.

PENBERTHY INJECTOR CO.
WINDSOR, CANADA. DETROIT, MICHIGAN.

RIVETED IRON AND STEEL PIPE

FOR HYDRAULIC MINES, IRRIGATION AND POWER PLANTS. Manufactured from the best grades of IRON or STEEL by **MODERN MACHINERY.**

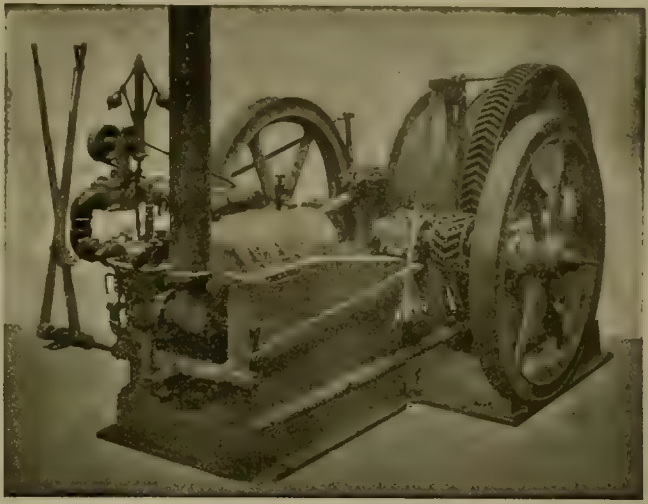
AGENTS FOR THE Celebrated CANTON STEEL.
Schaw, Ingram, Batcher & Co., 539 Mission St., SAN FRANCISCO. 211 to 219 J St., SACRAMENTO.

SMOOTH-ON TRADE MARK CASTINGS.

An iron cement for repairing leaks or fractures in steam or hydraulic work. When hard it will withstand a red heat, steam, water or oil, and expands and contracts with heat and cold the same as iron, insuring a tight joint at all temperatures. Difficult flange connections can easily be made with Smooth-On, as it adapts itself to the flanged faces whether parallel or not. Connections are easily taken apart. Unequaled for boiler patching, and repairing blemishes in iron castings. Write for catalogue and prices. Sole proprietors and manufacturers: Smooth-On Mfg. Co., Jersey City, N. J., U. S. A.

MESSRS. MADISON, BRUCE & SELLERS,
34-36 STEUART ST., SAN FRANCISCO, CAL.......................AGENTS FOR PACIFIC COAST.

HERCULES HOISTS Are Sold the World Over.

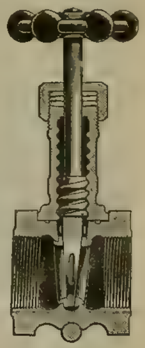


Hercules Gasoline Hoist--Speed 385 Ft.; Load 2500 Lbs.
HERCULES GAS ENGINE WORKS,............141-143 FIRST STREET, SAN FRANCISCO, CAL.

DON'T SAVE PENNIES AND WASTE DOLLARS

in the purchase of a Gasoline and Oil Engine and Hoist. Buy the best—the Weber—and get results. Full particulars on request.

WEBER GAS & GASOLINE ENGINE CO.,
P. O. Box 1132-I,
Kansas City, Mo.



The Lunkenheimer "Clip" Gate Valve.

Single Disc
DOUBLE SEATED.
Made with Screw Ends from ½″ to 6″,
Flange Ends 2″ to 6″ sizes.

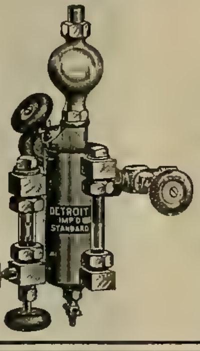
BEST IN QUALITY.
LOWEST IN PRICE.
THE ENGINEERS' FAVORITE.

These Valves are made of cast iron and all wearing parts of gun metal. They are superior to the common, cheap, brass valves with which the market is flooded.

WHY?

BECAUSE they possess all the advantages of a cast iron pipe fitting (Elbow, Tee, Coupling, Union, etc.) namely—are heavy and rigid—not injured by expansion and contraction or rough handling in pipe fitting. TAKE PRESSURE FROM EITHER END. Body and hub are held together by a steel clip, consequently always easily taken apart. Joint between body and hub made permanent by an imbedded seamless oval copper wire washer. If you desire the BEST, STRONGEST and MOST DURABLE valve for general purposes on all ordinary pressures, use this valve. IT IS A STANDARD FITTING, OF NEAT APPEARANCE and FULLY WARRANTED TO SATISFY. Made also in All Iron for Cyanide Plants. Try them and be convinced. Specify them and order through your dealer. Our Catalogue of superior Steam Specialties FREE for the asking.

THE LUNKENHEIMER CO., Cincinnati, Ohio, U. S. A.,
SOLE MANUFACTURERS.
BRANCHES: NEW YORK, 26 Cortlandt St.; PHILADELPHIA, Bourse Bldg.; LONDON, S. E., 35 Gt. Dover St.; MEXICO CITY, Puente de San Francisco No. 6.

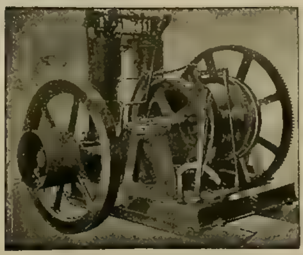


ALL ABOUT
Sight Feed Lubricators.

Our new catalogue for 1900 is ready for distribution. It explains in detail the principles governing the operation of **Sight Feed Lubricators**, using sectional view to show the internal construction, and containing cuts of the different styles in parts before being assembled into the complete lubricators, thus enabling every one to understand their construction and operation thoroughly.

In addition it shows our full line of **Glass Oilers, Oil Pumps, Oiling Devices, Multiple Oilers, Valves, Etc.** It will be sent to any address on application.

DETROIT LUBRICATOR CO., DETROIT, MICH.



Mining Hoist.

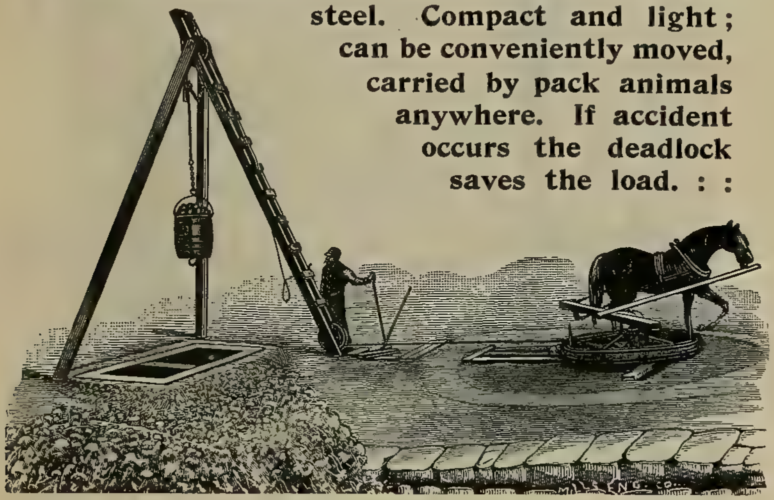
THE GOLDEN GATE GAS ENGINE
Will raise more ore than any other **AT LESS COST.**
MANY IN USE, Giving Satisfaction.
Built for any Capacity and for any Purpose.
Pumping Water, Propelling Boats, Hoisting Ore, Machine Shop Power, Etc.

Send for Particulars and Catalogue.

ADAM SCHILLING & SONS,
213 & 215 Main St., San Francisco, Cal.

THE COMMON SENSE WHIM

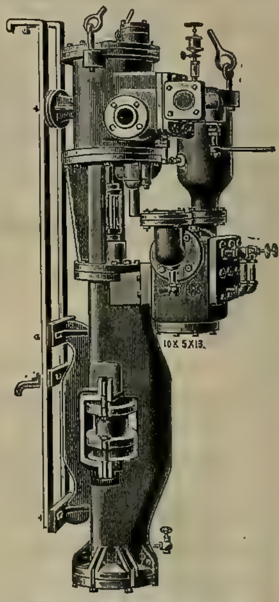
Is made of the best wrought iron and steel. Compact and light; can be conveniently moved, carried by pack animals anywhere. If accident occurs the deadlock saves the load. : :



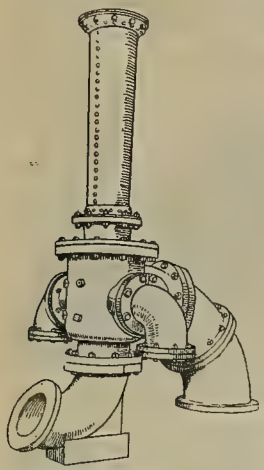
SINKING PUMPS,

Indispensable in sinking mining shafts or pumping out flooded mines. Easily raised or lowered by cable or rope. Equipped with outside packed plungers. Handles gritty or dirty water. Operates bolted to shaft timbers or only suspended by cable at any angle. Packing glands external. May be adjusted while in motion. Removable parts hinged. Steam movement positive and simple.

THE RISDON IRON WORKS,
MANUFACTURERS,
SAN FRANCISCO, CAL.



SEND FOR CATALOGUE.



THE EVANS HYDRAULIC ELEVATOR,

MANUFACTURED BY

RISDON IRON WORKS, San Francisco.

Used in Unwatering the Comstock Lode.

SEND FOR CATALOGUE NO. 5.

The cheapest and most efficient Water Elevator made.
It will do more and better work than any other Gravel Elevator.
It is fully protected by United States and Canadian letters patent.

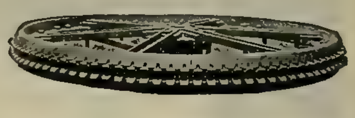
THE HALLIDIE ROPEWAY

For Transporting Ore, Fuel, Earth, Sugar Cane, etc., by Wire Ropes.
SIMPLE, ECONOMICAL, PRACTICAL, DURABLE.
LOADS MECHANICALLY. DUMPS AUTOMATICALLY.

WIRE TRAMWAYS (Single and Double Rope Systems),
Cableways, Transmission by Wire Ropes,
Incline Planes, Cable Grips,
Logging by Cables, Automatic Loaders,
PLOWING, SCRAPING AND TRANSPORTING by Wire Ropes,
DESIGNED, SUPPLIED AND ERECTED. Estimates Furnished.

Improved GRIP PULLEY.

Patents Nos. 483,442; 610,358.



EFFECTIVE, SIMPLE, AUTOMATIC.
Saves Wear on Wire Rope and Cable.
Send for Illustrated Pamphlet.
Correspondence Solicited.

CALIFORNIA WIRE WORKS, - 9 Fremont St., San Francisco, Cal.

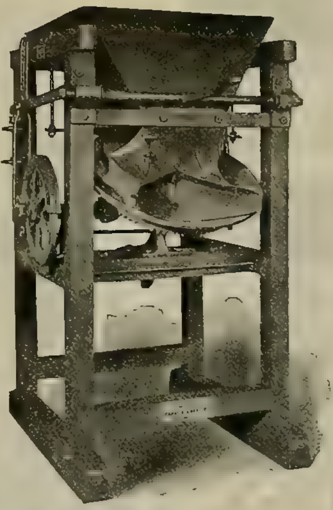
THE "JAMES" AUTOMATIC ORE FEEDER.

THE "JAMES" ORE FEEDER,

as illustrated on this page, is a machine of improved design for the automatic feeding of ores to stamp batteries and other crushing machinery. It is perfectly adjustable while in operation, and will feed equally well ores wet or dry, coarse or fine.

⁂

Shipping weight, with wood frame, - 800 pounds.
" " " iron " - 1000 "



ADVANTAGES

The advantages of this ore feeder, over any others that are in the market, are, that the feed is positive and will not gig back no matter how slight the motion to the arm; it can not possibly spill ore of any character and will definitely measure out from one to fifty tons per day of any class of ore.

Licensee for the Manufacture and Sale, **PARKE & LACY CO.,** 21 & 23 FREMONT STREET, San Francisco, Cal.

SOLE AGENT FOR
INGERSOLL-SERGEANT ROCK DRILLS and AIR COMPRESSORS.
KNOWLES PUMPS and PULSOMETER PUMPS, BULLOCK DIAMOND DRILLS.
CATALOGUES FREE ON APPLICATION.

to be taken from
the Library.

CALIFORNIA
STATE

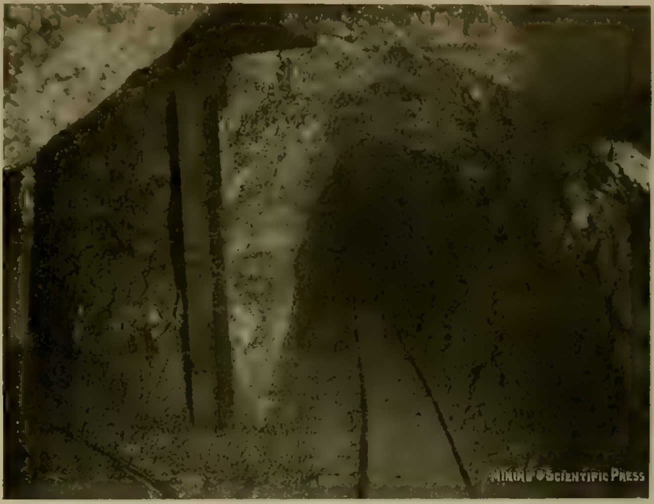
MINING AND SCIENTIFIC PRESS.
AND PACIFIC ELECTRICAL REVIEW.

No. 2098.—VOLUME LXXXI. Number 14. SAN FRANCISCO, SATURDAY, OCTOBER 6, 1900. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

Mining Frozen Ground in Siberia.

In the basin of the Amur, methods of mining the frozen soil of Siberia are interesting. The number of days in the year in which the temperature of that part of Siberia is below freezing point is about 200; the mean temperature for the whole year is below freezing point; the lowest temperature reached is — 37° C., the highest +27° C. The temperature conditions of the whole year tend to form ice rather than to melt it, and the whole of the superficial layers of the earth's crust are thus completely frozen. The miner has accordingly to deal with gravels frozen hard, though in places certain local actions may keep patches of ground from freezing, especially in swampy districts, so that the possibility of the workings being suddenly flooded is always present, in spite of the frozen condition of the ground. Frozen alluvium contains from 7% to 12% of ice; in this condition it is hard and tenacious, does not break under the pick, and dynamite and powder have little effect upon it. Hence these frozen gravels can only be worked by thawing, as in the Klondike, either naturally by the action of the sun's rays in the short summer season of about five months, or artificially. Direct flames, heated metal and steam have been tried, but only the first-named method is of any use. Practice has shown that a layer of burning wood properly applied will only thaw out its own thickness of frozen gravel, while it is impossible to thaw out a greater depth than one foot at each operation. When thus thawed, the gravel can readily be got out by means of the pick. At the placers of the Daourskaia Company, near Nertchinsk, three methods of mining the auriferous deposits are in use—open-cast working by hand, machine excavation and underground work. The first two methods are only applicable in the summer season; the last named can be worked all the year round, but is confined to the winter time, as it is preferred to employ all available hands at the surface as long as possible. The open working presents no peculiarities except that the depth of each face is very small, about one foot, to enable it to be thawed by the heat of the sun; stripping the barren surface earth is commenced as early in the year as possible, to expose the greatest possible surface of auriferous gravel to the influence of the sun: an average day's work amounts to three cubic yards of excavation per head. The machine excavator is only used for raising old tailings that have been worked, but which contain sufficient gold to be worth working over again. An interesting method of working is underground; shafts are sunk along the axis of the placer down to the bedrock, about 55 yards apart, and connected by a drift running on the bedrock and about 14 feet wide. From this drift crossdrifts are driven 14 feet wide and 14 feet apart to the rim rock of the placer; these crossdrifts are then connected by short cuts 14 feet wide, leaving the whole deposit thus cut into pillars 14 feet square, one-fourth of the whole area being left standing in the form of these pillars. After a district has thus been laid out the pillars are systematically robbed, working from the limits of the placer backwards and allowing the roof to come down. The complete working out of a district takes about three years. During the course of this operation a system of timbering is employed, consisting of close-fitting sets of timber framed of round wood six inches in diameter; in the main and crossdrifts these sets are kept in place by longitudinal timbers along the workings; all working faces are also kept close timbered.

The timber protecting the face to be worked is removed, firewood is piled against it, covered with a layer of charcoal to keep the heat down as far as possible, and set fire to; when the face is sufficiently thawed the fire is extinguished and the thawed ground cut down by the pick, fresh timber put in, and the work proceeds. One difficulty is that the heat required to thaw the face naturally rises in spite of all precautions and produces dangerous hollows above the roof timbers, together with falls of ground that are a source of accidents. The consumption of wood for mine timbering and firewood is great.



In Ore—Main Drift, 100-Foot Level.

Ore Dump Northwest of Shaft House.

Ore Dump Northeast of Shaft House.

Scenes at Mines of the Vulcan Copper M. & S. Co., Siegelton, Nevada.

(See Page 401.)

A Large Pump.

The work of dismantling a huge Corliss pumping engine is going on at Allentown, Pa. The pump was constructed in 1868 for the Lehigh Zinc Co., for obtaining water from a mine. The cost of building and installing the engine was almost a million dollars. The difficulties of erection were rendered greater by the engine being placed near the mine shaft. The engine frame and bearings are bolted to solid cut-stone masonry, 80 feet deep. Owing to the fact that the mining interests waned, it was decided to abandon the engine. It has not been operated for three years. At the time its destruction was begun it was in excellent condition. Dynamite is being used to throw down the heavy walking beams from their bearings, while block and tackle will prevent them from falling after the explosion. After that each one will be broken into suitable sizes for shipment. It is estimated that there are sixty tons of brass in the bearings and fittings. The height of the engine from the surface of the foundation to the top of the walking beam is 50 feet. The weight of the entire engine is 1500 tons. The diameter of the steam cylinder was 110 feet, the stroke 10 feet. The pump was intended to deliver 14,600 gallons of water per minute. There were two walking beams mounted on the same shaft 10 feet apart. They were jointed at their heads by many rods two feet in diameter, to which the connecting rods were fastened. Each beam weighed forty-four tons. The flywheels were two in number, one situated on each side of the steam cylinder, weighing ninety-eight tons. The flywheels were 30 feet in diameter. The material goes to the junk pile.

MINING AND SCIENTIFIC PRESS.

ESTABLISHED 1860.

Published Every Saturday at 330 Market St., San Francisco, Cal.

ANNUAL SUBSCRIPTION:

United States, Mexico and Canada.......$3 00
All Other Countries in the Postal Union....... 4 00

Entered at the S. F. Postoffice as second-class mail matter.

J. F. HALLORAN.......Publisher.

Special Representatives:

EASTERN.
E. H. HAVEN.......150 Nassau St., New York City.
MIDDLE WEST.
CHAS. D. SPALDING.......153 La Salle St., Chicago, Ill.
INTER-MOUNTAIN.
W. A. SCOTT.......43 Jacobson Building, Denver, Colo.
SOUTHERN CALIFORNIA.
W. D. CURTIS.......223 W. Second St., Los Angeles, Cal.

San Francisco, October 6, 1900.

TABLE OF CONTENTS.

ILLUSTRATIONS.—Scenes at Mines of the Vulcan Copper M. & S. Co., Siegelton, Nevada—In Ore—Main Drift, 100-Foot Level; Ore Dump Northwest of Shaft House; Ore Dump Northeast of Shaft House, 397. Latest Mining and Metallurgical Patents, 403.
EDITORIAL.—Difference Between American and Those Not American Miners; Of Valued Service: Ninth Annual Convention of the California State Miners' Association; Miscellaneous, 398.
MINING SUMMARY.—406-407-408.
LATEST MARKET REPORTS.—409.
MISCELLANEOUS.—Mining Frozen Ground in Siberia; A Large Pump, 397. Concentrates, 399. The Boise (Idaho) Basin Mining District; Russia's Production of Petroleum, 400. Gas Engine Economy; The Copper Deposits of Southwestern Nevada; Ventilation of Mines, 401. Power Generation; Use Made of Some Metals; Demand for Mining Machinery; A Large Enterprise; In Sympathy with the Other, 402. The First Gold Dredging Company in California; Supply of Platinum in Russia; Latest Mining and Metallurgical Patents, 403. Gold Sands of the Snake River, Idaho: Man, Muscle and Coal; Transition to Electric Power; Ore Thefts in Colorado; On the Use of Compressed Air; Diamond Drill Work, 404. New Developments in Jigging; Mining in the Philippines; Removing Stumps with Dynamite; Cement for Electric Wire Connections, 405. List of U. S. Patents for Pacific Coast Inventors; Notices of Recent Patents; Personal; Commercial Paragraphs; Obituary; Recently Declared Mining Dividends, 408-409.

ONE can now talk by telephone from San Diego, Los Angeles, San Francisco, Cal., Portland, Or., Butte, Mont., Denver, Colo., and Salt Lake City, Utah.

THERE is now a class of the miners employed at the Comstock, Nevada, that regularly meets for study, to qualify the members for the degree of mining engineer to be conferred by the University of Nevada. The idea is in every way commendable and worthy of practical observance.

MUNICIPAL OWNERSHIP of any great public utility can not be as much of a commercial success as private ownership. No one working for a city will put in daily use the brains, the energy, the watchfulness and the economy of operation required in private ownership and business competition. This is not because of lack of honesty or public spirit or good intent. It is so because of the very nature of things, and is not nearly so much a surprise that it is so as would be a solitary instance where the opposite result were observable.

LAST Monday the director of the U. S. Mint increased the price to be paid by the Government for silver from 55 to 57 cents per standard ounce. The price has advanced unsteadily since 1896, when the Government price was 47 cents. The present price quoted commercially—63¾—is the highest for some years, and is chiefly caused by large Asiatic and European coinage orders. India has been buying all summer, China began buying in August, and in September the British mint made considerable purchase. Nearly all those orders were for October delivery. During last month the U. S. Mints coined in silver $3,932,185.

AN old idea in a new garb is presented in a communication from Sumpter, Or., which, boiled down, alleges that the Standard Oil Co. is acquiring mining property in that district; that its tactics are to do sufficient work on a prospect to develop its value, and then cover it up, on the principle that it is safer there than in any bank, can be produced at will, and is not subject to taxes. Sumpter understands the art of advertising, and the statement is a good bid for prominence, which is here given it. The idea attributed to the Standard Oil Co. was an old one in the days of the Phœnician tin miners, but has not been overworked lately.

Of Valued Service.

The receipt of the twentieth annual report of the U. S. Geological Survey and a cursory examination of its fine volumes shows how well that important branch of the public service is filling its mission in aiding the development of the nation's mineral wealth. It is one federal work in connection with mining that deserves just commendation, and it is only justice to say that with the limited means at their disposal Director Walcott and his skilled assistants are doing valuable work; valuable to the prospector, the miner, and the mine investor.

It is within the memory of men not yet old, as years go, when metal ore deposits were considered as "freaks of nature;" when everything in connection with mining was looked upon even by educated men as a matter of chance or luck. But from chaos comes cosmos, and out of the welter of shapeless beliefs come laws as certain as those that regulate the passage of the hours. The formulation of those laws is primarily due to the miners themselves; in almost as great a degree to the mining engineers, metallurgists and chemists, who have advanced mining and scientific knowledge in theory and practice, and in these later years the U. S. Geological Survey has done much to determine data that are to the miner as well-made maps to the traveler or soldier. The rule of three slowly supplants the rule of thumb; the old "where it is, there it is" theory of gold formation and existence still has its devotees, but there is yearly a clearer popular perception of the basic laws that govern the basic industry of the nation, and for an understanding of these primal laws we owe much to the work of the U. S. Geological Survey.

The great work of creating a geologic atlas of the United States goes on, and prominent mining districts are successively given detailed attention. This branch of the work has been already discussed at considerable length. It forms but a part of the research and publication constantly carried on. General geology, paelontology, hydrography or stream measurement, forest reserves, description of prominent mining districts, Alaskan explorations, are among the subjects on which work continues. The timeliness of this work is an added element of value. For instance, on the last mentioned subject there is a volume of over 500 pages—an up-to-date encyclopedia on Cape Nome, Tanana and White River basins, the latest and newest American gold districts. Doubtless were there a great metal discovery of any kind reported from Cape Barrow the U. S. Geological Survey would have a bulletin out inside of a month with the latest procurable facts and an elaborate monograph thereon before the close of the year. This prompt recognition of the immediate demands of the prospector and miner characterizes the policy of the Survey, and while not neglecting the requirements of general scientific research, the more homely needs of the day and hour are supplied.

The simplicity of truthfulness, the absence of favoritism, the regard for accurate determination of existing fact, the unbiased independence of statement and the sterling character of the prompt information furnished are among the attributes that give value to the work of the Survey.

THERE is some present discussion as to the difference between American miners and those not American. One apparent difference does not seem to have been touched upon as yet in the discussion, viz., the fact that miners working in American mines in any capacity are not usually content to be told that a thing is so without knowing why it is so, what made it so. They do not care to have any one do their thinking for them, preferring to do their own thinking, and are not looking for opinions or information second hand. An instance of how this fact is not generally understood elsewhere was recently afforded in the case of a man who visited this office with a newly devised mining appliance of improved merit that he wanted to have brought to the notice of the mine superintendents of the United States. He had two flattering testimonials, one from an Australian mine manager, the other from a British mining engineer, and asked that they be published, saying "that will be all required." He was told that a great deal more would be required, if he wanted to enlist the notice of any mining men in America whose attention was worth having; that the best way to do would be to furnish a sectional drawing of his device and a brief technical statement of what it was intended for and what could be truthfully claimed for it, that American miners might read and decide for themselves as to the merit or lack of merit of the apparatus. To this the gentleman from England demurred, claiming that all the miners need be vouchsafed was to be told just what Messrs. So and So of Australia and London thought of the machine. This might do elsewhere, but would not win in the United States, where there is no glamour of names, and where miners pay little attention to anything that does not appeal to their intelligence. With surprise the representative learned that while the gentlemen whose testimonials he held were doubtless very worthy people, what they thought or did not think about mining devices was of no material importance to American miners, and that three lines of description outweighed three columns of testimonials. The instance illustrates one element in the mental make-up of men working in American mines that has not been touched upon in the discussion referred to.

THE official call for the ninth annual convention of the California State Miners' Association names Nov. 19th as the date and San Francisco as the place. It is none too soon for the several county mining associations to begin the work of selecting delegates and determining what shall be brought before the convention. There are several matters of importance to all sections of the State, and, also, questions affecting different parts of its area that need attention. To give due heed to such requirements is a part of what the annual convention is for. The convention is the place to bring matters of general value to the mining interests of the State that may be aided. The convention is made up of the several county organizations; they give it life, and constitute its existence. The work of the association goes right on through the year; it is continuous through its committees; part of the business of the annual convention is to hear the reports of those committees, and instruct them as to future action. But of equal importance is that the several county organizations formulate their needs and ideas, and present them in convention. The meeting of 1900 should be as large in numbers and profitable in results as any of its predecessors.

RHODESIA, SOUTH AFRICA, understands the art of advertising, and is up-to-date in claiming attention to its gold mines. Assertion is made that as soon as the Boer war is over a railroad will afford all modern advantages. Figures are furnished regarding one mine—the Globe & Phœnix—that sound as familiar as similar calculations nearer home. The figures, which of themselves do not lie, say that 5907 tons ore were crushed in twenty-four days, yielding, on the plates, 4742 crude ounces, and a profit of $62,831.38. The expenses are stated to be $29,486.12; so that the 4742 ounces must have produced $92,317.50, or $19.46 per ounce, which for crude gold is extraordinarily good. It is very seldom in South Africa that gold .942 fine is produced. Of course, that affords fine base for the prospectus: "Take an average of £13,000 profit a month," says the Review; "then we get £156,000 a year net!" Of course we do! The London Rhodesians have nothing to learn of the boomer's art, and do not bother about little things like facts.

"Is the Paris Exposition profitable to the exhibitors?" is a question now being discussed toward the close of the latest international exhibition which rounds out fifty years of such display. The general expression of opinion seems to be that the exhibition did not pay those who exhibited. This paper thinks differently. It thinks that such exhibition was opportunity for good advertising; and a good advertisement of a good article always pays. Those who are adverse in their comment on the conduct of the big Paris show are, however, undoubtedly right in saying that the wholesale giving of medals and honors brings the whole thing into contempt. In a manifest desire to please every one the French fair directors have cheapened their awards and have permanently hurt whatever prestige attaches to their receipt. The fact that the fair itself is not a financial success will go far toward deferring any future effort of the kind in any European capital.

Concentrates.

167° F. = 75° C., that is, $(167 - 32)\frac{5}{9} = 75$.

At the North Pole any earth direction is south.

The Alaska Treadwell stamps have a daily crushing capacity of 2860 tons ore.

Current Boston rates of Cochiti, N. M., G. M. Co.'s stock are at $8 per share; par value $25.

The kind of people who read circulars are usually too poor to buy what is commended therein.

The United Verde property of Arizona has been a copper producer and dividend payer since 1887.

A gold dredging machine is subject to taxation in the county in which it is permanently operated.

In the twelve years from 1888 to 1899, inclusive, California produced 6789 tons manganese, worth $60,766.

Cobalt oxide sells for about $1.80 per pound, or about $3.96 per kilogram. It is dealt in by the American Nickel Works, Camden, N. J.

With pyritic ore copper or brass screens are used to discharge the pulp from the battery, as the acid in the ore tends to oxidize iron screens, corroding them.

"Lis" is a Mexican term applied to mercury as the word "flouring" is in the United States—when the mercury separates into minute globules and refuses to amalgamate.

A luting around muffles that will stand fire is made of two parts litharge, ten parts bone ash, mixed thoroughly dry, water then added till of the required consistency.

The ordinary gas burner decreases markedly in its efficiency after a short time. An entirely new tip will give a much brighter light than one that has been in use but a brief period.

Tellurides are not found in sedimentary rocks—only in crystalline and igneous rock formations; lead and zinc are found in limestone, and, seldomer, in the eruptive rocks and granites.

Water under pressure will rise vertically 2 feet approximately for every pound of pressure, such use being dependent upon the pressure in pounds per square inch, and independent of size of pipes.

The average run of Rand, South African, gold ore is about .4 ounce per ton crushed—that is, about two-fifths of an ounce crude gold, or about .85% of that, fine gold, or, approximately, $7 per ton of all ore crushed.

Buying good mining stock is better than betting on election results. To win in the latter would only double one's money; the former affords finer opportunity for prefitable investment and without occasioning expense to another.

Some millmen claim that the formation of "verdigris" on copper plates can be prevented by binding them on the tops and sides with iron strips, and that the acid in the pulp will attack the iron in preference to copper, leaving the latter bright.

One of the reasons for the cost of zinc reduction is due to the fact that the temperature at which zinc oxide is reduced by carbon is very high, and being above the boiling point of zinc compels the conduct of the operation in retorts instead of in a smelting furnace.

A man has a right to leave his employment at any time, so long as he breaks no real engagement, and that right can not be restricted because of alleged wrong motive. A man has a right to do as he pleases—provided he does not interfere with any one else's right to do as he pleases.

Sludge in final procipitation vats in gold chlorination plants has value dependent upon the care and skill exerercised in chlorinating, and, in a degree, upon the quality of the ore. The gold obtained by final treatment from the sludges will not ordinarily exceed 2% of the total gold obtained in the chlorination works.

The only new thing sought by the majority of devisers or designers of new steam engine forms is to utilize more of the heat generated by the fuel consumed. As only about 50% of the units of heat in the fuel is utilized, there is still room for manifest advance. The form or arrangement is of little consequence; the commercial point is economy of operation.

There are no mechanical difficulties in the way of using crude alcohol as the working agent in oil or gas engines, but the cost would be absolutely prohibitive, being about five and five-eighths times as much as if burning oil were used in the motor, and about three and one-fourth times as much as if petroleum spirit were the combustible employed.

That quartz veins may be of comparatively recent origin is exemplified by such occurrences as that near Volcano, Amador county, Cal., where a distinctly marked quartz vein is observed to cut through beds of sand and gravel, presenting unmistakable evidence of having been formed subsequently to their deposition by the action of siliceous waters.

In a laboratory method of making sodium amalgam a flask of mercury is heated to about 300° F., and then small pieces of sodium, about the size of a pea, are gently dropped in, one at a time, until 3% is added. As each little pellet is dropped into the hot mercury a little explosion occurs, and the operation is necessarily slow. When the requisite percentage of sodium has been added the mercury is poured into a flat dish and allowed to cool, after which it is broken up and put into stoppered bottles under naphtha.

It is not unknown to find in placer gold workings a vein of gold quartz ore crossing the placer ground. Such has been found at Hoosier Pass, Summit county, Colo., where at an altitude of 1400 feet an oxidized outcrop of gold quartz ore followed through placer workings by shaft and tunnel developed a paying lode, as well as placer mine, on the same claim.

During 1899 San Francisco received coal as follows: From British Columbia 447,200 tons; coast mines, 710,600 tons (exclusive of coal received by rail from Mt. Diablo, Tesla, Colorado and Utah); Australia, 130,600 tons; Great Britain, 99,200 tons; Eastern, 34,400 tons; Mt. Diablo, 50,000 tons; Tesla, 80,000 tons; Colorado and Utah, 40,000 tons, a total of 1,592,000 tons. Southern California ports received 187,000 tons. Australian Newcastle coal ranged in price during the year from $6.25 to $7.50 per ton.

All steel used for boilers of steamships constructed under Lloyd's rules is required to have an ultimate tensile strength of not less than twenty-six tons, and not more than thirty tons per square inch of section, and the ultimate elongation must not be less than 20% in a length of 8 inches. It is to be capable of being bent to a curve, of which the inner radius is not greater than one and a half times the thickness of the plates or bars after having been heated uniformly to a low cherry red, and quenched in water at 82° F.

Sec. 2319, Revised Statutes, U. S., says: "All valuable mineral deposits in lands belonging to the United States, both surveyed and unsurveyed, are hereby declared to be free and open to exploration and purchase, and the lands in which they are found to occupation and purchase, by citizens of the United States and those who have declared their intention to become such, under regulations prescribed by law, and according to the local customs or rules of miners in the several mining districts, so far as the same are applicable and not inconsistent with the laws of the United States."

In the Siemens-Halske method for treating the cyanide liquors from the waste tailings or sludges produced in cyanide gold extraction, and containing a very small amount of gold, an extremely dilute solution of cyanide is employed to dissolve the gold. This is afterwards subjected to electrolysis, with iron anodes and thin lead cathodes, with a current density of two-tenths of an ampere per square foot. This results in an almost complete recovery of the gold in an adherent form upon the lead cathode. When the required amount of gold has been deposited the cathodes are removed and the gold separated by cupellation.

The decision by the Secretary of the Interior, Aug. 3, in the case of Marborg of Colorado, in which it was held: that an applicant for patent who has been adversed in the court is not obliged, after the commencement of adverse proceedings, to keep up the annual expenditure under Section 2324, Revised Stats., U. S., in order to prevent relocation and probable loss of his claim during the pendency of such proceedings, and that the same rule is applicable to protest proceedings before the land department—is interpreted to mean that it removes the necessity of doing annual labor on any unpatented mining claim against which there is any litigation.

As between cyanide and barrel chlorination process, the greatest difference in cost after roasting lies in the amount and value of chemicals used. The chemical cost in chlorination would vary from 50 to 70 cents per ton; in cyaniding from 25 to 45 cents per ton. While this fragmentary statement would appear to indicate that chlorination would be dearer, other elements, such as coarser crushing for chlorination, and percentage of saving, would offset such implication. The difference would require some space to explain, and as for comparison that need no longer be instituted. The ore itself should determine the process, and that can be best learned by experience.

A method for determination of iron in ores is as follows: Digest 1 g. ore in 10 c.c. strong nitric acid, adding 5 c.c. hydrochloric if the substance be found difficult to decompose. When decomposition is complete, add, without removing from heat, 10 c.c. concentrated sulphuric acid; boil till nitric and hydrochloric acids are completely expelled; remove from source of heat, and, when cool, add 50 c.c. water; boil till all soluble sulphates are in solution, and filter into a copper flask, washing the filter thoroughly with hot water. To the solution in flask add three strips heavy aluminum foil, free from iron, and boil till the iron is entirely reduced to the ferrous state, which may be determined by ammonium-sulpho-cyanate in the usual manner, when the solution is ready for decantation, and titration with standard solution of potassium permanganate. If copper is present in the sample, it will be found precipitated on the aluminum and its percentage may be determined by either the cyanide or iodide method, if required.

A cheap and effective dressing for a belt is tallow. When a belt is pliable, and only dry and husky, the application of blood-warm tallow, thoroughly dried in by the heat of the sun or fire, will tend to keep the belt in good working condition. The oil of the tallow passes into the leather, serving to soften it, and the stearin is left on the outside, to fill the pores and leave a smooth surface. The addition of resin to the tallow for belts, if used in wet or damp places, will be of service and help preserve their strength. Belts which have become dry and hard should have an application of neat's foot or liver oil mixed with a small quantity of resin. This prevents the oil from injuring the belt and helps to preserve it. There should not be so much resin as to leave the belt sticky. Belts should not be soaked in water before oiling and penetrating oils should but seldom be used, except occasionally when a belt becomes very dry and hard. It may then be moistened a little and have neat's foot oil applied. For new belts a composition of tallow and oil, with a little resin or beeswax, should be used. Prepared castor oil dressing is good and may be applied with a brush or rag while the belt is running. Belt dressings of any kind must not be applied too liberally in the case of a new belt, otherwise it is apt to stretch, making it very liable to run out of line.

An ammoniacal cooler for preventing fire damp explosions is made. On introducing into shot holes ammoniacal or hydrated salts, not explosive of themselves, their volatilization under the influence of the detonation is capable of cooling down the gases sufficiently to avoid all ignition of fire damp, and, inasmuch as the salts produce disagreeable nitrous vapors, certain inoffensive substances, rich in carbon, for preventing the formation of nitrous vapors are added to the salts. In practice the powder or other explosive is inserted into the bottom of the shot hole, and then, by way of tamping, a quantity of ammoniacal cooler, equal to half the weight of powder employed, is added on top of the charge, although the result would be the same if the cooler were placed on the bottom of the hole and the powder on the top. Inasmuch as the salts which constitute the cooler are hygroscopical, they are compressed into the form of cylinders, which are covered with paper and carefully stuck, and coated with melted paraffine, for preserving the salts so long as the paraffined case remains intact.

Velocity is measured by the number of feet traversed in a second. Thus a cricket or base ball hit hard travels about 100 feet per second, which is about the rate at which a carrier pigeon flies. A golf ball may start at 150 feet per second, an arrow at 250 feet, a pistol bullet at 750 feet, a rifle bullet at 1500 to 2000 feet. But the energy of the blow delivered by a projectile when instantaneously stopped in its flight is proportional, not to the velocity, but to the velocity multiplied by itself or squared; so that if the velocity be doubled the energy is increased four fold. But the energy is directly derived from the propellant. So that to double the velocity of a bullet one must produce four times the energy, to obtain which the charge must be increased four fold. And one can not have energy forward without energy backward, or recoil. Take a pistol with .750 f. s. velocity, quadruple the charge, and give the new weapon four times the length of the barrel for the gases to expand in, one gets a rifle with twice the velocity obtained by the pistol, or 1500 f. s.; but one also increases the recoil to such an extent that if a rifle were held like a pistol it would fly back into the face of the firer.

A circular percussion table in operation at the Argent mine, Tasmania, consists of a cast-iron table 13 feet in diameter, convex in form, turned smooth on the surface, and vibrated by cams worked by a shaft underneath. The separation of the minerals from the gangue is by means of water currents supplied by a curved water pipe, revolved slowly over the surface of the table, receptacles at the outer rim of the table receiving the several grades of concentrates. The ore is fed onto the table with water and runs in a curved direction toward the outer edge of the table. On its way the stream is reduced in velocity and depth to about one-third, owing to the greater surface covered, causing a separation of the lighter and heavier particles; the former leave the table at once, while the latter are further separated by passing under the stream of water from the rotating curved water pipe, which, assisted by the vibrations of the table, with gradually increasing energy and velocity, separates the various materials according to their specific gravity and washes them into the rotating delivery receptacles, and thence into circular troughs which collect the different sorts. Daily capacity of this machine is twelve tons.

A Cigale, Utah, querist who asked some time ago, "Is magnetism a separate and distinct force from electricity?" impatiently asks, "How long does it take to get an answer through 'Concentrates,' and why don't you answer my question?" "Concentrates" humbly confesses inability in this case as in others to successfully answer the inquiry, hesitating to rush in where angels fear to tread. Magnetism is considered to be "a separate and distinct force from electricity." Among points of difference, magnetism, unlike heat, light or statical electricity, affords no phenomena immediately addressed to the senses. Those words "magnetism" and "electricity" are only words used to connect cause and effect, convenient expressions to conceal our ignorance. We give names to nature's forces, but can do no more. "Electricity" is not a thing, but a force; it is called static electricity when stored up as idle, though then energy ready for doing work; while doing work it is called dynamic electricity. The other invisible, intangible manifestation that we call "magnetism" is "separate and distinct" from electricity, yet creatable thereby. The magnetic effect produced by electrical induction is the seat and center of all our electrical industries, telegraph, telephone, power and light. Like heat, light and electricity, magnetism is susceptible of being called into action at any time when subject to the right tests. To explain these manifestations of energy is a gift not vouchsafed to any one. It may be that they are all one force appearing in different forms.

The Boise (Idaho) Basin Mining District.

Written for the MINING AND SCIENTIFIC PRESS
by ROBT. NYE, E. M.

Among the famous old-time mining districts which have recently entered upon a period of increased activity, few have had a more interesting past than Boise Basin. In the report of the U. S. Geological Survey this district is called Idaho Basin, but Boise Basin is the name by which it is known throughout Idaho and the West generally.

Boise Basin includes the headwaters of Moore creek and its tributaries, which empty into the Boise river about 18 miles above the city of Boise. It is about 30 miles northeast of Boise, the nearest railroad station and supply point. The gold-producing area of the basin does not exceed 150 square miles. Its length from north to south is 15 miles and its greatest width about 13 miles.

Few districts have produced more gold in proportion to its size. The best and most conservative estimates of the production from 1862 up to the present place it at $100,000,000. Unfortunately, no accurate records were kept during the first ten years, when the output was at the high water mark, and consequently the estimates made can never be positively proven. Of the total output, not over 5% came from the quartz mines and the balance from the placers.

Gold was first discovered near the present site of Pioneerville in August, 1862, and before the end of the year the rich gravels near Centerville, Idaho City, Placerville and Granite Creek had been found. The reports of these discoveries soon spread and the influx of miners was so rapid that in a few years the basin had a population reported to be in excess of 40,000. As is usual with placer mining camps, the greatest production was reached during the first ten years. After that period the output and population gradually decreased and reached its lowest ebb about 1896 and 1897. Since then, owing to the introduction of dredgers to work the low ground which could not be profitably worked by the old methods, and the interesting of outside capital in some of the quartz mines, a great improvement and increased activity along all lines have occurred.

Idaho City, the county seat of Boise county, is 36 miles northeast from Boise, over good mountain roads. Centerville, Placerville and Quartzburg are respectively 8, 12 and 16 miles west of Idaho City. Pioneerville is 5 miles north of Centerville. Idaho City and Placerville each have about 500 inhabitants, while the total population of the basin is probably 1600 to 1800. A daily stage from Boise reaches all the basin towns, carrying mail, express and passengers. Quartzburg, the end of the line, is reached in about thirteen hours' ride from Boise. All basin towns are also connected with Boise by telephone. Freight from Boise is hauled to all basin points for from 65 cents to $1 per 100 pounds, depending upon the time of year and the consequent condition of the roads.

The elevation at Centerville, the most centrally located of the basin towns, is about 4200 feet above sea level. The summits of the gently sloping hills which comprise most of the area of the basin are from 100 to 800 feet higher, while the higher peaks of the chains of mountains surrounding the basin, and forming the rim of it, are from 7000 to 8000 feet high. The hills and mountains are almost completely covered with a splendid growth of pine, fir and tamarack, insuring a bountiful supply of cheap fuel and lumber for many years to come. Over large areas there is very little underbrush, and the grassy, tree-covered hills present the appearance of an immense park without a keeper.

The climate is unsurpassed throughout the world. In summer the days are warm and the atmosphere clear, dry and bracing. The nights are always cool enough to make two or more pairs of blankets a comfortable covering. The winters are generally mild, with a very heavy snowfall, the snow often lying 4 to 6 feet deep upon the level. The almost entire absence of wind prevents the snow from drifting and roads are easily kept open. Snowslides are unheard of, even in the precipitous mountains of the basin's rim.

The geology of the basin is most interesting and far from simple. The country rock is a soft, micaceous gray granite, which decomposes rapidly upon exposure to air and water. It has been referred to the Archæan period, but some geologists find reasons for considering it of a later period. The lower valley of Moore creek and Grimes creek for several miles above its junction with Moore creek was filled with a basalt flow which was contemporaneous with the flows of the Boise and Snake rivers, and which occurred in Neocene times. The present streams have eroded their channels entirely through the basalt, which is left as perpendicular cliffs on each side, forming a good example of a canyon within a valley.

Occasional porphyry dikes occur throughout the basin, and a large porphyritic belt extends from a point about 1½ miles southwest of Quartzburg in a northeasterly course along the rim of the basin to Grimes Pass, a distance of about 8 miles. Beyond Grimes Pass it has not been traced, although it no doubt extends some distance farther.

The gravels of the streams and their low, flat banks were generally from 2 to 6 feet deep, and consisted principally of granite, porphyry and quartz cobbles and boulders and sand of the same material. Few of the boulders are over 8 inches in diameter, and not over 10% of them are over 4 inches in diameter. From 10 to 60 feet above these stream gravels are bars or benches of gravel of the same material and character. Sometimes several of these parallel benches occur one above the other. The stream gravels and bench gravels were almost without exception very rich. In places the stream gravels were worked, but as they were low and flat the bench gravels were easier and more profitable to work, and were attacked first, and the tailings from these bench deposits, which have been for the most part worked out, have covered large areas of the rich virgin stream gravels to a depth of 10 to 40 feet. In some cases the lower benches have been covered with the tailings or debris from the higher workings, as well as the original stream beds.

In places large deposits of auriferous gravel occur several hundred feet above the creek beds. These deposits, while like those lower down, no doubt indicate a former position of the streams, and are unmistakably much older and are ascribed to the Neocene period, while the stream gravels and lower benches are Pleistocene. The gravel of these deposits is all rounded and much water worn. Besides these former channels of the streams, many gulches have been found to be exceedingly rich, the gold of which was found in a few feet of sandy soil and angular gravel, which showed little signs of erosion. Such gulches invariably lead up to some quartz ledge, and most of the richest quartz mines of the basin were discovered in this way, as few of them outcrop.

The stream gravels rest upon the granite, generally, but on Moore creek for several miles below Idaho City, and for a short distance above, they rest upon a soft, sedimentary deposit of sand and clay, which the miners term false bedrock. This deposit, which contains little or no gold, was doubtless laid down upon the bottom of a large fresh water lake, as it bears no signs of having been deposited in flowing water. Smaller patches of these lake beds occur near Centerville and Placerville.

One of the most interesting occurrences is that of a heavy yellow sand that hangs back with the black sand and gold in the sluice boxes. This has been determined as monazite, and it is believed to be the only place this comparatively rare mineral has been found in the Western States. There is no doubt but that it is an original mineral in the granite of the basin.

Seldom have extensive placer deposits been more easily and certainly traced to their source than in this district. Quartz veins, mostly small but many of them very rich, occur throughout the basin. Two well-defined gold quartz belts, however, may be considered with some certainty as the principal source of the gold in the placers. The first and largest is closely identified with the porphyrite belt, which extends from near Quartzburg to Grimes Pass. The veins occur in the porphyrite or near its contact with the granite. In this belt lie the Ebenezer, Gold Hill, Iowa, Morning Star and other well-known mines. In the Gold Hill the pay ore was in places 40 feet wide. The other belt extends from Gambrinus and Illinois gulches, about 5 miles east of Idaho City, in a northwesterly course several miles to the Elkhorn mine on Elk creek. Every stream and gulch heading in or crossing either of these belts has been rich, and streams and gulches not crossing either of these belts have carried little gold, except in cases where an isolated gulch that was rich led up to a quartz ledge which did not belong to either belt.

The water supply for hydraulicking is limited and the season is consequently a short one, ranging from three to four months. A few mines have water for five or six months.

The old Plowman claim, near Idaho City, operated by the War Eagle M. Co., has the largest water supply, usually getting four to five months' run, with over 2000 inches of water. Their mine is the best equipped in the basin. They are using four giants against a bank which is now about 100 feet high. About two-thirds of the bank is gravel and one-third clay. The clay caves off in large boulders, which have to be blasted, many of them before they can be handled. This is the only placer mine in the district where blasting is necessary.

The only large tract of good gravel remaining near Centerville is owned and worked by Oaks & Smith and the Wong Sing Co. This ground, owing to the abundant water supply and the absence of clay and cement, can be worked at a less cost per yard than any ground in the basin.

The richest ground in the district, probably, is that owned by Leary & Reed, near Placerville. Considerable amounts of cement and a low head of water reduce the production here.

A Boston company, under the management of Mr. Kirkpatrick, is operating a good hydraulic plant on Fall creek, and the Pioneer Gold Gravel Co. has a large amount of ground near Pioneerville, which it leases in small tracts. Besides those mentioned, a large number of smaller workings add materially to the total output.

The large profits made by some of the gold dredgers in Montana and California caused a sudden demand for good dredging ground, and the broad, flat, debris-covered valleys of Moore, Grimes, Granite and Wolf creeks received early attention. In 1897 and 1898 large tracts of these creek bottoms were prospected and much of them found to be rich. The abundance of water for dredging purposes, the absence of clay, cement and large boulders and the soft, easily cleaned bedrock make it ideal dredging ground.

The Risdon Iron Works put in one of their dredgers on Moore creek for the Boston & Idaho Dredging Co., which has been operating seven to eight months a year since 1898, and proved very successful. The latter company last year built a dipper dredger of their own design, which is now working satisfactorily. The Boise Dredging Co., Bedrock Dredging Co. and Bullion Dredging Co., all under the same management, each have a dredger. Those of the first two named ran part of the season of 1899 and proved the value of their ground, but the dredgers have been idle this season and will be largely rebuilt before they run again. The boat of the Bullion Dredging Co., built after the same design as the other two, is not yet finished.

The natural conditions for dredging on all the creeks named are practically identical, and experience has proven that all ground yielding over 6 cents per cubic yard can be worked at a profit. There is probably enough ground along these creeks to keep six to ten dredgers busy for ten years each. The dredging season is seven to eight months a year.

While the discovery of rich, free milling surface ore in a number of quartz veins followed very shortly the discovery of placer gold, very little thorough, systematic development of the quartz mines has been done until very recently. In spite of this fact, however, a number of the basin quartz mines have good records of production. The Gold Hill and Pioneer claims, near Quartzburg, worked as one mine, produced $2,225,000 in a few years and the shaft is now down only 425 feet. It is claimed that there was good ore in the bottom level when litigation stopped operations. The Iowa, in the same neighborhood, produced over $200,000 before the War Eagle M. Co. took hold of it a few months ago. It is now being equipped with a modern 30-stamp amalgamation and concentration mill, and a chlorination mill to treat the concentrates. The Elkhorn mine, on Elk creek, produced over $500,000, but recent work upon it has proved unprofitable up to the present time. The Illinois and Gambrinus mines, about 5 miles northeast of Idaho City, are credited with a production of $225,000 and $263,000, respectively, but are not now being worked. Perhaps half a dozen other mines have produced from $25,000 to $100,000, while the number which have produced smaller amounts is large.

The veins occur in the granite and associated porphyry dikes, and their chief characteristics are generally similar. For the most part they are zones of sheeted granite or porphyry, filled with many small seams of quartz carrying free gold, pyrite, arsenopyrite and zincblende scattered through them. The walls for some distance from the veins are usually much altered. The rock of the veins and walls is usually soft and heavy and requires substantial timbering. The country rock is soft and, while drilling and breaking easily, usually stands well and crosscut drifts and tunnels seldom need timbering.

The surface ores are free milling, but below the permanent water level, usually found at a short distance from the surface, the values often lie principally in the sulphides and a high percentage of extraction cannot be obtained by simple amalgamation. The present freight and smelter charges at the nearest smelters amount to about $40 per ton, prohibiting the shipping of any but high-grade concentrates or ore. The almost entire absence of lead and copper in the ores, and the absence of suitable fluxes in the immediate vicinity, puts smelting out of the question. The most promising process seems to be that adopted by the War Eagle M. Co., previously mentioned, and their work is being watched with a great deal of interest by all mining men of the district.

While most of the few hydraulic mines now being operated will continue to be profitable for many years to come, no new discoveries of hydraulic mines can be looked for. All new development must come from the large areas of dredging ground and the quartz veins. While no rush or boom is expected or desired, work already planned and started insures a steady growth and improvement.

Little has been written about this district, but a large amount of valuable information about it can be found in the monograph of Prof. Waldemar Lindgren, entitled "The Mining Districts of the Idaho Basin and the Boise Ridge, Idaho," and published as a part of the Eighteenth Annual Report of the U. S. Geological Survey in 1898.

RUSSIA'S production of petroleum during 1899 was the greatest ever known and paid best. The revenue of the Russian Government from the excise duty on refined petroleum amounted to nearly $14,000,000 in 1899—an increase of $1,500,000 over 1898. Eight years ago crude oil was selling at Baku at 1½ to 2 cents per pood of thirty-six pounds. During 1899 the average price of crude oil was about 7 cents per pood, and during the last two or three months the raw material was bringing 9 to 10 cents per pood, with a corresponding rise in the price of other petroleum products.

Gas Engine Economy.

Although the gas engine has made rapid progress during the last decade, and the improvements that have been developed have increased both the efficiency of the engine and its steadiness of running, there yet remains a field for improvement that includes within its bounds great possibilities. The gas engine, as it stands to-day, is by no means the engine it is likely to be a dozen years hence. It has many faults. These are, indeed, counterbalanced by its many virtues, and for that reason the faults are overlooked in extolling its merits. There is nothing better than competition to spur inventions and improvements, and the rapidity with which the power-using public is taking up the gas engine augurs well for its future.

To begin with, the gas engine as built at present has a terminal pressure within the cylinder averaging about thirty-five pounds to the square inch. If products of combustion are allowed to leave the exhaust pipe at this pressure, the resultant noise is so great as to constitute an objectionable feature. Therefore, the exhaust is led through a series of tortuous passages in order to quiet it, with the result that the back pressure in the engine is increased, with a consequent loss of power in the engine. Although the compound engine and the variable-stroke engine have been tried and abandoned, the writer believes that there is ample opportunity for improvement in this respect. An increase in the expansion would give at least 10% increase in power for the same fuel consumption, when employing the compression pressures now in general use. There would also be absence of noise, as the terminal pressure could, in all likelihood, be brought to within four or five pounds of that of the atmosphere.

It is not realized by every gas engine manufacturer that the advantages of the multiple-cylinder engine are numerous. In the first place, an increase in the number of cylinders is conducive to steady running, as is generally admitted. The decrease in the necessary weight of the flywheel is not only of advantage in the saving of iron, but it also reduces the friction of the engine to a marked degree, and, consequently, increases the mechanical efficiency of the engine. In a multiple-cylinder engine there are opportunities for balancing which are lost sight of by the majority of designers, and much has been done in this line in a hit-and-miss sort of way. There is much literature on the subject of balancing, and very few writers agree as to proper methods. In fact, the gas engine builder quite frequently has derived an empirical formula of his own which gives results that are, in his estimation, good enough, but by no means perfect.

There is also a chance for improvement in the handling of the water that passes through the water jacket. In factory tests it has been found that the best results were obtainable when the temperature of the water of the water jacket was 150° Fahrenheit, this temperature varying in different engines. But the writer has yet to see a single gas-engine instruction sheet in which this fact is mentioned. In fact, no attention whatever is paid to the jacket water after the engine leaves the factory. Now, why should this be so? Is it because the gas engine is the motive power for the ignorant or the indolent? The writer admits that this matter does not assume great proportions in the engines of small dimensions; but the question arises: would it not pay to employ a temperature regulator on the engine that would control the temperature of the engine cylinder by means of the water supply? It would be absolutely useless to leave this regulation to the engineer unless the engine were operating under a comparatively constant load, for with a diminution of the load the water supply should be decreased, and vice versa.

The question of high compression is a matter that is a puzzle to the average gas-engine builder. The writer has quite frequently been asked for his opinion on this question, and usually with an inflection that showed plainly the questioner's aversion to increase of compression pressures. And why this aversion? The answer is not hard to give. The gas-engine builder who already has an established line of patterns and has tools, templets, etc., which are adapted to the particular designs which he has in hand, finds that to increase the compression means a necessary strengthening of his engine in almost every part. It is notorious that the average gas engine is seldom built too strong for its work, and an increase in compression is, perhaps, a harbinger of frequent breakdowns. There is, however, no reason that when a new design is contemplated it should not be so proportioned that it can withstand the increased pressure.

With increased compression comes the danger of premature ignitions, commonly known as "back-firing," and there is a limit to compression for each fuel employed which depends almost entirely upon the ignition temperature of that fuel. For this reason compression can not be carried to so high a temperature when gasoline is the fuel employed as when the fuel is natural or artificial gas. Gases rich in hydrogen—as those made by the water gas process—are also an obstacle to high compression. The compression of a charge of pure air and the subsequent introduction of the fuel at the end of the compression is a method that overcomes this difficulty, but is covered with patents, and can not be employed by the gas engine manufacturer without the payment of royalties. The subject is one that has been given considerable attention by a prominent firm of gas-engine builders, and the results obtained indicate that the subject is one worthy of consideration, and that an increase in compression carries with it an increased economy of fuel consumption.

A matter which appears to have but little attention from the gas-engine designer is the proportions of the inlet and exhaust passages. These are too frequently made much smaller than they should be, and often without apparent reason. In a series of engines recently examined by the writer, no regularity of proportion was apparent, as the ratios of the passages to the volumes of the cylinder and the piston speed were the same in only a few instances. The designer did not seem to realize that throttling the air as it entered the engine would reduce the volume of the charge, nor that an obstructed exhaust would increase the back pressure on the piston. In several cases the valve openings were ample, but the port leading from the valve box to the cylinder was contracted, although there was more than enough room to have it made larger. There is another class of designers who give both valve openings the same area, while the usual excuse for this is that if the exhaust valve is big enough the other is also; yet it seems to the writer that it is a confession of inability to decide what is the better size in either case. To make the valves big enough is all well and good, but there is a practical limit beyond which it is always foolish to go, as to make the valves or passages larger than necessary requires an unnecessary expenditure in the manufacture. Fortunately or unfortunately, the upper limit is not very often passed, and it is found in practice that the engine could be much improved by increasing the inlet and the outlet passages.

There is still another question that bears very strongly on the economy of the gas engine, and that is the question of load. All gas engines give their best performance at nearly full load. There are but few power requirements in which the engine would run at its full load for the major portion of the time it is in use. The engine is guaranteed to produce a horse power on so much fuel per hour, and it does very nicely when the load is that at which the engine is rated; but let the load fall off 50% or more, and note the enormous falling off in economy. But how avoid it? The problem is nicely met by dividing the load between several engines. Thus, if the maximum load is 50 H. P., install a 20 and a 30 H. P. engine. When the load is one-half of the total and not more than three-fifths, the larger engine may be employed. When the load drops below two-fifths of the whole, the smaller engine may be employed, and when the power requirement is too great for the larger engine both may be used together. Of course, this plan is not practical when the load is changing between wide limits in a short interval of time, but there are many cases where it may be applied. A plan which is better adapted to the latter case, and where the requirements for speed regulation are such as to permit its use, is to employ a multiple-cylinder engine and govern it by cutting out one cylinder at a time, instead of having the impulses stopped on all the cylinders at the same time. This plan is already in use, and it is understood to be a success.

In all gas engines, and in gasoline and oil engines especially, the combustion of the fuel is a point that may be well looked after. Imperfect mixtures, especially those which are too rich in fuel, often result in the discharge of unburned material into the exhaust passages. The best way to determine the state of the mixture in the gas engine cylinder while the engine is running is to place a small pet cock on the cylinder in such a position that it opens directly into the compression space. When this pet cock is open and a part of the mixture allowed to escape at the time of the explosion, the color of flame gives a good indication of the proportion of gas in the charge. If this proportion is about right, the flame will be a deep blue, similar to that at the base of a Bunsen flame, while should the proportion of gas be too great the point and the edges of the flame will be tinged with orange. And this, by the way, is a very simple method for determining the proper opening of the gas valve.

While the maximum economy of the engine is obtained when the engine is giving nearly all the power that can be obtained from it, the point of least fuel consumption lies somewhere just below the point of greatest power. The mixture which will develop the highest mean effective pressure does not of necessity waste the least gas. It is, therefore, well to determine the point of greatest economy, and to so proportion the engine that the load it is required to carry is as nearly as possible at this point.—E. W. Roberts, in The Gas Engine.

TALKING of miners' drilling contests, the Telluride, Colo., Journal says this thing of drilling straight down holes in every match is getting monotonous and is not the drawing card that it was a few years ago. Why not have uppers, roof and breast drilling? This is what will test a miner's skill. Not one hole in 1000 in mining is a down hole. Next year some scheme should be devised for raising the rock on a scaffold and letting the contestants go up into it from underneath. This test will bar not a few who tackle the down holes in the hope of getting a piece of the money, and will also give strangers an idea of what mining is like.

The Copper Deposits of Southwestern Nevada.*

Written for the MINING AND SCIENTIFIC PRESS by E. MCCORMICK.

The existence of deposits of copper-bearing mineral of some magnitude in southwestern Nevada has long been known to the mining world, but the first attempt at systematic exploration of any of these deposits is believed to be the series of mining operations now being conducted by the Vulcan Copper M. & S. Co., in Santa Fe mining district, Esmeralda county.

The Vulcan Co. own and are exploring three groups of claims, namely, John L., New York and Parrot. Their operations at the present time are concentrated upon the latter group, which comprises the following claims: Kearsarge, Parrot, Phœnix, Dewey, Bowler, Powell, Lena May, Nora K. and Schley.

This group of claims is situated 5 miles northeast of Luning, on the line of the Carson & Colorado R. R., the workings being located in the mouth of a canyon at an altitude of about 5000 feet above sea level and some 700 feet above the plain or flat below.

The geology of this section is similar to that of all the "basin region," the surface of which was formed by the drying up of former great lakes. The country rock is magnesian limestone, the mine being a contact between the limestone on the north and porphyry on the south. This eruptive rock has broken up through the limestone and can be traced on the surface for a considerable distance. One result of this disturbance has been extensive fissuring, and through the bedding planes ore solutions have circulated, replacing the limestone in part with bodies of sulphides, which afterward have become oxidized by the oxidizing and hydrating action of atmospheric waters. As a consequence we find the surface bearing zone consisting of siliceous and magnesian gangue, impregnated and coated with chrysocolla and malachite. Owing to the metamorphic action following the intrusion of the eruptive rocks, the magnesia of the limestone has been converted to the silicate and as such is found as a coating on the sides of the fissure. The surface croppings, from all indications, are simply the result of the solutions from the main fissure following the shortest course to the surface.

The property has from the first been carefully and systematically developed, the object being to ascertain the full extent of the ore body and put it in condition to be a steady producer. There are a number of surface inclines, shafts and excavations on the property, from which good ore has been taken and now lies on the dump ready for shipment, as illustrated herewith.

A double compartment shaft has been sunk to the 300-foot level, and levels extended from same at the 100 and 200-foot points, cutting a shoot of ore 40 feet wide that averages 5.22% copper, 3 ozs. silver and 1 oz. gold. At present the hoisting is effected by a gasoline engine of the two-cylinder type, built by the Union Gas Engine Co. of San Francisco, about 200 tons being hoisted daily.

For fuel supply for steam and smelting, the company has secured the coal deposits at Columbus, distance 40 miles from the mine, and are now exploring same both with a view to their own consumption and introduction into adjacent markets. With the blowing in of the smelter and the successful issue of the Vulcan Co.'s enterprises, this hitherto neglected section of Nevada should take on a more prosperous appearance.

* See illustrations, front page.

Ventilation of Mines.

W. E. Mead of Ward, Colo., tells the Miner that it is simply a matter of timbering to have good air in the breast of any tunnel or in the bottom of any shaft, as well as through every drift and stope in any mine. It will cost a little more, but not nearly as much as will be gained by the extra work obtained from men working in good clean air instead of air charged with powder fumes. Motion in air is caused by difference in pressure, and this can be obtained by heat or by some artificial means. Box up the skip or cage way and the travel of the skip or cage will clear the bottom of the shaft, acting like the sucker in a pump. If one has a tunnel of any considerable length, make it double track and partition between the tracks; run the cars up one side and down the other, and have clear air at the breast. If a fan is used, have a suction fan; it will draw out the gases. A blower only mixes these gases up; it does not remove them. If the air hangs dead in the bottom of the shaft, hang a fire pot in the air shaft and the trouble is instantly removed. The difference in work obtained from working in clear air over air that is foul is frequently 50%, while it is merely a matter of lumber partitions and bulkhead to ventilate every part of a mine.

Power Generation.*

There is no question of greater importance at the present moment to those engaged in the management of our manufacturing industries than that of power generation. The supremacy which the steam engine has long enjoyed is now assailed from two sides. The water turbine and the gas engine have become dangerous rivals.

During the past ten years a most remarkable development of hydraulic power has been taking place on the continent of Europe in France and Germany, and in America at Niagara.

The aggregate amount of power at the present date generated from falling water forms no inconsiderable portion of the total power utilized in manufacturing industries; and two years ago it was estimated by the author to be between 236,000 and 350,000 H. P.

On the other hand, gas engineers have been busily engaged in working out the problems presented by large gas engines and by the utilization of the waste gases of blast furnaces.

Gas engines up to 650 H. P. have been built, and have worked smoothly and economically; while at Seraing in Belgium and at other places the blast furnace gases have been utilized for driving the engines which supply the blast.

The question, therefore, which the engineer now has to settle when deciding upon the site and locality for a new factory, or when deciding upon the system of power generation to adopt for extensions of the old, is no longer so simple as when only one method of power generation in large units was open to him.

It is no doubt true that the choice between the three possible sources of power is one which in many cases will be settled purely by local considerations; and the proximity of a large waterfall or of an extensive coal field to the factory will be held to point to the turbine or to the steam engine as the most economical power generator. In a great number of cases, however, especially when the decision of the engineer covers the choice of a site for the factory, the problem is capable of no such easy solution; and the most economical source of power can only be determined after an exhaustive study of comparative costs data.

The aim of the writer in the present paper has been to collect and arrange in comparable form some of the more important figures bearing on the cost of power generation.

(Tables I to VI in original article contain details of sixty-five actual or estimated costs of steam, water or gas power per H. P. year of 8760 hours.)

Taking the best figures of each of the three sources of power dealt with above, and bringing them all to a common basis of comparison, namely, the cost of the E. H. P. year of 8760 hours, the author obtained the figures given in the following table:

TABLE VII.—COMPARATIVE COSTS OF ELECTRICAL POWER.

Source of power.	Lowest cost per E. H. P. year of 8760 hours.			
	Estimated	Locality.	Actual	Locality.
	£ s. d.		£ s. d.	
Water....	1 5 5	Canada.	1 19 0	Switzerland.
Steam....	4 18 8	North England.	4 9 7	United States.
Gas (producer)..	5 0 0	England.	......	....
Gas (blast furnace)	4 1 7	Germany.	......	....

The figures in the table support the opinion, now generally held, that water when developed without excessive capital expenditure is the cheapest source of mechanical or electrical energy. When, however, the hydraulic engineering expenditure has been heavy, or when the power after generation has required to be transmitted over long distances, the margin between the relative costs of water and steam power is greatly narrowed, and in some cases disappears.

Electrical energy generated by falling water is costing more at Rheinfelden, at Zurich, and at Buffalo than it would cost in South Lancashire if generated by steam power in large units, and the margin between the actual charge for power at Niagara and the estimated cost of steam power in large generating stations in South Lancashire is only 12s 1d E. H. P. year.

In this connection it is interesting to note that the charge for electric power in Buffalo is 13s 6d per E. H. P. year higher than at Niagara; and the excessive charge to small consumers in the same city (£25 11s per E. H. P. year) would seem to indicate that the cost of transmission between Niagara and Buffalo represents at least 20s per E. H. P. year on the power sent into that city.

Turning now to a consideration of the relative position of gas power, the question of the practicability of large engines may be taken as settled. If they do not cost excessive sums for maintenance and repairs, large gas engines, in conjunction with coke ovens and blast furnaces, may entirely alter the present position of affairs; and the new industries which at present are being established in the neighborhood of water power stations may find themselves in severe competition with similar manufactures carried on in the coal and iron districts of the older manufacturing countries.

It has been calculated that 2,000,000 H. P. is annually wasted in the gases issuing from the blast furnaces of the United Kingdom. If these waste gases could be industrially utilized in the manner suggested we should to a large extent be compensated for our lack of natural water power.

But blast furnaces demand coke, and coal beds are exhaustible, so that even if this source of mechanical and electrical energy be tapped it can only postpone, but not avert, the final triumph of the waterfall and of the turbine.

Use Made of Some Metals.

With lead by far the greater portion is converted into white lead, red lead and orange material, which are used as pigments of paints, distributed over great surfaces in such thin coatings that their metallic contents is practically never recovered. A good deal of lead is manufactured into sheet, and a considerable proportion into bullets, shot and other projectiles; and, though still remaining in a metallic form, it is so widely distributed in use as to cause it to be irrecoverable in the form of scrap. A portion of the lead product used as sheet lead and pipe does come back into the market, but the portion of lead used in these ways is comparatively small as compared with the other uses of the metal.

The consumption of zinc is largely in galvanizing steel or iron sheets, in the manufacture of brass, as sheet zinc, and as the oxide of zinc used as a pigment in paint. That portion of the metal which is used in galvanizing is distributed as a thin covering over a large surface of iron, and the metal is entirely lost in the oxidizing and general disintegration of the zinc sheet. It has never been attempted to recover the zinc from galvanized iron. Zinc which is manufactured into brass, in the proportion of one-third zinc to two-thirds copper, remains in a permanent form, which is often available for new use as scrap brass, and, next to iron and steel, is the largest commodity in the scrap metal market.

The major portion of the tin product of the world is used in covering tin plates. Ordinary tin plates carry 1½% to 3½% of tin. Many attempts have been made to recover this tin from old tin scrap, but no considerable amount of metal has thus returned to the markets of the world as recovered from tin scrap up to the present time.

Of the common metals next to iron and steel, copper is the one which is used to the largest extent in the metallic form, only a small proportion of the production being utilized in the salts of copper, blue vitriol (the salt of copper used in galvanic batteries) being the principal salt of the metal sold in the market. The great uses of copper are in the manufacture of brass, of which it forms a two-thirds component part ordinarily, and in electrical conductors and in the form of sheet used in roofing, the bottoms of cooking and other utensils, in the manufacture of pipes to be used where a considerable amount of elasticity and pliability are required. The proportion of scrap copper for sale in the market is greater than that of any other metals, with the exception of iron and steel; but the total amount of old copper offered for sale is comparatively insignificant compared with the total copper production.

Demand for Mining Machinery

Dealers in mining machinery report that the outlook for a first-class fall trade was never before so good. Within the coming month mining men who have been busy all summer with development work will begin to arrive in this city with their plans for future improvement. Mining is necessarily a progressive industry. No practical miner would put a $30,000 first-motion hoist over a 10-foot prospect hole, and, on the other hand, no one who has a fair idea of economic principles will continue to hoist ore from a depth of 250 feet with a windlass or whim. The result is that the almost constant purchase of machinery is necessary. The machine that was ahead of the requirements last year may be behind to-day. These purchases are generally made in the fall and winter, after the summer's work has shown what is necessary, and there is no more certain indication of a prosperous and successful season than a brisk trade in mining machinery. Conditions are more favorable to buyers than they were a year ago. Then every factory in the United States was crowded to its utmost capacity and the miner who succeeded in getting his order filled within four months was fortunate. This condition has been greatly improved during the last year. Nearly every prominent manufactory of mining machinery in the country has had its capacity increased. The remarkable increase in the demand for mining machinery during the past three or four years has induced most of the leading firms to create special mining departments, and one firm has found it necessary not only to build a new factory in this country, but to establish a branch factory in Canada for the special purpose of supplying Canadian miners without straining the capacity of the main establishment. All of these improvements in the manufacturing situation have materially relieved the pressure so that miners who place their orders now have a reasonable assurance of prompt service, and very many who have been holding off and getting along as well as they could with their old machines are now putting in their orders.—Denver, Colo., Republican.

A Large Enterprise.

At Sault Sainte Marie, Ontario, F. H. Clergue and associates have an extensive project. A few years ago, at the lower end of Lake Superior, they cut a canal that furnished 10,000 H. P. for electrical energy, but when they wanted to sell the power they found no takers. To save the original investment they were forced to change their policy, utilize it themselves, and find a means for development. The first enterprise was a spruce pulp mill, now making a product that sells for $900,000 a year, and fixes the price for paper pulp.

Mechanical pulp is worth $30 a ton, sulphite pulp, wood treated chemically, is worth more; the company decided to make this also, and the largest sulphite mill in the world is nearing completion, for sulphite pulp sulphur is necessary. The Sudbury works of the Canadian Copper Co. are expected to furnish considerable sulphur as a by-product. Sudbury is 100 miles from the Sault, and produces a good deal of nickel. The nickel ore mined there is nickeliferous pyrrhotite, containing nickel, sulphur and iron. At the matte furnaces of the Canadian Copper Co. they are saving nickel, but the sulphur and iron are not utilized. Mr. Clergue thinks he can make a commercial product from roasting pyrrhotite. His company have bought a nickel mine near Sudbury for the sulphur, and are building the Manitoulin & North Shore Railway to and through the nickel belt and on to Georgian bay.

With the extraction of sulphur from the pyrrhotite, there is left a ferro-nickel ore, with possibilities for the manufacture of nickel-steel. The company proposes the utilization of this ore, and claims to be able to accomplish reduction on an economical scale of ores of iron into steel by electricity. Furnaces are devised that to the extent of a five-ton unit have smelted this soft, high nickel ore into nickel-steel, sufficient iron ore being added to the mixture to make a hard steel. The nickel percentage of their ferro-nickel was so great that the resulting steel was very soft, it being a peculiar feature of nickel that a percentage of about five or six makes the alloy soft, while a percentage of three or thereabouts makes an armor plate. The company has a machine shop and the hard cutting tools used there are made of its own nickel-steel smelted in its own furnaces by electricity. The plans for the ferro-nickel works propose 100 furnaces of five tons daily capacity each.

To the company the Dominion and Ontario governments have given grants of money and lands. The lands include 1,650,000 acres for a road running from the Sault to Missinable on the Canadian Pacific Railroad, 150 miles northerly. The Dominion has given cash subsidies for an extension of the road to Hudson bay in five years an additional grant of $500,000 and 1,250,000 acres have been offered. The lands of these grants are not to be selected in one bunch, but within a reasonable distance of the lines of the road, in small blocks. To avail itself of this privilege the company has timber cruisers, mineralogists and geologists traversing that region, each party of two men accompanied by Indian guides and canoemen, selecting timber lands, running out geological formations, verifying and correcting old surveys; the grants will be selected under their reports.

Clarke & Co. of Toronto formulate an extensive program, the details of which remain to be confirmed.

IF two clocks on the same shelf have their pendulums adjusted to swing in exact unison, and one of them is set to running, in the course of time the other will start up in sympathy. Each sound impulse caused by the vibration of the pendulum of the clock that is running is communicated to the other pendulum. Each successive impulse adds to the swing of the sympathetic pendulum, which began in an exceedingly small way at the very first stroke of the other pendulum, and this goes on till the sympathetic pendulum is making its full stroke. So with sympathetic tuning forks. Each air wave that is sent out by the initial fork strikes the other fork and causes at first a slight vibration, which accumulates, because each successive air wave strikes the sympathetic fork just at the end of its swing and works in harmony with the natural tendency of the fork to vibrate. The result is a co-operation. Each helps the other. How much better it would be for the world if men could pattern after this law of physics.

A NEW YORK PAPER says that in that city, located on one of the narrow side streets down town, is a factory in which are made every year more than $100,000 worth of divining rods for use in finding hidden treasures. From this factory alone are turned out and sold each year almost 5000 fake rods, which means that in the rural districts within 200 or 300 miles of the metropolis are found every twelve months that many gullible and ignorant people. These rods are sold at from $15 to $35.

---

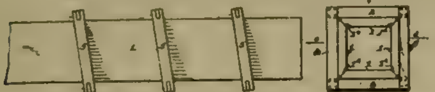
* J. B. C. Kershaw; condensed.

Mining and Metallurgical Patents.

Patents Issued September 25, 1900.

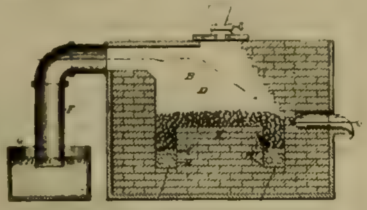
Specially Reported for the Mining and Scientific Press.

Knockdown Flume.—No. 658,332; A. L. Adams, Bridgeport, Conn.



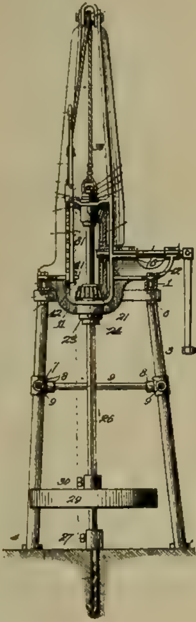
Knockdown flume having three or more sides provided with beveled meeting faces, combined with binder adapted to envelop all sides, means whereby force is applied to one or more sides to produce resultant force at an angle to initial force so as to crowd remaining sides of flume hard against binder and thus firmly lock the whole structure together.

Method of Treating Ores.—No. 658,412; G. M. Westman, New York.



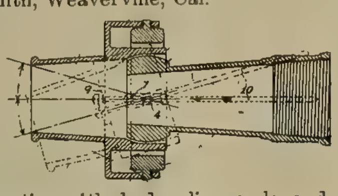
Process of treating arsenical ores which consists in melting the ores by passage of electric currents therethrough, thereby vaporizing arsenic, cooling portions of electrodes maintaining portions of electrodes intervening between ore and cooled portions in melted condition and collecting precious metals in such melted portions.

Drilling Machine.—No. 658,447; A. E. & C. A. Jordan, Buel, Kans.



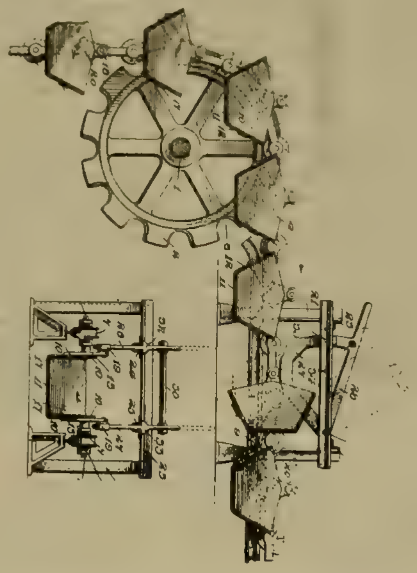
Drilling machine, comprising frame or stand, consisting of bars bent to form parallel horizontal portions and depending or leg portions, also bent to form runners at lower ends of certain legs, rounds or braces connecting legs, cross-bars connecting horizontal bars at under side and junction with depending portions, casting mounted upon horizontal bars, sleeve and small wheel journaled in casting one above other, rod extending slidingly through wheel and sleeve adapted to rotate with same, lever suitably mounted, cable suitably guided and connected at one end to lever having swivel connection at opposite end with rod, means to hold lever at desired point of adjustment, drill-bit secured to lower end of rod, shaft geared to wheel, and means to rotate shaft.

Deflector for Hydraulic Nozzles.—No. 658,516; J. W. Smith, Weaverville, Cal.



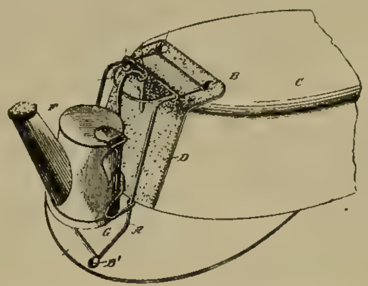
Combination with hydraulic nozzle and discharge pipe of spherical segment fixed to outer end of pipe, supplemental tubular pipe having rear end enlarged and loosely turnable over spherical segment, having open slots at opposite sides, ring of larger diameter, pivot pins connecting rings with interior spherical segment, passing through slots in supplemental pipe, lugs connected with supplemental pipe extending outwardly, thence rearwardly substantially parallel with sides of rear portion of supplemental pipe, pivot pins by which lugs are connected with exterior ring at right angles with its connection to spherical segment, lever whereby supplemental pipe is turnable about either of its pivots with relation to main nozzle.

Pumping Mechanism for Conveyors.—No. 658,656; A. L. Le Grand, West Pittston, Pa.



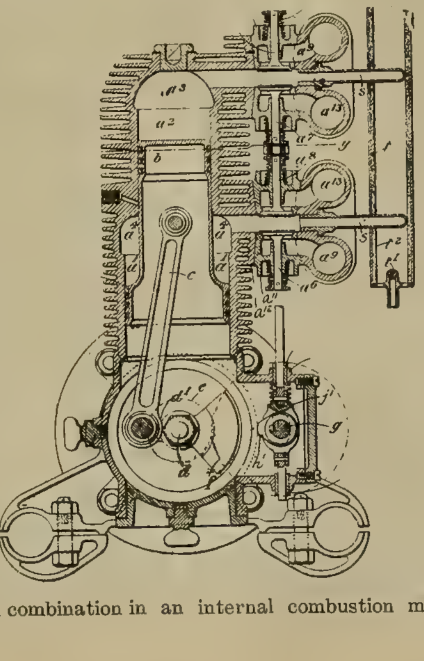
Combination with conveyor comprising pair of chains, gravity buckets located between chains and provided with terminal pintles constituting link-connecting devices for chains, rollers mounted upon each pintle, trip arms extending upwardly from pintles, having terminal anti-friction rollers, dumping station comprising supporting frame and guide bars, pivoted trip comprising pair of depending trip bars guided by guide bars of station arranged to obstruct path of movement of trip rollers, and locking means for retaining trip in operative or inoperative position.

Support for Miners' Lamps.—No. 658,642; C. J. Heckel, Pittsburg, Pa.



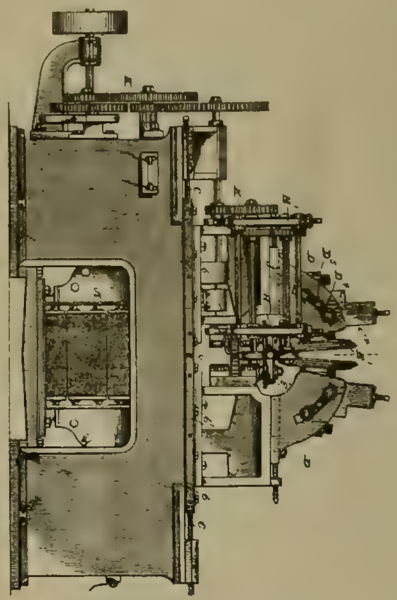
Support for miners' lamps, consisting of wire frame having upper and lower portions bent at an angle projecting in opposite directions, provided in upper portion with eye to receive hook of lamp, segmental guard projecting horizontally forward between members of frame and in front of eye, semicircular socket secured to lower portion of frame and in which lamp body rests.

Internal Combustion Motor.—No. 658,595; W. E. Simpson, London, England.



In combination in an internal combustion motor, cylinder of varying bore, trunk piston to form with cylinder working chambers, connecting rod and valve mechanism with means for controlling same to supply chambers alternately with fuel or to cut off either chamber from its fuel supply and to admit a non-explosive charge to chamber thus cut off, which charge is then compressed to maintain thrust on connecting rod.

Electric Welding Machine.—No. 658,741; O. Parpart, Cleveland, O.



Tube-welding machine, combination of two electric current conducting devices having clear space between each other, respectively connected with opposite electric poles, adapted to have contact respectively with opposite edge portions of butt joint of tube, and two rolls located respectively on opposite sides of conducting devices, adapted to compress tube between them, together with joint guide located in plane passing through clear space between conducting devices and adapted by engagement with joint edges to cause each of such edge portions to have contact with only its appropriate conducting device.

Composition for Converting Iron into Steel.—No. 658,438; E. Hardmeyer, Kokomo, Ind.

Composition of matter for converting iron into steel consisting of albumen 100 pounds, and Epsom salts 15 pounds.

The First Gold Dredging Company in California.

Sacramento City, November 1st, 1850.

No. 70......

This is to Certify that....A. B. Paul....is the owner of one unassessable Share in the Yuba River Gold Dredging Company, subject to the Rules and Regulations in the Constitution. Wait Barton, President.

Almarin B. Paul, Secretary.

Job H. Watson,
William Lowell, Trustees.
Joseph Tryon,

This company, composed of the five names above, put up $25,000, purchased the Linda dredging outfit, brought out from Boston, and went to work on the Yuba river at Oulsley's bar. Joseph Tryon was superintendent. The company worked about six weeks on the bar, but the large rocks encountered made the operation impracticable. Mr. Paul says the company had 100 shares in it, each one of the five owners having twenty shares. Each held and lost all he put in, although before getting to work they were offered $100,000 for all the stock, and refused it.

Russia supplies 94% of all the platinum manufactured, and the Ural platinum industry may be said to monopolize this metal commercially. Up till quite recently this industry was completely dependent upon some few foreign firms, with offices in London or Hamburg and agencies in Russia. There are no installations for handling the metal in Russia, and all the crude platinum has consequently to be transferred to the firms referred to. The export of crude platinum is, however, likely to soon cease altogether, inasmuch as the syndicate of foreign capitalists which has secured the platinum working establishments of the Ural has erected two refineries at Jekaterinenburg. The difference in value between crude and refined platinum is about 100%—9000 to 10,000 roubles per pood, and 15,000 to 20,000 roubles. The syndicate has also secured the crude platinum held by Count P. P. Schuwalow and M. P. P. Demidow, so that the syndicate will handle about 300 poods of crude platinum annually. About 75% of the whole production goes to America, with which country the syndicate intends to enter into direct relations. It is expected that the business will prove a remunerative one.—American Manufacturer.

Gold Sands of the Snake River, Idaho.

In a paper on the "Hydraulic Pumping Plant on the Snake River, Idaho, for Power, Irrigation and the Treatment of Gold Sands," by John Birkinbine, at the Washington meeting of the American Institute of Mining Engineers, he notes the existence of free gold in large quantity, but generally finely comminuted (much of it being float gold), and that the Snake river is actively exploited by dredgers and ground-sluicing. The most desirable deposits of auriferous sands are either above the river level, and unworkable, except by hand labor or by water artificially elevated, or are in bars in the bed of the stream, from which the sand and the water for washing it must be raised by mechanical power. Close to American Falls the territory adjoining the shores is worked at a number of places, the material being handled by scrapers drawn by horses and treated in crude ground sluices with satisfactory results. The present operations are confined to bars, or to localities where the stripping is slight, because the material must be handled by animal labor or by steam dredgers, which latter must pay from $4 to $6 per ton of coal, delivered at the dredgers, of which nearly sixty dredgers are reported at work on the Snake river. Electric power developed at the American Falls may possibly be conveyed to operate dredgers at other points on the river, at rates which, while profitable to the generating company, will permit a reduction in the cost of operating the dredgers. With water delivered to the top of the banks, and used through pipes and nozzles, this territory yields more gold at smaller cost per ounce.

Mr. Birkinbine calculates that three sluice-heads of water, supplied by the 750 cubic feet per minute furnished by the present plant, should each wash at least 500 cubic yards per day when in operation—i. e., move 1500 cubic yards per twenty-four hours; 26 cubic feet of water would, therefore, be required per cubic foot of material washed. But even if a more liberal supply of water must be pumped, this would permit the moving of the material to sluices at a cost below that required for dredging, and much below that which prevails at the active ground-sluicing operations.

The project is to use the irrigation ditches for conveying water to the gold diggings; but it may be found advantageous to attack some of the auriferous sands with water which need not be elevated as high as for the ditches, and greater service can thus be secured from a given river volume, applied as power to pump the water for washing. If, however, gold washing is carried on as an adjunct to an irrigation system as planned, there is opportunity for special saving in each department.

All of the gold in the Snake River district is finely comminuted, and the magnetic iron sand associated with it is also quite finely divided. It may be found practicable to withdraw the iron sands by magnetic separators, leaving a smaller volume to be subjected to amalgamation.

Man, Muscle and Coal.

The fact that the new steamer Deutschland develops power at the rate of 1 H. P. hour for each one and one-half pounds of coal consumed has been said to be the greatest development of marine boilers and engines. Static power producers have done even better than this. At the Edison power plant power has been developed at the rate of 1 H. P. hour for each pound of coal consumed. A few equations from this starting point would lead to:

One pound coal equals 1 H. P. hour.

Two thousand pounds coal equals 2000 H. P. hours.

Two thousand pounds coal equals 200 H. P. days of ten hours each.

One H. P. hour equals 14 M. P. hours.

Two thousand pounds of coal equals 2800 M. P. days of ten hours each.

Two thousand pounds coal equals 9 M. P. years of 311 days each.

Value of 2000 pounds coal, excluding transportation, $1 to $10, according to locality.

Annual production of coal in the United States, 240,000,000 net tons.

Potentiality in man power years of 240,000,000 tons of coal, 2,160,000,000 years.

Estimated number of male producers in the United States, 20,000,000.

Ratio between 20,000,000 male workers and the potentiality of 240,000,000 tons of coal, 1 to 108.

That is to say, 20,000,000 workers, without the aid of coal, would have to labor 108 years to develop a force equal to the potential energy of the present annual production of coal in the United States.

Transition to Electric Power.

With electrical distribution of water power only a small space is necessary for the few large wheels and dynamos that absorb the entire energy of the water. Millsites, instead of being confined to a little land along the banks of a river or canal, at once expand to include the territory within 5, 10 or a greater number of miles of the generating plant. This expansion of service area affects the number and the character of power users. The number of industries is limited only by the water available, and the capacity of each may be either great or small. Since millsites have come to include all the land within a long radius that is not required for other purposes, the opportunity to buy cheap power has only a slight influence on rents. Almost the entire saving in the cost of power is thus free to be divided between the water company and its patrons.

A distinct feature of electrically distributed water power is the advantages it offers to manufacturers of small and medium capacity. The consumer of 100 H. P. will probably have to pay somewhat more per unit than the consumer of 1000 H. P.; but the difference in rates will represent only a small fraction of that in cost which would result were a separate water-wheel installed for each case.

It is interesting to note that the results with electrically distributed water power are different from what some have expected. Electric energy, it was claimed, for example, would go great distances to the factories. As a fact, however, the factories have gone great distances to the electric power. Location and other advantages being equal, it is found more economical to move an industry once than to move a large amount of energy to it over a great distance daily. Increase of transmission voltages may reduce, but it can not eliminate the costs and losses of electric conductors. For very long transmissions the fixed capital in conductors, pole lines and the extra machinery necessary for the several transformations bears interest, per delivered unit of energy, that might well cover the entire charge for such unit near the generating plant. In the future, as at present, long-distance transmission of electric power must be the exception for special cases and transition, to within a few miles at most of cheap sources of energy, the rule for the great majority of industries served.—A. D. Adams in Cassier's Magazine for October.

Ore Thefts in Colorado.

Much of the high-grade ore that is stolen from the rich mines of Cripple Creek is marketed, it is asserted, in this city, says the Denver, Colo., Post. The managers of the mines that have suffered the most, according to a heavy stockholder in one of the companies affected, have evidence that certain ore buyers are getting rich from the stolen stuff, obtaining it at half and sometimes less than half its value.

The mining managers estimate that about 25% of the employes of the mines in Cripple Creek are engaged in systematically pilfering high-grade ore. They use many methods in getting the rich specimens out of the mines undetected. The scheme of compelling the men to change their garments before going down the shaft to work is regarded as the only solution of the problem, and, though it may inflict indignities on the honest miners, the managers think they will submit rather than draw suspicion upon themselves by refusing.

Men interested in the companies that have decided to compel men to not only submit to being searched, but to change their clothes after coming from the underground workings, say they do not know of any other remedy than the action taken by the companies.

They say: "The miners will no doubt protest, but think the fair-minded and honest ones will see the justice of the proceedings. You say that the men will object to being compelled to have two sets of clothing at the mines? Well, we believe an amicable agreement can be reached on that subject without difficulty. The mines should and, we believe, will be ready to furnish the miners with their working clothes. Few people have any idea of the extent of the theft of ore. The Elkton Company estimates that enough ore is stolen annually to rob us of one dividend —$75,000.

"Five of the Elkton employes were arrested recently for stealing ore. Twenty odd others who were known to be implicated in the thefts escaped. On the person of each miner arrested was found, on an average, $40 worth of ore. One of the men arrested has been a trusted employe of the Elkton for years, and his arrest was a great surprise to the management of the mine.

"Now, the question that arises is: whether the stockholders or the miners, who are paid their wages, are entitled to the profits of the mines?

"In this office a miner recently told us that he had seen a letter from a Cripple Creek miner, who was a foreman and had forty or fifty men under him, to a Denver assayer, asking him if he could handle, so that no questions would be asked, ore in car lots. The letter, our informant told us, offered the Denver man 50% of the value of the shipment for doing what he was asked."

That ore has and is being stolen in large quantities is admitted by the miners, who say that a few men working together have been heretofore able to make profits by their thefts. The taking of rich and small specimens from the mines is easily accomplished. The miner takes it in his dinner pail, the band of his hat, his shoes; but the most favored method has been by the use of belts, concealed under the shirt. These belts hold about ten pounds of ore, and only ore valued at $1 per pound or more is taken.

The wholesale stealing is also done in various ways. The ore sorters throw pieces of the richest stuff far out on the dumps and pick it up at night; but the favorite method is by putting large chunks of rich ore in the buckets that bring up the waste and barren rock. The buckets that contain valuable ore with the refuse are marked, and the men on top, seeing the mark, dump the bucket where the valuable rock may be easily picked up at night.

The greatest difficulty the ore stealers have to contend with is in disposing of the ore they have acquired. In some instances it is sold with the understanding that it is stolen; but the favorite scheme is to carry the ore to some friend who is operating a lease and have him send it out with his shipment. Of course, if there is no other way out of it the leaser pays to the owners of the property which he is operating a royalty on the stolen stuff and in this way covers up the tracks of his friend.

On the Use of Compressed Air.

The following is an abridgment of a paper on "The Practical and Economical Points in Using Compressed Air in Connection with Pneumatic Tools," read by J. L. Pilling of Chicago before the Franklin Institute:

It has been my privilege in connection with my avocation to visit about all the establishments where compressed air is used in the United States, and, without contradiction, I will say that, with few exceptions, I have not seen a properly constructed air plant in my travels.

The theoretical points of air compression have been understood from time immemorial, but the most essential, practical and economical points which are in demand to-day have not been touched upon, so far as I have been able to ascertain, which fact is proved by the observation cited in the first paragraph.

Compressed air will go as much below its normal temperature in expansion as it goes above it in compression; therefore, the larger the exhaust port and shorter the exhaust passage, the less liability of icing up the tool.

AIR COMPRESSORS.—Air compressors are as near perfect as we may expect to see them for years to come. The trouble lies not in compressor, but the manner in which the compressor is connected to the receiver, and taken therefrom. A receiver is not for an accumulation, as many think; only at the third stage. First, it is for condensing surface; second, to take care of the pulsation of the compressor; third, for an accumulation.

AN UPRIGHT RECEIVER.—By all means connect discharge pipe from compressor near the top of the receiver; take the outlet to the main line, about one foot from the bottom of the receiver. Have the receiver so placed that the outside atmosphere can circulate around it. Have a blow-off cock with a very short connection at the bottom. If conditions are such that a horizontal receiver must be used, connect discharge from compressor on top of receiver at one end; connect outlet to main line at the other extreme, but as low as possible, as long as it is above the fore and aft line of the receiver.

Why? On a clear day there are eight grains of water to a cubic foot of air, and foreign matter in suspension. Through the compression heat is generated. Heat will always rise. As long as air is above its normal condition in temperature the moisture and ingredients are in suspension. Moist air is a friction; moist steam is a lubricant. It will, therefore, be readily understood what a receiver is for, and why it should be connected up as I have already stated.

If, under these conditions, the air is still warm as it leaves the receiver, then the receiver is not large enough, or the compressor is too small, or both. (It is often well to place another receiver adjacent to where the most air is needed.) This argument will hold good even if an intercooler is used, as on a compound compressor. Precipitate the moisture in your receiver; that is what it is for. By so doing, you will have no trouble with your main line freezing, and you will obtain better results from your pneumatic tools, which are as finely constructed as any piece of mechanism on earth. Treat them as such; give them good, dry air; increase their efficiency by so doing, and lessen their repair bill.

Diamond Drill Work.

The British Columbia Minister of Mines proposes the exploration of the metalliferous country of the Kootenays by a government diamond drill. The cost of a plant to bore 1200 feet would be about $5000; the cost of working should be under $4 per foot. According to statistics from various parts of the United States, the cost of boring twelve holes from 200 to 800 feet in length each, totaling 5957 feet, is $14,839.62, or $2.49 per foot. This included labor, superintendence, bits, repairs, water, extras, freight, traveling and carbons. In northern Michigan, two holes totaling 634 feet, two 360, six 1350, two 611, six 1091, or eighteen holes totaling 5048 feet, cost $2.60 per foot in very hard ground. In Colorado 567 feet were bored at 44 cents per foot. The cost depends a good deal on the length of standpipe used. The smaller drills suggested would be worked either by hand or horse power.

New Developments in Jigging.

Some notice is being made of the concentrating works at Great Falls, Mont., where a new departure has been made from the old system of jigging. R. H. Richards, in his Cycle of the Plunger Jig, enumerated and discussed the law of free settling particles; the law of hindered settling particles; the law of acceleration, and the law of suction. According to Rittinger, the law of free settling particles (which he calls the law of equal settling particles), and the law of acceleration, are those which determine the separation of ore from its gangue. The Canadian Mining Review instances that, in accordance with this view, the best results should be obtained when the ore was sized, and, consequently, the mills of Germany and other European countries introduced a system of close sizing before jigging, which has been largely copied in America, but which gave rise to a great deal of criticism, and was finally abandoned by the most progressive mill men on this side of the Atlantic. An experimental investigation by Munroe of Columbia University, New York, established a third law of hindered settling particles, by showing that particles of ore falling en masse, as actually happens in the bed of material on the jig screen, are impeded in settling by falling through interstitial spaces, which is equivalent to their falling through narrow vertical channels of circular cross-section. As the interference increases with the size of the ore particle relatively to the diameter of the interstitial space through which it falls, it is evident that small particles of heavy ore, which would be equal settling with considerable larger particles of gangue, will enjoy a superior opportunity of being separated and saved. This conformed to recent experience in actual milling operations and explained the advantages which had been observed to follow the jigging of ore previously classified with hydraulic classifiers. The classifier accordingly superseded the trommel, and close sizing before jigging was relegated to the past. In other respects there was no material difference between European and American practice. A jig, consequently, while giving a remarkably clean product, could not be crowded without throwing large quantities of ore off with the tailings, and any increase of speed produced the same result. The speed was determined by velocity of rising current needed to lift the particles of gangue which would be equal settling with the smaller ore particles left in the classified product fed to the machine. Here was its limitation, closely and accurately confined, and the tendency of most mill men was to force through a larger tonnage than that for which the jig is calculated, with the inevitable result of loss of values.

It is to be noted that this limitation was fixed in accordance with the theory of particles falling in water after having reached the period of a uniform rate of fall, that is, after the resistance has increased with the increasing velocity of the particle until it counteracts the normal acceleration due to gravity. From this it follows that the jig stroke must be relatively long to allow the particles to reach this period of uniform rate of fall. According to the practice built up from this theory, the length of stroke for ore particles $\frac{1}{8}$ inch in diameter would be from 2 inches to $2\frac{1}{2}$ inches, repeated about eighty times a minute. A stroke as short as $\frac{1}{2}$ inch would not be used with particles larger than 1 m.m. (= $\frac{1}{25}$ inch), at a speed of not over 125 strokes per minute. Only with jigs for the finest sands, material such as is now concentrated on vanners and washers of the Wilfley type, were short strokes of from $\frac{1}{4}$ to $\frac{1}{8}$ inch, and speeds of from 200 to 350 strokes per minute, employed.

Attempts were often made to increase the speed, but the resultant losses were so great that the millmen hastened to retrieve what was looked upon as an error, and so the possibilities of doing good work on relatively large sizes of sands at very high speeds were not discovered. This is the peculiarity of the practice inaugurated by W. J. Evans at Great Falls, which, the Review asserts, has proven so successful that the system of high speeds and short strokes will be introduced into the 6000-ton concentrating plant being erected at Anaconda, Mont. At Great Falls ore crushed to pass a $1\frac{1}{2}$-inch mesh screen is jigged with 180 strokes per minute, $1\frac{1}{2}$ inches long, and other smaller sizes in proportion. In general the length of stroke should be approximately the same as the diameter of the maximum size of ore particles fed, making due compensation for the relatively greater resistance to falling in water on the part of very small sizes of grains. The result of this is to take advantage of the acceleration before the period of uniform velocity of fall has been reached, and thus to assist gravity many times a minute. Mr. Evans would dissent from this way of stating the matter, his view being that jigging depends less on gravity than on frequent assisting of gravity by quickly applied suction at the moment of reversal of motion. This is a widely different thing from the so-called law of suction proposed by Mr. Richards. He says: "The law of suction seems to be that jigging is greatly hindered by strong suction where the two minerals are nearly of the same size, the quickest and best work being then done with no suction; but when the two minerals differ much in size of particles, the quartz being the larger, strong suction is not only a great advantage, but may be necessary to get any separation at all." Directly opposed to this, it would seem that the practice adopted by Mr. Evans would logically lead to a return to the continental system of close sizing before jigging, since the larger grains would yield more readily to the forces operative at such high speeds. The Review continues:

Another feature of the new system adopted at Great Falls is an increase in the depth of the jig bed, with the use of screens of larger mesh. That this has been necessitated by the change to higher speeds and shorter strokes indicates that Munroe's law of hindered settling particles plays here a role which, in some respects, must be different from that which it performs with classified ores under the prevailing American practice. There are features here which are manifestly novel and require further investigation. That greatly increased capacity per unit of screen area is obtained by Mr. Evans' system, without causing losses of valuable mineral, is indubitable, and thus the value of the jig is still further enhanced. In order to obtain the best results with high piston speed, it is important to secure a vertical motion with the piston held rigidly in a horizontal position. This end has been secured in a jig designed by Mr. Evans, having double piston rods working through boxes fixed in the cover of the piston compartment.

Mining in the Philippines.

At Washington, D. C., are received official Government reports showing that the mining bureau is an interesting department in the administration of Philippine affairs. The mining bureau is in charge of C. H. Burritt, who went into the service as a private soldier. Lieut. Burritt has translated and compiled the Spanish mining laws which have been in force since 1846, and has prepared a new system of laws modeled upon those of the United States, but adapted to the conditions existing in the archipelago, which will be considered by the authorities and put in effect when conditions warrant.

Concerning the mineral resources of the Philippines, Lieut. Burritt says:

There are two belts of coal extending through the whole archipelago on an angle of 60°, northeast and southwest. The greatest deposits of coal are in the islands of Cebu and Negros, the finest beds in the small island of Bataan. This coal is all, so far as is definitely known, of a Tertiary age and might be better characterized as highly carbonized lignite. The first discovery of coal was made in 1827, on the island of Cebu, and since that time lignitic beds have been found on the island in great quantities not 12 miles from the capital. These mines have been worked, on and off, at the different stages, but it was never realized what a steady output was. Here the circumstances exist in that the seams and leads are badly broken. Uling-Uling was and is now the principal coal mine in Cebu. The coal of these islands is better than Australian and Shanghai coal and equals that of North Borneo.

Copper is next in importance. It is found in all parts of the island, especially abundant in the provinces of Lepanto, Benquet and Camarines.

The best known copper region lies around Mt. Data, which is given out as being 2500 meters in height. The ranges of which Data form one peak trend due north to Cape Lacay and form the boundary for all the provinces infringing on it. Data lies in the province of Lepanto. In this range copper ore has been found from time immemorial. Mean assays show over 16% copper, mainly as tetrahedrite and allied ore. The gangue is quartz. The rock in the country is described as a large quartzite lens imbedded in a great mass of trachyte. Attempts have been made to mine copper as well as coal, and with the same results. This failure is not because of the quantity or quality of copper, but because of a lack of steady labor and proper means of transportation.

Gold is found in every part of the archipelago—Luzon and Mindanao especially. Gold mining during the Spanish regime was a failure, because of the tax and unfair dealing with hired help. Placer mining has never been seriously worked, although where gold has been discovered it has always yielded well.

Of the other minerals of the islands, there are silver, lead, iron and quicksilver. The most important deposit of argentiferous galena is at Tarrijas, on the small island of Marinduque. A metric ton, or 1000 kilograms, contains 96 grams of silver, 6 grams of gold and 565.5 kilograms of lead. Iron is found in abundance in Luzon, Caraballo, Cebu, Panay and other islands. Quicksilver is rumored to have been found in the islands of Panay and Leytle, but no verification is placed on these rumors.

Lack of transportation facilities and of intelligent labor are the chief obstacles to the development of the mineral resources of the Philippines. In relation to this, Lieut. Burritt says: "In all the island of Luzon there is not a road that would transport properly a load of goods 200 miles. This fact has been, and will be, the adversary of civilization, and until good roads are built to intersect every part of the islands civilization will be at a standstill, and the insurrection will go merrily on. Luzon needs roads to open up its vast resources; roads that will bear all travel and still be good; not the roads of to-day, which are an intermingled mass of mud after the first rain. How can coal mines be operated without roads? How can copper and ore mines be operated without roads? That they can not be operated with any success is proven by the many skeleton mines that intersect the mountains of northern Luzon and elsewhere and show the bitter experience of failure. Roads and bridges of the highest standard are needed. No roads, no peace; no roads, no mines. Labor is the obstacle that stands in the way of success in mining in this archipelago. The native labor is transient and can not be depended upon. They will work until they have capital enough to lay off three or four months, and love nor money could not get them to do a stroke of work until they are broke. That mines when once started should be kept going is vital. Let a mine close for two months and its future is a failure. The importance of having labor which can be depended upon is apparent. Unless the Philippinos get down to business like they should, they will be supplanted in the labor field by Chinese. This is inevitable."

Removing Stumps With Dynamite.

Stumps can be removed by using dynamite, which not only throws out the stump, but tears it in pieces small enough to handle, the earth is cleaned off, and the pieces may be cut up and used as firewood. In placing the charge or charges under the stump the operator must study the nature of the soil, size and direction of the roots, and so place the charge that it may present its explosive force against the center of resistance. This can be done by boring under the stump into the soil somewhat deeper than past the center, so that the charge may be under the center of the stump. In all cases put in enough dynamite to do the work thoroughly. Where several holes are loaded, the charges all coming close together under the stump, one primer of a single cartridge will explode all the others. A hardwood tamping rod must always be used to push the cartridges to the bottom of the hole and to ram the hole full of dirt. It will also be found necessary to use more dynamite with pine stumps than with hardwood stumps, and in light than in heavy soils. From two to three pounds of dynamite are usually required to remove a stump. The main object is to use rather more than too little dynamite, and to concentrate the charge as nearly as possible at the point of greatest resistance. The tools required in stump blasting are a wood auger, a dirt auger and a tamping rod. The augers should be from $\frac{1}{2}$ to $2\frac{3}{4}$ inches in diameter, with a shank about 5 feet long.

The best time to do the work is midsummer, when the ground is dry and hard. Place two sticks of dynamite as close under the center of the stump as possible and get the load close to or against the wood, using a $1\frac{1}{2}$-inch auger with a shank 4 or 5 feet long.

For placing the charge under the stumps, use two 2-inch augers, each equipped with a 5-foot shank, one to bore into the dirt and the other to bore into the stump root. The charge should be placed directly under the middle of the stump, and it will take from one-half to three cartridges, according to the stump. The greatest care should be exercised in handling the caps. The fuse ordinarily used will burn 1 foot per minute and should not be cut less than 2 feet long. That will enable the operator to get twenty rods away. The 40% dynamite is safer than the common black powder, as sparks will not ignite it. When a stump is not entirely blown out, pieces of others can be piled around it and it will burn out readily.

Cement for Electric Wire Connections.

To make good electrical connections between the adjoining ends of wires used as electrical conductors, especially in electric lighting and power circuits, it is customary to first twist or otherwise bind the ends of the wires together in order to make a joint having the required mechanical strength, and then apply solder to this joint for the purpose of making a continuous metallic circuit of low resistance.

An improvement in this line is a metallic cement, which may be applied to the joint by hand after the wires are twisted or secured together without the use of heat, and for all practical purposes takes the place of solder. The cement consists of an amalgam, with which is mixed a binding material, the mass having about the consistency of putty. When put up in stick form the cement will not harden, except at the surface, where a slight crust is formed, and when the mass is worked between the fingers it becomes soft and plastic, so that it may readily be applied to the wires. In making a joint the wires are twisted or secured together, and the joint formed is coated with cement.

The cement consists of the following ingredients in the proportions specified: Zinc, four parts; tin, two parts; copper, two parts; cadmium, two parts; bismuth, four parts; lead, two parts; antimony, one part; mercury, eight parts. The solid metals are granulated and melted together, after which the mercury is added, the mass being stirred at the same time. When cool, the mass is pulverized in a mortar, and a binding material, consisting of liquid glucose and silicate of soda, in sufficient quantity to bind the mass together and give it the consistency of putty, is added to the mass. The cement thus formed will not harden when in bulk, and may easily be worked between the fingers; but when spread out on a joint it not only adheres to the latter, but hardens in from twelve to twenty-four hours. The cement may be applied to the wires without any previous application of acid, and by amalgamating with the conductors it forms as perfect an electrical union as could be formed by the application of solder. The application of the cement prevents oxidation of the wires. After the joints are thus made they are covered with an insulating tape.—American Manufacturer.

MINING SUMMARY.

ALASKA.

(Special Correspondence).—During the past two months there have been several new creeks discovered and some bench developments that are extremely rich. I examined a bench claim near the head of Anvil creek which paid about $1000 per day to the rocker, and the one adjoining, which was sold to C. D. Lane for $75,000, before he got possession two men with one rocker in thirty-five days took out $71,500; but, in my opinion, they got the cream of it, for at a recent visit I made it did not look near so well. There are several drawbacks to this country; the worst of all is the pencil-and-hatchet-men, who have staked the whole country from the highest mountain to the lowest valley, and never do any work; the next, the endless litigation; almost every claim of any value in the country is to-day in the hands of a receiver. Any one can put the best claim in the country in the hands of a receiver whether he has ever seen the claim or not; all he has to do is to put up a willow stake as big as your finger and get some irresponsible fellow to swear that he had this stake last year, or that the other fellow's location was not properly made.

We are just now in the midst of the greatest storm of the season. The damage to property on lower Main street and along the beach will reach close on to $1,000,000 in the last forty-eight hours, and many hundreds are left homeless and penniless. The sight in the surf is grand, yet frightful, to see a great mass of lumber and property of every description hurled round and round at the mouth of Snake river and dashed back and forth by the surf until it is ground into kindling wood. MINER.

Nome, Sept. 13.

In August, Judge Noyes refused to remove Alexander McKenzie from the position of receiver of the claims of the Pioneer M. Co. at Nome, and the Court of Appeals reverses Judge Noyes' decision and orders him to give a correct account of all the gold extracted and to hand it over to the Pioneer M. Co. immediately. The decision has given much satisfaction.

ARIZONA.

COCHISE COUNTY.

The Copper Queen Co. has contributed $3000 to the University of Arizona to aid in the construction of a machinery hall for the industrial and mechanical department of the institution.

MOJAVE COUNTY.

Manager Ware of the White Hills M. Co., at Kingman, says that the silver-gold ore below the 600-foot level of the Occident mine holds out. The shaft will be sunk to the 1000-foot level.

E. T. Loy, of Chloride, who negotiated the sale of the Minnesota-Connor mines, is ill in Philadelphia. The amount of the first payment is said to have been $25,000 and the sum for which complete title passes $300,000. Work on the newly acquired mines has begun by W. Miller.

PINAL COUNTY.

In the Golden Rule mine, near Mammoth, a 4-foot ledge contains sulphide and carbonate of copper 8%, eighty ounces silver and $12 gold. The company is sinking three shafts. J. D. Burgess is manager.

The reorganized Pinal Con. M. Co. propose resumption of work on the mines of the company, 16 miles from Florence.

YAVAPAI COUNTY.

The Mulholland property, near the Trilby, in the vicinity of Prescott, is sold for $20,000 cash. It is a developed copper property and is bought by W. Quigley of Ohio.

The stamp mill of the Montgomery M. Co. at Lynx creek, 12 miles from Prescott, was completely destroyed by fire on the 28th ult.; loss, $10,000.

YUMA COUNTY.

The Arizona Giant Copper Co., represented by N. G. Douglas of Los Angeles, have bought for $10,000 three copper claims—Self-Defense, Gladiator and Hercules—8 miles southeast of Ehrenberg.

The Mariquita gold mine, Plomosa district, is reported sold to D. A. Stokes of Los Angeles for $67,000. He will erect a reduction plant and work the mine.

CALIFORNIA.

AMADOR COUNTY.

Ledger: The East Central Eureka M. Co. has brought suit against the Central Eureka M. Co. for $120,000. The hearing has been set for Oct. 6. The plaintiff alleges that defendant is wrongfully and unlawfully extracting ore from plaintiff's ground.

Record: Ten stamps of the South Spring Hill are running on ore from their mine and ten stamps on ore from the Lincoln mine. Supt. Tregloan is very confident of once more placing the South Spring Hill mine on a dividend-paying basis.——At the Keystone, Supt. Pritchard, large bodies of low-grade ore have been developed and are being put through the 40-stamp mill.——The shaft at the Bunker Hill mine has been unwatered 40 feet below the 600-foot level and retimbered the entire distance ——Supt. Purrington is developing the Gover–Fremont property.——Twenty-five stamps of the new Oneida mill at the Oneida mine are in operation, temporarily by water power, as the Standard Electric Co. are not yet ready to furnish electric power. The ore comes from the 1900 and 2000-foot levels.——The new steam hoist built by Knight & Co. at the South Eureka mine is completed and works smoothly.

BUTTE COUNTY.

J. Clark of Yankee Hill has a large deposit of marble in the Big Bend country.

CALAVERAS COUNTY.

Work on the old Central Hill gravel mine has stopped; no water. Pure sulphur forms on the banks in fungus-shaped exudations.

Work at the Lloyd mine, Central Hill, is being steadily prosecuted; the shaft is down 160 feet.

At San Andreas the case of Laura Daveggio vs. the Utica G. M. Co., to recover $25,000 for damages to the health of the plaintiff by reason of smoke and fumes from the Utica chlorination works at Angels Camp, ended in a verdict for the defendant.

At Jenny Lind the Lost Log group is idle, except the Brown addition, where a tunnel is being run to strike the vein at the shaft by Ira Phelps.

The Sheep Ranch G. M. Co. will run their works at Sheep Ranch by water power; 8700 feet ditch and 11,439 feet pipe will be needed, 20, 18 and 16 inches.

The Lightner mine at Angels Camp is run by electric power furnished by the Standard Electric Co.

At West Point the hoisting works of the Lockwood were burned to the ground last week. Up to Sept. 10th the mine was worked by the Grasshopper M. Co. The mine was to have resumed.

EL DORADO COUNTY.

W. I. Smart will superintend the work at the Shaw mine, near El Dorado.

The Barbara mine has been unwatered for examination.

J. E. Russell, in the Superior Court, prays for possession of the Spring Canyon placer mine and $5000 damages.

INYO COUNTY.

Independent: The Ballarat M. Co. will build a 10-stamp mill at their mine, 4 miles south of Ballarat.——Supt. Harrison of the Ratcliffe Con. is looking for miners and needs about fifteen more men.——The miners working at the Cooper mine, at Stone corral, are getting $4 per day.——The Tuber Canyon Co. will take out their roller mill, replacing it with a new 10-stamp mill.—— Supt. Stebbins of the World Beater mine has interested Los Angeles men in the mine and is running a tunnel from the mill level to tap the ore body 300 feet lower than the present workings.——Supt. Pickett of the Cole & Garcia mine will develop the property with twenty men.

KERN COUNTY.

The Yellow Aster M. Co. is locally credited with intention to build a 100-stamp mill in addition to its present 30-stamp mill.

The present freight rate on oil from Bakersfield to San Francisco is 42 cents per barrel. The switch charges from the main track on the Southern Pacific Railroad system into the Kern river oil fields is $5 per car, or about 3½ cents a barrel, a total present cost of 45½ cents per barrel for shipping the oil from the wells to San Francisco. The present price of oil in the Kern river district is 85 cents to $1 per barrel at the wells. There have been contracts made extending over a period of five years at $1 per barrel delivered at the wells.

A Bakersfield special to the Herald says, while forging at the mouth of No. 5 Sterling, Kern River district, a gas blowout occurred, and quick as a flash the rig was wrapped in flames. The crew just barely escaped being roasted to death. The rig was consumed. The gas flamed 20 feet above eleven five-eighths casing. The hole is down 700 feet. Hereafter there will be no more forging at Sterling wells. It is a general practice, however, in the district.

LASSEN COUNTY.

The Daisy Dean M. Co., operating at Hayden Hill, has incorporated; J. H. Roberts, J. G. Jilson, C. L. Crane, L. A. McIntosh. L. A. McIntosh is Supt. Midas mine, Harrison Gulch, Shasta county.

LOS ANGELES COUNTY.

The Desert M. Co. has incorporated in Los Angeles; A. C. Harper, A. Solano, R. H. Smith, M. Allen, R. N. Walton; capital stock, $250,000; subscribed, $500.

MADERA COUNTY.

The Boulder M. Co. is incorporated; J. R. Ryan, W. F. Waddell, W. C. Tighe, J. W. and J. L. Ragsdale, J. McKee, Madera, and A. C. Francis, San Jose; capital stock, $300,000; subscribed, $250,000.

MARIPOSA COUNTY.

A pump station is being cut at the lower level in the Mariposa mine, and as soon as the pump is installed the work of sinking to the 800-foot level will commence. Work on the west drift at the second level has been stopped at 500 feet to push the drifts at the 600-foot level, each of which is in about 200 feet. Men are getting out rock for the foundations for the mill buildings.

NEVADA COUNTY.

The Union reports a strike at the Reddik mine in the Delaware channel.

The Red Hill mine is to be opened and the mill rebuilt.

PLACER COUNTY.

The Dewey Con. M. Co., composed of Stewart, Doolittle, Sprague, et al., is building retaining works in Indian canyon, near Iowa Hill, to mine next winter by the hydraulic process.

Supt. Jordan has the Blue Lead mine in good condition. A bedrock cut is extended up the Dutch Flat canyon. He thinks he has found the old deep blue lead channel.

The Pioneer G. M. Co., through its secretary, C. H. Howard, states that at the meeting at Helena, Mont., the Pioneer-Lynn M. Co. was organized under the laws of Colorado, with the same number of shares as the old company, of the par value of $5 each, for the purpose of acquiring the California properties, and asks surrender of certificates of stock, before Oct. 22, and at the same time pay 20 cents for each share surrendered; stockholders so doing will thereupon receive a receipt for a similar number of shares of the new company, to be delivered as soon as certificates can be prepared. It was at first proposed to require a payment of 50 cents a share upon the exchange of stock, but the sum was reduced to 20 cents on the recommendation of the advisory committee appointed by the stockholders. In case all of the stockholders should not exchange their stock, those making the exchange will be given the right to take the remaining stock of the new company on paying therefor 25 cents a share.

PLUMAS COUNTY.

In the strike of rich gravel in the back channel at Rich Bar slugs worth $40 have been taken out.

SAN DIEGO COUNTY.

The Monarch Co. is reported to have struck an increased quantity of oil in the well at Morena.

SANTA BARBARA COUNTY.

At the Carreaga rancho, in the north of the county, the Western Union Oil Co. has a well at 1150 feet; daily production, seventeen barrels.

SHASTA COUNTY.

The Mount Shasta mine and the claims comprising the group were sold at commissioner's sale at Redding last week to satisfy a judgment held by R. R. Vair against the Mount Shasta Gold Mines Corporation and others for $5926.11, with costs and interest, to W. Harfst of San Francisco for $6098.57.

SIERRA COUNTY.

J. H. Roberts is building a railroad from Boca, Nevada Co., to Roberts.

SISKIYOU COUNTY.

(Special Correspondence).—The Salmon River M. Co. at Sawyer's Bar have shut off their giants working there and are extending their flume 1 mile farther down the Salmon river to work a rich bunch of gravel at that point. The company's flume is already 5 miles long and the extension will make it one of the longest flumes in the State. There are other undeveloped gravel claims along the Salmon river yet and capital would be recompensed by an investigation.

The Mountain Laurel mine, one of the Ball group, turned out more rich free gold ore this week.

Rollin, Sept. 30.

The Greenhorn No. 2 is pumped out.

Baker & Jewett are shipping ore to the Tyler mill on Klamath river.

The Salmon River M. Co., near Sawyer's Bar, will extend their flume to the Mayers claim.

The Schroeder mine on Deadwood will resume operations.

SONOMA COUNTY.

At Cinnabar mining district, Pine Flat, on the 1st inst., L. W. Pittman was elected recorder.

TRINITY COUNTY.

The "inverted siphon" of the La Grange Hydraulic G. M. Co., forming a part of the main water system, conveys the water of Stuart's Fork and Rush creek to its mines on Oregon Gulch mountain and Morris hill. The pipe is 30 inches in diameter, made of steel, and was tarred and tested before being put in place. It is anchored at all angles and buried for a great part of its length in a trench 3 feet in depth and 3 feet in width. There are eight 3-inch valves on the inlet side and five manholes at points about 1000 feet apart. Expansion joints are provided at each end of the pipe just below the inlet and outlet pieces. The inlet piece is bell-shaped, 4 inches diameter at the upper end and tapers gradually to 30 inches. It receives the water from the bottom of the head box and is curved at the smaller end to come into line with the pipe on the hillside. The outlet piece is in the shape of a bonnet, 4 feet in diameter at the upper end, and discharges the water into the vertical end of the outlet box. At the lowest point of the "syphon" the pipe has a 4-inch gate valve, which serves as a blow-off cock when necessary to at any time empty the pipe, opened and closed by bevel gearing. The pipe crosses Stuart's Fork on a wooden truss bridge 12 feet wide, 138 feet long. The main water system consists of 23.85 miles of flume and ditch, three inverted "syphons," aggregating 8754 feet in length, and eight tunnels, aggregating 11,134 feet, making a total length of 27.61 miles of mining ditch.

Journal: J. McClees of Minersville was in Lewiston recently with seventy-six ounces of gold which he had taken out of his mine at Ridgeville, near Minersville, in five days' work last week. This makes about $2500 that he has taken out the past month.——J. McMurry has sold his mining interests to his partner, W. I. Hupp, Sr.

TUOLUMNE COUNTY.

The Comstock, in the east belt, is being operated by the Golden West M. & M. Co. of San Francisco. The tunnel is now in 900 feet; a double-compartment shaft is to be sunk.

The Gagnere mine, at Tuttletown, is being operated by the Tricolor Con. M. Co.

At the Santa Ysabel Supt. Gorrie has unwatered the mine.

A shoot of ore is reported on the seventh level in the Confidence mine.

The Dreisam shaft has reached a depth of 400 feet.

The Green Con. Co., near Sugar Pine, have erected a new hoist at No. 2 shaft on the Green.

Near Big Oak Flat the Four Oaks mine has been shut down. Pumping is still being prosecuted.

The Mack Con. Co. have suspended all underground operations. The prospecting mill is running.

YUBA COUNTY.

The large flume of the Yuba Electric Power Co. near Dobbins Ranch is completed. It extends 10 miles, the total cost about $300,000.

COLORADO.

BOULDER COUNTY.

Three miles north of Caribou, the Silver Lake M. & M. Co., which bought the Silver Lake mine last June, has sulphide ore, bearing gold, silver, copper and lead, $50 per ton, at 100 feet, and intends sinking a shaft 500 feet deep on the vein, where there is 4 feet of concentrating ore, besides 2 feet of smelting ore.

Wolframite or tungsten, reported in the Nederland district, analyzed 70% tungstic acid.

The old Blue Bird has a vein of silver ore which runs 1800 ounces in silver. Twenty men are employed.

CHAFFEE COUNTY.

C. E. Barrick, manager Magenta mine,

near Granite, says the Magenta shaft will be continued to a depth of 600 feet without stopping to drift or crosscut. Forty thousand dollars will be expended in development.

C. Haines, manager Cameron M., L. & T. Co., Whitehorn, has men at work doing assessments and driving tunnels to cut the veins on Cameron mountain.

CLEAR CREEK COUNTY.

At Empire operations on the old Maud S. mine, on Douglas mountain, gave returns of $140 per ton for smelting ore. An aerial tramway has been constructed from the mine to the tracks of the Colorado & Southern Railroad, and power drills will be used for development.

Near Georgetown the Pelican two weeks' ore production gave mill run returns of $5600. There is still some profit in silver mining.

FREMONT COUNTY.

At Florence the Colorado Fuel & Iron Co. has closed down the Fair Gulch coal mine. It employed about 100 men. The mine is closed indefinitely.

GILPIN COUNTY.

Jno. Richards last week shipped a lot of bricks picked up out of the gulch to the State Ore Sampling Works, and for the lot of 550 pounds he received a check for $340.40, being a value of nearly seventy ounces gold per ton. These bricks formerly occupied a place as the lining of the assay furnace in Hill's smelter at Black Hawk and were impregnated with gold, which had been carried off with the metallic copper.

Register-Call: At Perigo and Gilpin 125 miners are at work. The smelting ore and mill tailings from these sections all find their way into Black Hawk.——At the Perigo property about fifty men are at work. The Perigo mill's thirty rapid-drop stamps crush eighty tons ore every twenty-four hours.——The Daisy mill in Gamble gulch is running ten stamps on Gold Dirt ore. The Gold Dirt employs twenty-five men.——Fifteen stamps at the Petersen mill treat about twenty tons of ore from the Gold Dirt mine every twenty-four hours.——At Yankee W. R. Miller has an assay of 960 ounces silver from his Boer lode, or $576 per ton.

GRAND COUNTY.

H. H. Daniels has sold a tract of placer land at the head of Willow creek and Gold Run to to the Louraine G. M. & M. Co. The company will build a ditch and do other work preparatory to the commencement of active washing.

HINSDALE COUNTY.

Near Lake City the old Elmendorf mill, last used by the Hartwig M. & M. Co., has been bought by the Moro Co. and is to be put in order. A wire tramway 4000 feet long is to be built to carry the ore from the mine to the mill.

The Golden Fleece Co. is building thirty canvas tables to run the tailings over.

At Lake City work is resumed on the Golden Fleece tunnel, now in 1700 feet; when the upraise is started to the upper workings the tunnel will be 2800 feet long.

LAKE COUNTY.

At Leadville in the Bon Air shaft ore is being sacked which runs $300 per ton in silver and lead.

The shipments from the home properties are nearly 250 tons per day.

The Herald-Democrat says difficulty exists in obtaining supplies of machinery for mining development.

Among other improvements in mining, milling and smelter practice the Leadville Carbonate Chronicle notes an expenditure of $100,000 in the Arkansas valley smelter by Manager Weddle designed to accomplish a saving. There was a waste in slag and a loss in smelting caused by the fumes and gases from the blast furnaces, which all contain values in the shape of gold, silver and lead, in a measure saved by the use of large brick chambers, through which the smoke and gases pass, the heavier particles settling to the floor. With the best flue chambers designed, however, only a portion of the values have been saved; the system in operation Nov. 1st at the Arkansas valley plant is intended to save practically everything worth saving in the smoke from the furnaces. There are two sections in the system of flue chambers. One extends beyond the plant for about 1000 feet, arched shape, a cross section of which measures 256 square feet; material used is iron and cement, frame work of channel iron with metal lath wired to the beams, covered with a coating of cement, inside and out, an air space of about 2 inches being left between the two coats, air tight and impervious to moisture. The interior of this chamber contains a few feet from the bottom a V-shaped trough, where the heavier particles settle. Cars will be run below this trough and the flue dust collected every day. The second section consists of a different shaped chamber, but of the same material, iron and cement, known as the beehive. The system consists of three parallel chambers, nearly 1000 feet each in length, but each one connected. The arched openings, however, can be closed by iron dampers, permitting one parallel line to be entered and cleaned out, while the smoke winds its way through the other two, until it enters the stack. As the heavier particles in the smoke will settle in section No. 1, the deposition in the second section will be slower; it will not be necessary to make a cleanup more than three times a year. To assist in supplying a draught the same style of chambers are being constructed from the Ropp and hand roasters. The circular stack is 185 feet high, inside diameter 18 feet.

SAGUACHE COUNTY.

In the Eagle mine, near Bonanza, is a stringer of rhodochmite ore, rich in native wire silver.

SUMMIT COUNTY.

There is a Breckenridge project to operate the flat contact veins of Yuba Dam Flats by a smelting company. The bodies of iron sulphide ore are from 2 to 6 feet in thickness.

TELLER COUNTY.

The gold output for September is figured at $1,946,000, as follows:

	Tons.	Value.	Total.
Colorado City.....	8,500	$36	$ 306,000
National..........	4,000	30	120,000
Metallic...........	6,000	25	150,000
El Paso...........	3,000	25	75,000
Economic.........	6,000	30	180,000
Arequa............	2,500	20	50,000
Smelting ore......	15,000	70	1,050,000
Miscellaneous.....	....	..	15,000
Total value....................			$1,946,000

IDAHO.

CUSTER COUNTY.

The Challis Messenger says the Stanley Basin dredger is now taking out daily $600, handling about 2000 yards gravel.

At Mullan the new Morning compressor is building, T. Cox, manager.

IDAHO COUNTY.

(Special Correspondence).—Placer season here has been a good one, despite the light snowfall last winter. An early spring, with cool weather and June rains, conserving and helping water supply. We used—had no more to use—about three-quarters as many miners' inches as last season, and broke about seven-eighths as much ground with good values and satisfactory summary.

Newsome.

LEMHI COUNTY.

The Silver Star M. Co., A. A. McMillan, M. J. Lowney, C. S. Jackman, capital stock $10,000, assessable, and the Tri-Metallic M. & M. Co., 2,000,000 shares, 1 cent each, have incorporated in Butte to operate in Lemhi county.

OWYHEE COUNTY.

Near Silver City the Cumberland mill is in operation.

Free gold in galena is reported at South Mountain. R. C. Williams, Supt. South M. Co., says he has twenty-five men employed on development work.

The Avalanche says about Jan. 1st the Trade Dollar Co. will install locomotives in its working tunnels operated by compressed air. The air compressors, mills, hoists, fans and all machinery will be operated by electric motors.

The Sinker tunnel, near De Lamar, is now in over 2000 feet.

SHOSHONE COUNTY.

At Oro Fino the Eureka P. P. M. Co. has applied for patents on its properties at Reed's creek. It has a mile of flume completed. This is the first application for a patent in the Pierce district.

MONTANA.

Estimates of Montana's copper output this year make it in the neighborhood of 325,000,000 pounds, worth $42,250,000.

BROADWATER COUNTY.

R. A. Bell, in the East Pacific mine, near Winston, has ore which runs $3000 per ton gold in No. 4 tunnel, 900 feet from the surface.

CASCADE COUNTY.

The Diamond R. concentrator at Neihart is to be enlarged to a capacity of 300 tons daily. It is the intention to build the mill by day labor. W. W. Masters is superintending. The plan of transferring ore from the Broadwater to the mill is to erect a wire tram above tunnel No. 8 at the Broad and run by air line to the concentrator; capacity fifty tons per hour; raised upon pillars 30 to 110 feet above the ground; 3400 feet in length; total fall, 500 feet.

MADISON COUNTY.

At Red Bluff Manager Sherman at the Red Chief mine has the grading finished for a thirty-five-ton concentrator.

G. D. B. Turner at the Red Bluff mine has new head gear and plans completed for a seventy-five-ton concentrating plant.

The electric power company at the Madison canyon, 6 miles from Norris, has forty-six men at work on a flume, 10 by 14 feet wide, 2500 feet long.

NEVADA.

ELKO COUNTY.

The Dexter and Tuscarora Cos. at Tuscarora are to consolidate.

ESMERALDA COUNTY.

H. M. Yerrington is arranging to ship 200,000 tons borax to Japan.

EUREKA COUNTY.

O. J. Smith is appointed receiver for the Whalen Con. C. M. Co., at Alpha.

HUMBOLDT COUNTY.

Near Golconda, at the Adelaide mine, owned by the Glasgow & Western Exploration Co., experts are sampling to determine to what extent the smelter shall be enlarged.

LINCOLN COUNTY.

At Searchlight the McCurdy mine, owned by the Quartette Co., at a depth of 250 feet has a ledge 17 feet wide.

C. Gracey, at El Dorado canyon, will add the five stamps recently purchased from the White Hills Co. to the mill, making thirty stamps for crushing ore for the new cyanide plant; 100 tons of ore daily will be sent to the mill.

STOREY COUNTY.

Last Sunday the electric current was turned on at the Floriston power plant to test the lines connecting with the sub-station at the C. & C. shaft and found satisfactory. Superintendent Ryan received the first message from Floriston over the double line of telephone wires connected with the power plant pole line. A test run of the Gould & Curry mill will be made, the machinery adjusted to the power, and it will begin crushing on the 15th. The delivery of electric power on the Comstock lode will be appropriately celebrated this month.

WHITE PINE COUNTY.

The Ely G. M. Co. expects to have its new mill and ore-leaching plant in working order December 1st.

At Ely the Robust mine shaft is down 120 feet. When the 130-foot level is reached, a station will be cut and connection made with the surface above the mill by a tunnel, through which the ore will be handled.

NEW MEXICO.

BERNALLILO COUNTY.

At Bland, in Cochiti district, W. C. Wynkoop will superintend the erection of a 100-ton cyanide mill to take the place of that recently burned down.

The Star Co. will build a tramway and pipe line.

GRANT COUNTY.

The Atlantic mine at Pinos Altos, owned and operated by the Treasury G. M. Co., under the management of W. Brand, is being worked on the seventh level. The ore runs $17 in gold, $8 silver and $6 copper.

Dimmick Bros. have a thirty-ton smelter and refiner on their property at Pinos Altos, and are treating the ore mined since June 1st.

The Rathburn, Maze and Cothron groups at Pinos Altos have been leased and bonded to the Golden Giant M. Co. corporation. This company is now arranging to increase the capacity of its stamp mill to 125 tons daily.

The Gold Coin Prospecting & Development Co., which set out from Colorado Springs last March for a trip of three years, is operating in the Malone mining district, in the southwestern part of the county. There are eight men. It is the plan whenever a prospect is found which promises well to do sufficient development work to demonstrate its work, and then turn it over to a sub-company for future operations.

OREGON.

BAKER COUNTY.

Baker City reports a strike at the Baisley-Elkhorn mine between the 100 and 200-foot levels of a 3-foot vein of high-grade ore.

JOSEPHINE COUNTY.

F. H. Osgood has purchased the Josephine mine on Rogue river and has men fitting it for operation.

Kelly & Shipley have sold their group of copper claims to T. M. Draper of San Francisco.

UTAH.

BEAVER COUNTY.

It is figured that the Horn Silver Co.'s mines at Frisco have exposed in the property and in the tailings dumps 500,000 tons of ore that will afford an average of 30% zinc.

JUAB COUNTY.

(Special Correspondence).—The Eureka Hill combination mill is operating on 175 to 200 tons of very hard ore per day. The mill contains 100 stamps, 1000 pounds each, 100 drops per minute; fifty Frue vanners, thirty-two amalgamating pans, sixteen settlers, a number of clean-up pans, retort and smelting furnaces. At present sixty stamps are doing the work. In former years plates were in use below the batteries, but that was at a time when the gold in the ore was a more important factor than now. The ores carry oxides, sulphides and chlorides; the values, named in the order of their importance, are silver, lead, gold and copper. The silver which is found with the galena and lead carbonates is saved in the concentrates; that in chloride form being saved in the amalgamating pans. In the pans a small percentage of gold is obtained, but the most of it is saved in the concentrates.

The ore passes through Gates' crushers before going to the stamps. The product of each battery of five stamps passes to three vanners set in tandem—each vanner getting a third. Formerly sizers were used to divide the material, but they were discarded, first, because it is claimed they did not do their work perfectly on these ores; and second, because it seemed a better saving was made to permit the fine and coarse material to pass over the belts together. Hence, the product is the same from all the vanners. The bulk of the ores carry a high percentage of silica, which is pretty thoroughly eliminated from the concentrates by the vanners, though some of the fine carbonates are lost in the siliceous tailings. Now these vanner tailings are collected in a series of settling boxes—the water and slimes overflowing from one into another, the first box catching the heaviest and coarsest sand and the next the finer and more slimy substance, and so on. The water, finally, is pumped up to the battery floor for use again on the stamps. When the boxes are full the material therein is dropped down through traps to the sand floor, where the different grades are mixed to make it quite uniform in consistency before it is thrown into the pans. As is usually known the pans are provided with agitators, by which the pulp is kept stirred to a ropy state during the process of amalgamation. The water in the pans is kept heated by live steam from the boilers.

The mill is located on the side of the mountain, some 300 feet higher than the ore landing of the mine shaft. The ore is carried from the mine to the crushing floor of the mill by a tramcar line; a second tram line carries the concentrates from the vanner floor to the railroad track; a third train conveys coal from the railroad to the mill boiler room. The engine room contains a 500 H. P. engine.

Eureka, Sept. 27. WASCOTT.

(Special Correspondence). — The Star Con. mine, which has been greatly improved within the last few months, is shipping one car per day of gold-bearing ore, which runs in value from $1200 to $1500 per car. The ore is largely oxidized, and it is claimed much of the gold is in a sylvanite. Present shipments come from the second, third and fourth levels. Recently a new ore body was opened on the fourth level in a drift some distance from the shaft. Besides the shipping ore, a large tonnage of milling ore is accumulating at the mine. Besides the gold values, the ore carries silver, which averages about ten ounces per ton. The work is in charge of Supt. C. F. Packard.

The Boss Tweed, located a short distance from the Star, but farther up the hill, is being worked under lease to Wm. Gundry & Son, who are shipping about one car per month of high-grade copper ore, which is found in sulphide and oxidized form, mixed with red, vitreous and silicate copper, with apparently some green copper carbonates, all making a display of variegated colors.

The South Swansea has built a new shaft house, put in new hoisting machinery and sunk a 650-foot shaft about 100 feet from the old shaft. The new shaft, through which all the ore will be handled in the future, is 30 feet west of the vein at the 650 station. It is expected that present shipments will be increased. The ores here are silver and lead.

The Carissa and Spy, a group belonging to a Colorado company, at the head of which is Eben Smith of Denver, are being rapidly put in position to increase their output. The Carissa now ships 300 tons per month of gold, silver and copper ore from the 100-foot level. The ore carries about three ounces gold to the ton. The copper occurs as gray copper and copper carbonates. The gold is in quartz, spar and baryte crystals. The Spy, one of the old properties of the district, is being put in good condition, as regards equipment and buildings. The shaft is 700 feet deep. The ore now being taken out carries copper in an oxidized and carbonate form, with also some native copper and iron; the whole, it is believed, runs 20% copper. Present shipments amount to about seventy-five tons per month. About twenty-five men are employed at the Carissa and twenty at the Spy. A. J. Underwood, formerly at Victor, Colo., is manager of both properties. WASCOTT.

Silver City, Sept. 30.

(Special Correspondence).—Within the past year a steel structure has been erected over the Grand Central, making a shaft house, blacksmith shop, engine room and boiler room, all under one roof, but suitably divided off. Over the 1100-foot shaft is a 50-foot steel gallows frame, extending to the apex of the main steel building. The hoisting equipment consists of an engine with 18-inch cylinder and 48-inch stroke; a double reel for 4½-inch flat cable. The hoist is good for 2000 feet depth, with a maximum speed of 2000 feet per minute. The air compressor is a fine piece of machinery, having piston inlet air cylinder, 18¼x32 inches; with 16x32 steam cylinder. It is the right hand half of an eighteen-drill duplex and consequently has nine-drill capacity. The power comes from two 80 H. P. return tubular boilers.

The electric signal system works perfectly. It produces flashlights for station signals and has closers on cage by which bells may be given the engineer while cage is in motion. A 6-inch, riveted, spiral, sheet-iron pipe is in use for conveying compressed air from compressor to the 1100-foot level; in the drifts 3-inch iron pipe is used. An air pressure of ninety pounds per square inch is used.

The Grand Central vein has been opened vertically from the fourth to the eleventh levels and in length 1000 feet. The ore occurs in the blue dolomite line; the vein, which generally is vertical, ranges in width from 5 feet to 125 feet. The workings are timbered up in square sets. The ore, which at present comes from drifts about 500 feet east of the shaft, consists of sulphides, oxides and chlorides, carrying gold, silver, copper and lead. Most of the gold is found in the oxidized ore; the silver in the sulphides and chlorides. The dry ore averages thirty-five ounces silver, $15 to $20 gold and 10% copper; separate from that are the sulphide ores which run 45% to 55% lead, sixty to seventy ounces silver and $5 to $7 gold to the ton. Shipments now run about sixty tons per day. On the premises is a large dump which is being preserved as milling ore. The development of the mine has been under the direction of Supt. Pat Donnelly.

The Emerald, in charge of M. L. Oglesby, did 1500 feet of work the past year and erected a new shaft house and gallows frame. On the 500-foot level some ore was found, though no shipments have been made as yet.

The Mammoth mine is producing about 3400 tons per month, part of which is treated at the Mammoth mill at Robinson. The ores are gold, silver, lead and copper. The mill operates sixty stamps, thirty-six vanners, twenty-eight amalgamating pans and fourteen settlers, the method of saving being similar to that of the Eureka Hill mill.

The Black Jack, belonging to Knight & Evans, has been well equipped with hoisting machinery; a 400-foot, double-compartment shaft has been sunk, from which prospecting levels are being run for ore.

Mammoth, Sept. 29.

(Special Correspondence). — The Eagle & Blue Bell group, in charge of J. C. Chrystal, is located on the Eureka side of the range and has been well equipped within the past year. This was formerly a silver producer in the main, but of late the principal values are gold. Shipments have been made with more or less regularity during the past two years. Present shipments run one or two cars a month, the returns ranging from three to seven ounces gold, with a few ounces silver. Much of the latter is in the form of a chloride. The mine contains a great deal of ore that would be adapted to concentration and the erection of a mill may be considered later on.

The Centennial–Eureka maintains the shipment of its regular tonnage. Within the past year considerable improvement in equipment has been made, including a tramway line over which the ore is carried from the mine to the ore bins at the railroad. The electric signals, which have been in use in the shaft for two years, appear to operate very satisfactorily. Not only can signals be given from station to station, but those on the cage can signal the engineer to stop or start at any point in the shaft.

The Bullion–Beck concentrating mill, which has been closed down for some time, was designed to run on the low-grade lead ores. As this class of ore has accumulated in the past the mill has always handled it, and doubtless will do so in the future. The high-grade product is always shipped to the smelters. A strike of considerable importance is reported to have been made in the Muldoon tunnel, on Bullion–Beck property, in the vicinity of the Centennial–Eureka.

The Apex, whose earlier development was through the Uncle Sam tunnel, is now sinking a shaft from an upper 800-foot tunnel to reach its lower workings, 450 feet below the latter tunnel. The Apex ore body pitches eastward 65° from the horizontal and carries a fair valuation. L. C. Doty has charge of the Apex.

The Yankee Consolidated, near the May Day, recently opened a new ore body, from which a three-car shipment was made, the values therein being a heavy lead sulphide, carrying gold and silver.

The Uncle Sam, belonging to Knight & Sons, has a record of having produced $600,000 since it was opened, its ores being high-grade lead. Some of its shipments have run as high as 70% lead, and it is stated that no shipments have run below 50%. The Humbug, in the same locality and under the same management, though not at present a large shipper, is said to have high-grade ore and will be in position to ship at almost any time.

The Victoria recently put in a hoist and sunk a shaft 550 feet, from which considerable amount of drifting was done. This belongs to the Grand Central people.

Most of the new work on the lime belt of the Tintic range, within the last two years, has been done by local people. This comprises that section running from the north end of the spur at the Uncle Sam south to Mammoth.

Eureka, Sept. 28.

SALT LAKE COUNTY.

The Liberal and Butler No. 2 at Bingham have an option by C. C. Hayden of Colorado and J. Hudgens of Arizona, they binding themselves to pay for it $50,000 before the expiration of eighteen months.

The Bulletin hears that development operations are to be resumed at the Red Wing group, under the direction of H. T. Sappington.

Improvement is noted at the Last Chance mill. A sample of old tailings assayed 2% lead, 2.5 ounces silver and $2.40 gold. Present tailings show a trace of lead, 1 ounce silver and 70 cents gold.

WASHINGTON.

J. M. Dennett says that he has "penetrated into the Cascade range 60 miles from the railroad, and after two days of prospecting located veins showing 19 feet of anthracite coal." He estimates the quantity of coal in sight at 25,000,000 tons, but may be unduly optimistic.

FERRY COUNTY.

Fifteen miles south of Republic the Ignas M. & M. Co. is developing the Ignas mines under the superintendence of E. W. Lafrances. In a belt of schist and black shale is a vein of 8 feet of ore, carrying 100 ounces in silver.

Supt. D. C. Jackling expects the new Republic mill will be ready to operate next week.

KITTITAS COUNTY.

At Liberty, L. Alstrom last week in the placers of the Swauk found a nugget which weighs 24½ ounces and is valued at $350.

OKANOGAN COUNTY.

The Okanogan Free Gold Mines, Ltd., near Oroville, is in the hands of the sheriff, who has stopped all work on the claims. Supt. Finley estimates that by sinking a shaft 150 feet deeper than the lower workings and crosscutting 100 feet the vein could be reached at a place where the ore body would be undisturbed, and figures the cost of this work at $4600.

SPOKANE COUNTY.

The mining department of the Spokane Industrial Exposition, which opened in Spokane on the 2d inst., has a good display of minerals. Among the locations which have prominent exhibits this year are Slocan, Nelson, Ymir, Ainsworth, Rossland, Boundary, East Kootenay, B. C., the Cœur d'Alenes, central Idaho, Libby, Montana, Okanogan and eastern Oregon.

WYOMING.

CARBON COUNTY.

The first carload of machinery for the Grand Encampment smelter has arrived at Wolcott station.

Native copper is being found in the Ferris-Haggarty in the 200-foot level.

FOREIGN.

BRITISH COLUMBIA.

At Sandon the Ivanhoe mill, belonging to the Minnesota Silver Co., has started up. The concentrator has a capacity of 200 tons a day. P. Hickey is Supt.

One million shares of the Rossland Giant are reported bonded to San Francisco men for $100,000. The bond goes into effect Oct. 1, and is for two years. In that time the bondholders, according to the agreement, must sink a new working shaft 700 feet, do 1000 feet of tunneling and 1000 feet of diamond drilling. The old owners are to receive 55% of the net proceeds from ore shipped during the two years; the other 45% will be held in escrow as a protection to them should bonders break the contract.

At Nanaimo, September 30, at a meeting of the Miners' Union the question of a 10% increase was reopened and it was decided to ask for the raise.

"Miners (200) wanted to go to British Columbia; passage advanced; wages 12 shillings per eight hours' day. Apply for further particulars to E. 2780, Mail office."

The above advertisement appears in the issue of the 8th of September of the Glasgow Mail.

Nelson reports that a new straight-line roasting furnace is to be installed at the Hall mines smelter. The hearth is 12 feet wide and 120 feet long.

The Jaune de Lamare syndicate is operating fifteen hydraulic leases, comprising about 1000 acres of auriferous gravel, at Boulder Creek, Atlin. Twenty men are at work with two monitors.

Kamloops reports a strike of cinnabar at the mines near Savona, where work was recently resumed.

In the Lenora copper mine on Mt. Sicker, Vancouver Island, its shipments average 1200 tons a month. The ore runs $2.50 in gold, $2.50 in silver and 10% wet assay of copper to the ton.

At Greenwood the first ore shipments to the smelter took place on the 26th. The smelter will not be in operation until December.

The Granby smelter will ship about 150 tons matte to New York.

At Nelson the recent payment of a 5% dividend on the capital stock of the Athabasca is to be repeated quarterly.

About 1800 tons of concentrates of lead from the St. Eugene mine at Moyie have been shipped to a copper smelter at Antofagasta, Chile. The British Columbia product is used for fluxing purposes. There is an unlimited market in Chile for concentrates of lead.

BRITISH GUIANA.

U. S. Consul Moulton to Demarara, British Guiana, says the rush to the gold fields of Guiana and Venezuela, which was expected to follow the settlement of the Venezuela boundary dispute, failed to materialize. The new boundary fixed by the arbitration court is quietly accepted by the people of British Guiana and Venezuela. Gold mining is being prosecuted in the British Guiana gold fields, and a few Americans are there trying to make their fortunes. The yield of those gold fields is about $2,000,000 a year. All the gold obtained is secured by placer mining. Mining in British Guiana is attended by the greatest difficulties and hardships, and there is danger to life. The gold fields are all at some distance in the interior. To reach them the miners have to travel through swamp lands and dense brush, which are infested by alligators, enormous reptiles and wild beasts. Everything the miners carry along has to be packed by men. British Guiana is no place for American miners.

LOWER CALIFORNIA.

Ensenada, capital upper district of Lower California, reports that Benton, Ramsdale & Stevens have deposited with the Secretary of Mines for the northern district of Lower California, $75,000 in silver, and filed denouncements for nearly 4000 claims to copper mines in the interest of Montana parties. The denunciations begin as far south as San Fernando, where the greatest number of claims are, and run through the known copper country as far north as San Ysidro. Each claim is 40 meters square. There is no limit to the number that one may file upon, provided he pays the location fees.

SOUTH AFRICA.

All points of view are interesting. R. Redmon, from Johannesburg, who says he has been connected with newspapers in South Africa for seven years, says that the Transvaal of the future will not compare with the republic under Boer rule. He thinks it will be twelve months before the gold mines of the Rand can be cleared of water and the machinery put in working order; the chief difficulty or menace to the welfare of the ordinary working individual will be the consolidation of mining interests, the amalgamation of the various gold trusts into one gigantic corporation that will shut out the miner and ordinary workingman from the chance they might have had. This fact is evident, the consolidation is sure. "One has only to turn to Kimberley, the diamond district, and observe the limited amount of labor required to work that great diamond country. I recall the time when Kimberley employed thousands of workingmen of all classes, when every auriferous field was thrown open to the public, when every individual worked on a basis of equality as regards the natural wealth of the ground, when the working miner had the same opportunity of a rich find as the capitalist who might own the next claim. Everything prospered. Rhodes and his party were able to amalgamate the various interests and buy out the smaller people. Competition was useless. The great De Beers diamond trust was formed, which to-day rules the diamond market of the world. Very naturally the output of diamonds was curtailed in order to keep up market prices. Thousands of workmen were left to starve, and the once prosperous colony of Griqualand West became a slow mining village, with only the De Beers company to keep it afloat. Later on these self same workmen, miners, chiefly Americans, found employment on the Johannesburg gold fields, and were satisfied to work under the government of the Transvaal. All mining claims were distributed fairly to taxpaying citizens, and the Uitlander had the same opportunity as the Boer. In fact, the ordinary Boer was satisfied to work on his farm and leave the gold to the more progressive European or American. It needs very little prophetic insight to predict the South Africa of the future. The same conditions must prevail on the Witwatersrand as were put in force in Kimberley, as the controlling interests are held by the same men. Cecil Rhodes is the head of the great diamond trust, and is the largest shareholder in Transvaal mining companies. With the exception of a few American, German and French companies, the whole of the Transvaal is in the hands of the Rhodes interest. Under the new rule, therefore, the only issue will be the speedy consolidation of the mining interests, the closing of the smaller mines and the regulation of the output of gold to suit the London market. Instead of a city of 120,000 inhabitants, Johannesburg will take a turn after the manner of Kimberley, and become merely a small mining town, controlled by the Rhodes Consolidated Gold Mining trust. Interested publications prophesy a coming 'boom' in African stocks and shares, but the boom can be safely put down as imaginary. It will not come. On the contrary, many of the smaller companies will go into liquidation and the interests will be bought up by the larger trusts. Miners and tradesmen will not find employment in the Transvaal under the new rule. The volunteers now fighting will, of course, be given the first chance, and very few men will be required to work the consolidated mines."

Personal.

A. B. SNOW has returned to Montana from Siberia.

C. E. LOOSE has returned to Utah from San Francisco.

T. B. COMSTOCK of Los Angeles, Cal., is visiting San Francisco.

J. B. TREGLOAN is now Supt. Melba mine, Calaveras Co., Cal.

E. A. WILTSEE of San Francisco is visiting Cripple Creek, Colo.

CHAS. C. DERBY of New Almaden, Cal., has returned from his visit to the Orient.

D. H. JACKSON of El Dorado Co., Cal., will remain another year at Cape Nome, Alaska.

R. C. GEMMELL, Utah's State Engineer, is in Alpine county, Cal., sampling mining property.

WM. DENNIS has resumed the superintendency of the Mountaineer mine, Nevada Co., Cal.

LETSON BALLIET, who has extensive mining interests in eastern Oregon, is in San Francisco.

JNO. R. PHILLIPS has returned from the East to the Amador Queen mine, Amador county, Cal.

W. H. STORMS of San Francisco will shortly take charge of the Baliol mine, Amador county, Cal.

W. E. TERHUNE goes as Supt. Coconino Co.'s new plant on the Colorado river, northern Arizona.

E. A. DAVIS, Supt. Ribbon Rock mine, has returned to El Dorado county, Cal., from San Francisco.

HENNEN JENNINGS, WM. MEIN AND F. BRADLEY have returned from Grass Valley, Cal., to San Francisco.

S. T. CURTIS, a Comstock mining superintendent, has been offered the management of a mine in Dutch Guiana.

W. A. AKERS has returned to Salt Lake City, Utah, from an examination of gold properties in Park county, Colo.

SAM'L W. OSGOOD has resigned his position at Crystal Falls, Mich., to accept the superintendency of the Copper Harbor mine, Keweenaw, Mich.

ALEX. HILL of London, England, representing the English stockholders of the Pacific Northwest M. Co., is at Libby, Mont., examining the Snowshoe mine.

H. R. BOSTWICK, who recently completed an electric railway at Seoul for the Emperor of Korea, and aided in routing a mob which attacked the line, has returned from the Orient to San Francisco.

Commercial Paragraphs.

THOS. KANE & CO., 64-66 Wabash Ave., Chicago, are sole sales agents for the American Spiral Pipe Works.

THE Jeanesville Iron Works Co.'s Denver office reports recent sales and shipments: Diamond mine, Leadville, Colo., two station pumps; No. 9 B sinker to Butte, Mont.; No. 9 B sinker to Independence, Colo,; No. 5 sinker and station pump to Central City, Colo.; station pump to Colorado & Southern Railroad, 1000 gallons per minute.

THE Jeffrey Manufacturing Co. of Columbus, Ohio, have received the following letter from F. E. Drake, director of machinery and electricity, United States Commission to the Paris Exposition of 1900, Paris, France: "I am pleased to inform you that your company has been awarded a gold medal in Class 63, a silver medal in Class 23 and a bronze medal in Class 21 for your exhibits in these classes by the international jury." This covers their line of chain-belting elevating and conveying machinery and coal-mining machinery.

THE Sullivan Machinery Co. of Chicago is extending its western agencies. In addition to the Denver office, in charge of Mr. R. D. Hunter, the Sullivan Co. has now established a branch office at 101 South Howard St., Spokane, Wash., in charge of Mr. M. J. Ready, who has a complete line of rock drills, diamond drills and supplies for same. The Sullivan Co., Chicago, has moved the main Chicago offices from 54-60 North Clinton St. to the Merchants' Loan and Trust Building, 135 Adams St., Rooms 1220-1221. The store and shipping department will remain on Clinton St.

THE New Process Raw Hide Co., Syracuse, New York, furnish rawhide pinions of a style and quality commended by many users of high-speed geared machinery. The company claims that the pinions they make are long-lived and also prolong the life of the metal wheels with which they mesh, reducing vibration, and serving as a good insulator. They supply either spur, bevel or friction pinions, as desired. Their further claim is that as is steel to iron so is new process rawhide to all other rawhide. This is an age of specialties. They make rawhide pinions, which are used by the U. S. Government and more than 200 electric railways. They have attained a good reputation, and propose to maintain it.

SQUIRE V. MOONEY, manager The John A. Roebling's Sons' Company, 25-27 Fremont street, San Francisco, has notification that that company, with headquarters and manufactory at Trenton, New Jersey, has received for its exhibit at the Paris Exposition two grand prizes and two gold medals, the highest honors within the gift of the Exposition authorities. The Roebling display at the Exposition consisted of two exhibits, one the products of the company's electrical department, the principal feature a full size model of a section of underground trolley track, illustrating the communications with the conductive bars and the lead-encased cables which transmit the current to the cars, the other exhibit in the department of metallurgy, giving comprehensive view of all the products of the Roebling works, with the exception of the electrical conductors. Part of that exhibit contains samples of every variety of steel and copper wire, from the largest sizes made to wire with a diameter of $\frac{1}{1000}$ of an inch. This latter is so fine that it is impossible to detect it between the fingers. It is half as thick as the finest human hair, and a mile of it weighs about a quarter of an ounce. It is drawn through diamond dies, and is a good example of the skill displayed by the workmen in the process of manufacture. The Roeblings have exhibited at all the prominent expositions for a number of years and possess many awards conferred, including gold and other medals. At the Centennial, at the World's Fair in Chicago and at the Philadelphia Export Exposition the excellence of its manufactures was acknowledged. The Roebling Company in the last two years has built a large wire mill, and has in its employ about 3000 operatives.

Obituary.

HENRY C. BALLARD, the man who built the Loop above Georgetown, Colo., died on the 24th ult. at Tie Siding, Wyo., where he was superintending railroad construction on the Union Pacific.

J. G. LAWS, well known for many years in Nevada and California as a journalist, died on Sept. 20th at Cinnabar, Trinity county, Cal., where he was Supt. of the Integral quicksilver mine. Fifteen miners from the Integral, Altoona and other mines carried the body down over the long and rough mountain trails to the railroad, and the train brought it to Oakland, Cal., where his family lives.

List of U. S. Patents for Pacific Coast Inventors.

REPORTED BY DEWEY, STRONG & CO.,
PIONEER PATENT SOLICITORS
FOR PACIFIC COAST.

FOR WEEK ENDING SEPTEMBER 25, 1900.

658,333.—TOWEL RACK—E. C. Alford, Moro, Or.

658,616.—BROOM HOLDER—H. Blome, McMinnville, Or.

658,479.—TIRE REMOVER—B. M. Buckland, Poplar, Cal.

658,718.—SPEED GEAR FOR BICYCLES—J. A. Cardinell, S. F.

658,497.—METALLIC LATHING—M. Carrick, S. F.

658,482.—CHECKING DEVICE—C. J. Castera, Jr., Los Angeles, Cal.

658,358.—TOP—W. R. Ellis, Livermore, Cal.

658,708.—GUN SIGHT—S. E. Fischer, S. F.

658,709.—GUN SIGHT—S. E. Fischer, S. F.

658,500.—AXLE NUT—W. H. Holliway, Oakdale, Cal.

658,647.—HAY RAKE—J. H. Hughes, Alicel, Or.

658,374.—ADVERTISING DEVICE—J. N. Johnson, Prescott, A. T.

658,503.—BED BOTTOM—G. H. McBride, S. F.

658,728.—BOILER FEEDER—H. C. Needham, Los Angeles, Cal.

658,672.—STAMPING MACHINE—C. M. Pierce, Weston, Or.

658,397.—THILL COUPLING—O. H. Platt, Chico, Cal.

658,533.—DOOR CHECK—D. Schuyler, San Diego, Cal.

658,516.—NOZZLE DEFLECTOR—J. W. Smith, Weaverville, Cal.

658,687.—FIRE ESCAPE—J. M. Swift, Selma, Cal.

658,495.—EARTH DRILL—H. E. Williams, San Jose, Cal.

658,692.—HOSE COUPLING—R. Williams, Walla Walla, Wash.

658,496.—WAGON GEAR—G. T. Willis, Fresno, Cal.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

AUTOMATIC FLUSHER.—No. 658,139. Ira P. Clarke, Alameda, Cal. The object of this invention is to provide an automatic apparatus for the flushing of sewers and the like at frequent intervals. It consists of a chamber or receptacle having an opening connecting with the sewer, and a valve by which the opening is closed. A float is suspended from one end of a lever fulcrumed above the valve, and a weighted traveler is movable to and from the fulcrum point on the opposite side of the lever. A chain connects the traveler with the valve so that when the float has risen to a certain point the traveler will be disengaged, and will move quickly to the outer end of the lever, thus suddenly opening the valve to allow the escape of the water. As the water discharges the float will sink, and will again tilt the lever into such position that when the tank is approximately empty the traveler will rapidly return toward the center of the support of the lever, and slackening the chain will allow the valve to close suddenly upon its seat. The flow of water being continuous will cause this operation to continue automatically and indefinitely.

MANUFACTURE OF FLAT WIRE CABLES.—No. 658,118. Sept. 18, 1900. E. I. Parsons, San Francisco, Cal., assignor to the American Steel & Wire Co. of Chicago, Ill. This invention relates to an apparatus which is used in the manufacture of cables, such as are made by laying a series of ropes side by side, and stitching them through to form a flat cable. The difficulty in manufacturing this class of cables arises from the unequal tension upon the transverse sewing wires caused by different power applied in pulling the wires through. In this invention the pull upon the stitching wires is made approximately the same by means of a bar having a hook upon one end, through which the pull is exerted. There is a shank or stem upon which the hook bar is slidably guided, said shank having a handle and a yielding spring and latch mechanism through which connection is made between the handle and the shank. There is a device by which the latch is disengaged when a given tension has been reached so that the pull upon the stitching wire will always have the same tension, and if this is exhausted the latch disengages and relieves the pull.

DEFLECTOR FOR HYDRAULIC NOZZLE.—No. 658,516. Sept. 25, 1900. J. W. Smith, Weaverville, Cal. The object of this invention is to provide a means for changing the direction of hydraulic nozzles through which water is discharged under a high rate or great pressure. It consists of a supplemetal pipe, and means for supporting it axially in line beyond the main nozzle, with a lever or means by which it can be turned to either side, or up and down, so that the stream of water issuing from the nozzle will impinge upon this extension, and will, by thus acting upon it, turn the main nozzle to the opposite direction by the reactionary force of the water upon supplemental nozzle, while the latter is held in this position. When the supplemental nozzle is released it will of itself return to a position in line with the main nozzle and will not interfere with the stream which is discharged therefrom.

BED BOTTOM.—No. 658,053. Sept. 25, 1900. G. H. McBride, San Francisco, Cal., assignor of $\frac{51}{100}$ to D. H. Bibb, of same place. This invention consists of a rectangular bed bottom frame with spirally twisted elastic cables having their ends fixed to the opposite ends of the frame and intermediate between the ends, the cables are interlaced in such a way that they mutually support each other, and by being immovably interlocked any pressure which may be brought upon one side or the other is transmitted so that all of the cables sustain a portion thereof. The usual top mattresses are placed upon this structure to complete the bed.

Latest Market Reports.

SAN FRANCISCO, Oct. 4, 1900.

SILVER—Per oz., Troy: London, 29½d (standard ounce, 925 fine); New York, bar silver, 64c (1000 fine); San Francisco, 63⅞c; Mexican dollars, 51¼c.

There is a noticeable rise in silver, editorially discussed on page 398. Regarding the Government purchases of silver, it is to be noted that the Government at present purchases only such silver as is contained in gold deposits from the Klondike and other gold-producing sections. Under the existing statute all silver in gold deposits is paid for at the market price. The advance is a good thing for Western silver-lead producers. The Bulletin reports specie shipments from San Francisco during the month of September as follows:

To Hongkong—		
Silver bars	$ 334,732	
Mexican dollars	2,535,308	
Gold coin	11,343	
		$2,881,383
To New York—		
Gold coin	$ 29,260	
Silver coin	18,580	
Currency and bonds	1,460	
		49,300
Total		$2,930,683

For the first nine months of the year shipments were:

Gold bars	$ 3,278
Silver bars	3,539,174
Mexican dollars	7,960,230
S. A. dollars	35,827
Silver coin	339,022
Gold coin	3,818,562
Gold dust	2,650
Japan gold	......
Currency and bonds	2,547,244
Total	$18,245,987

COPPER.—New York: Lake, 1 to 3 casks, $17.00 cash; carload lots, 16.75; Electrolytic, 1 to 3 casks, 16.87½; carload lots, 16.62½; Casting, 1 to 3 casks, 16.75; carload lots, 16.60. San Francisco: 18. Mill copper plates, 20c; bars, 22@23c.

LEAD.—New York, $4.37½; Salt Lake City, $4.25; St. Louis, $4.32½; San Francisco $5.00, carload lots; 5½c 1000 to 4000 lbs.; pipe 6¾, sheet 7½, bar 6c; pig, $4.70 @5.10. London, £17 17s 6d.

SPELTER.—New York, $4.15; St. Louis, $4.00; San Francisco, ton lots, 5½c; 100-lb lots, 5¾c.

ANTIMONY.—New York, Cookson's, 10½c; Hallett's, 9½c; San Francisco, 1000-lb lots, 12c; 300 to 500 lbs., 13@14c; 100-lb lots, 15@18c.

IRON.—Pittsburg, Bessemer pig, $14.00; gray forge, $13.50; San Francisco, bar, per lb., 2.50c in small quantities.

STEEL.—Bessemer billets, Pittsburg, $17.50; sheet bars, $22; San Francisco, bar, 7c to 12c per lb.

The steel rail pool has fixed the price of steel rails for the coming year at $26 per ton—$9 per ton cheaper than last year and $1 higher than it was expected the rate would be. On 80-pound rails that is a reduction of $1131.40 to the mile in the cost of rails.

The rail makers, in reducing steel rails from $35 to $26, a reduction of about 25%, figure a market for, in round figures, 2,000,000 tons of rails, or the bulk of the rails that will be needed for the requirements of 1901. There is considerable profit at $26.

The price for Bessemer pig is $14 and of slabs $17.50. A slab is a steel rail in the form of a chunk of steel. For nominal cost it is rolled out long into steel rail. For this $3 is the charge. At this cost steel rail is worth $20.50 per ton.

TIN.—New York, pig, $29.75; San Francisco, ton lots, 31c; 1000 ℔s., 31¼c; 500 ℔s., 31½c; less, 32c; bar tin, ⅌ ℔, 34½c.

QUICKSILVER.—New York, $51.00; large lots: London, £9 2s 6d; San Francisco, local, $48.50 ⅌ flask of 76½ ℔s.; Export, $45.50.

NICKEL.—New York, 50@60c ⅌ ℔.

MAGNESIUM.—New York, $3.00 ⅌ ℔.; San Francisco, $4.00.

ZINC.—San Francisco, 5½c; slab, 6c; bar, 7¾c.

SOLDER.—Half-and-half, 100-℔. lots, 20½c; San Francisco, Plumbers', 100-℔. lots, 17¼c.

BABBITT METAL.—San Francisco, No. 1, 10c.

ASSAY LITHARGE.—San Francisco, 10c ⅌ ℔, small lots.

BISMUTH.—New York, ⅌ ℔., $1.60 50-℔ lots; San Francisco, $2.50 to $2.75 ℔ lots.

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 30c to 35c.

PHOSPHORUS.—F. o. b. New York or Philadelphia, 45@50c ⅌ ℔.

TUNGSTEN.—New York, ⅌ ℔., 95c; San Francisco, $1.15.

FERRO-TUNGSTEN.—New York, 37%, 35c; San Francisco, 65c (60%).

FERRO-MANGANESE.—Pittsburg, 80%, domestic, $85, large lots.

PLATINUM.—San Francisco, crude, $17 ⅌ oz.; New York, $18.25; manufactured, $19.50@22.00.

POWDER.—F. o. b. San Francisco: No. 1. 70% nitro-glycerine, per ℔., in carload lots, 15¼c; less than one ton, 17¼c. No. 1*, 60%, carload lots, 13¼c; less than one ton, 15½c. No. 1** 50%, carload lots, 11¾c; less than one ton, 13¾c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9½c; less than one ton, 11½c. No. 2** 30% carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9, in lots not less than 1000.

FUSE.—Triple tape, $3.60 per 1000 feet; double tape, $3.00; single tape, $2.65; Hemp, $2.10; Cement No. 2, $3.00; Cement No. 1, $2.65, in lots of 3000 feet and up.

CANDLES.—Granite 6s, 16 oz., 40s., 11¾c ⅌ set; 14 oz., 40s., 10½c.

CHEMICALS.—Cyanide of potassium, 98%-99%, jobbing, 32½@33½c ⅌ ℔.; carloads, 30@31c; in 10-℔. tins, 40c; sulphuric acid, 66% B, 2c ⅌ ℔.; soda ash, $1.60 ⅌ 100 ℔s. 58%; hyposulphite of soda, 2¾@3c ⅌ ℔.; blue vitriol, 5½@6c ⅌ ℔.; borax, concentrated, 7@8c ⅌ ℔.; chlorate of potash, 12@13c; roll sulphur, 6c; alum, $1.90@2.00; flour sulphur, French, 2¼@2½c; California refined, 1¾@2c; nitric acid, in carboys, 8c ⅌ ℔.; caustic soda, in drums, 3@4c ⅌ ℔.; Cal. s. soda, bbls., $1.00; sks, 95c ⅌ 100 ℔s.; chloride of lime, spot, $2.50@2.60; nitrate of potash, in kegs, 8c; caustic potash, 10c in 40-℔. tins.

OILS.—Linseed, pure, boiled, bbl., 75c; cs., 80c; raw, bbl., 73c; cs., 78c. Deodorized Stove Gasoline, bulk, 15c; do., cs., 21c; 86° Gasoline, bulk, 21c; do., cs., 27c; 63° Naphtha or Benzine, deodorized, in bulk, per gal., 14c; do., in cs., 20c; Lard Oil, Extra Winter Strained, bbl., 70c; cs., 75c; No. 1 bbl., 50c; cs., 55c; Neatsfoot Oil, coopers' bbls., 60c; extra bbls., 65c; cs., 60c; No. 1 bbl., 52½c; cs., 57½c.

The Standard Oil Co. has reduced the price of crude oil 5 cents per barrel to $1.20 The price has remained stationary at $1.25 for about two months.

Refined petroleum in New York has been reduced 20 points to $7.85 in barrels and $5.30 in bulk, Philadelphia prices being on a basis of 5 points lower.

COAL.—San Francisco, coast, yard prices: Wellington, $9; Seattle, $7.00; Coos Bay, $5.50; Southfield, $9.00. Cargo lots, Eastern and foreign: Wallsend, $8.00; Brymbo, $7.50; Pennsylvania, hd., $14.00; Scotch, $8; Cumberland, $12; Cannel, $9.50; Welsh Anthracite, $12.00; Rock Springs, $8.50; Colorado Anthracite, $14.50. Coke, $16 per ton in bulk; $18 in sacks.

San Francisco Stock Board Sales.

SAN FRANCISCO, Oct. 4, 1900.

100 Alpha	04c	200 Potosi	21c
200 Belcher	20c	400 Savage	23c
400 B. & B.	35c	100 Sierra Nev.	34c
150 Ophir.	76c	100 Utah	05c

Recently Declared Mining Dividends.

Bunker Hill & Sullivan M. & C. Co., Idaho, $21,000	Oct. 4
Boston & Colorado Smelting Co., 1½%	Oct. 1
Anaconda, Mont., Copper M. Co., $1.25 per share and 75 cents extra	Oct. 27
Parrot M. Co., Montana, $1.50 per share	Oct. 29

Quicksilver

—FOR SALE BY—

The Eureka Company,
OF SAN FRANCISCO.
ROOM 1, - - 320 SANSOME STREET,
SAN FRANCISCO.

WE BUY very rich Ores, Dental Scraps, Tellurium Ores, Mill Wastes, Jewelers' Sweeps, Gold Retorts, Old Iron Retorts, Base Amalgam, Quicksilver, Amalgamated Plates, Gold and Silver, Old Slags.

A. M. DONALDSON & CO.,
ASSAYERS AND WASTE PRODUCT SMELTERS,
1661 Larimer St., Denver, Colo.

Donaldson's Assayers' Slag Hammer { 1 lb......$1.10 / 1 lb. 3 oz. $1.25

Quicksilver

For Sale in Lots to Suit.

REDINGTON & COMPANY, Wholesale Druggists, 23-25-27 Second Street, San Francisco.

FOR SALE.

For Sale or Bond---Very High Grade Copper Property Located in Arizona.

JOHN M. VRCHOTA, La Crosse, Wis.

FOR SALE.—A MAMMOTH GOLD MINE OF free milling ore. Never before offered for sale. A rare opportunity for large capitalists or a strong syndicate. Apply to E. J. FRASER (sole agent for owners), 522 Parrott Building, S. F., Cal.

A group of 12 Colorado high-grade gold mines are now offered for sale for the first time. Wide veins of rich, free-milling ore. Plenty of wood and water. Good roads, and near R. R. station. Title U. S. Patents. Capitalists or their special agents only need apply. Buyer and seller brought together for negotiations. Address E. J. FRASER (sole agent for owners), Room 522, Parrott Building. S. F., Cal.

FOR SALE.

Lease and Bond, Eighteen Months, Easy Terms, Copper Property, New Mexico.

High grade ore with good gold values. Accessible. Plenty wood and water. Strong vein. Three shafts. Will pay from start. Adjoins large producing mine. **H. E. RUNKLE, El Paso, Texas.**

Hoist on Hand for Immediate Shipment.

A first-class Steam Hoist, double 10x12 cylinders, drums 48″ dia. by 30″. For specifications, price, etc., address Mining and Scientific Press.

FOR SALE,

Lease or Bond, 6 Months' Time.

80,000 acres of timber lands at La Tesca Municipality, Ahuacatlan, Tepic, with mineral deposits—gold, silver, zinc and land. Water power close to the mines. Address to

ELIAS GALINDO, Box 26, Tepic, Mexico.

FOR SALE.

AIR COMPRESSORS.

6x8 and 10x12 Knowles, belted, straight line, high duty Air Compressors.

THE S. H. SUPPLY CO.
WRITE FOR CATALOGUE OF MINING MACHINERY AND SUPPLIES.
22nd and Larimer Sts., DENVER, COLO.

Samples by Mail or Express Will Receive Prompt Attention.

ALBERT I. GOODELL,
ASSAYER AND CHEMIST,
1430 Stout Street......................DENVER, COLO.

FRED C. MILES,
CISCO, PLACER CO., CAL.
COPPER AND GOLD PROSPECTS.
A GOING GOLD PROPERTY.

AMERICAN AND FOREIGN
PATENTS
CAVEATS, TRADE MARKS.
DEWEY, STRONG & CO.
330 MARKET ST. S. F.

SITUATIONS WANTED.

SITUATION WANTED AS ASSAYER. Address B. H. W., care of the Mining and Scientific Press office.

GRADUATE MINING ENGINEER, five years field work, surface and underground, familiar with cyaniding, surveying and draughting, desires position after Nov. 1st as Assayer and Chemist or Ass't Supt. A1 references as to ability and character. Salary small object; opportunity to prove ability considered more important. Address B. F., care this office.

WANTED.—SITUATION BY A MAN OF EXperience who is competent to take charge of a gold mine. Understands assaying, surveying, and has business qualifications. Best of references as to character and ability. Address K. C., this office.

WANTED.—SITUATION BY A COMPETENT and experienced millman on concentrators or battery frame. Highest references. Address L. W., 509 Kearny street, room 2, first floor, San Francisco, Cal.

SITUATION WANTED by a first-class miner with years of experience; up to date in timbering and working a mine; handles men with skill and economy; understands modern milling and concentrating; with business ability; best of references. Address Superintendent or Foreman, care this office.

MINING ENGINEER (technical training), twenty years' experience as surveyor, assayer, superintendent and manager of mines and mills; business qualifications; linguist; at present general manager mining and milling proposition in Mexico; desires to make a change on account of health; best references. Address S. O., Mining and Scientific Press.

WANTED.—A SITUATION AS MANAGER OF A gold quartz mine in Colorado or California; understand assaying and chlorination; salary, one-half in mining stock and one-half in cash. $200 per month. Reference as to ability: L. X. Smith, manager of Gillett Gold Extraction Co. Address L. W. THIELE, Altman, Colorado.

WANTED SITUATION
AS MILLMAN, FOREMAN, OR ASSISTANT.

Have had eight years' experience with one of the largest mining companies in Idaho, in pan amalgamation, cyaniding and refining of bullion. Ability to do assaying. Refer to De Lamar Mining Co., De Lamar, Idaho. Address W. H., this office.

WANTED.

WANTED.---A NEW OR SECOND-HAND 15 H. P. GASOLINE HOIST.

Keystone Con. Mining Co., Amador City, Cal.

WANTED.—METALLURGIST CAPABLE OF taking charge of 40-ton copper furnace using charcoal fuel, situated in Mexico. State experience and wages wanted; references. Address "Metallurgist," Mining and Scientific Press.

INFORMATION WANTED

regarding whereabouts of John R. Williams, about 70 years old. Last heard of as Supt. of a mine in Copper's Hill, Vermont, in 1866. Has an adopted son about 32 years old. Supposed to be placer mining in the West, possibly California. $25.00 reward at Deseret News Office, Salt Lake City, Utah.

WANTED.

Experienced Promoter and Stock Operators

to handle the sale of stock for an oil company. State previous experience.

For particulars, address

C. J. TALLON,
308 Market Street,........San Francisco, Cal.

Experienced Coal Miners

can secure **steady employment** either on **contract** or by **day's work** at the **TESLA COAL MINES, Tesla, Alameda County, California.** Good wages guaranteed, also good board. Good climate, and also good accommodations and houses for families.

For further particulars, please apply to the Superintendent at the Mines, or to the Company at 328 Montgomery St., San Francisco, Cal.

REFRACTORY ORES WANTED.

1000 TONS or more which will assay $75.00 Gold per ton and over, delivered free of charge at San Francisco, Cal. Correspondence solicited.

C. J. TALLON,
308 MARKET STREET, SAN FRANCISCO, CAL.

BENJAMIN T. LLOYD, STOCKS, BONDS AND MINES.

Have immediate customers for well-developed Gold and Copper Properties.

P. O. Box 608, **SALT LAKE CITY, UTAH.**

INVENTORS, Take Notice!

L. PETERSON, MODEL MAKER,

544A MISSION STREET, bet. First and Second Sts., SAN FRANCISCO. Experimental machinery and all kinds of models. Tin and brasswork. All communications *strictly confidential.*

WEST COAST OF MEXICO.

WÖHLER, BARTNING Suc's, Mazatlan (Sinaloa), Mex.

Bankers, Importers, Exporters and Commission Merchants.

Representatives and Agents of the principal Mining Companies in the State of Sinaloa and the dependencies of the Pacific coast in the States of Durango, Chihuahua, Sonora, Lower California and Jalisco.

ORE BUYERS AND EXPORTERS. - MINING SUPPLIES.

THE FIRST RAINS HAVE COME!

Paint your buildings ready for winter with

Buswell's Paints.

BEST FOR DURABILITY.

$1.25 and $1.50 per gallon.

LUBRICATING OILS.

COLOR CARD AND BOOKLET SENT FREE.

BUSWELL PAINT CO.,
902 Broadway, Oakland. 31 Market St., San Francisco

CHAS. F. POTTER & CO., MINES AND STOCKS.

FISCAL AGENTS FOR THE

COPPER CROWN OF ARIZONA MINING CO.
425 First Ave. North,
MINNEAPOLIS, MINN.

References: Hennepin County Savings Bank, Bradstreet's Mercantile Agency, R. G. Dun & Co.

N. B.—Copper Crown of Arizona Mining Co. own a rich property near the Black Diamond, in the Dragoons, Cochise county, Arizona. We will be pleased to send "investors" full information as to ore and assays. A limited amount of $1 shares for sale at $50 per 1000, $500 per 10,000 shares.

MILL PLANS.

Cyanide, Concentration, Smelting, Sampling.

F. D. BAKER, Mech. Eng., DENVER.

Our Exhibit at the Paris Exposition and the fact that the

Cross Oil Filters

Are used in the power plant of the U. S. Machinery Exhibit there, has already brought us several French orders.

Our guarantee is the same in all parts of the world, viz: that they will save 50 per cent of oil bills, and we send them on approval at our expense.

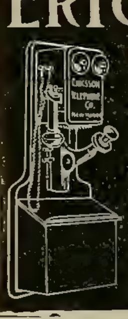
THE BURT MFG. CO.,
Akron, Ohio, U. S. A.

Largest Mfrs. of Oil Filters in the World.

We also manufacture the
BURT EXHAUST HEAD.

THE CALIFORNIA DEBRIS COMMISSION, HAVING received applications to mine by the hydraulic process from the Dewey Consolidated Gravel Mining Co., in the Homeward Bound, Evening Star and Morning Light Mines, near Iowa Hill, Placer Co., to deposit tailings in Indian Canyon; from Mary E. Ruth et als., in the Buckeye Mine, near North San Juan, Nevada Co., to deposit tailings in a worked-out pit; from the Ralston Divide Gold Mining Co., in the Pat Goggins and Blacksmith Flat Mines, near Virner, Placer Co., to deposit tailings in Long Canyon; from Nathan Gardiner, in the Sidney Placer Mine, near Igo, Shasta Co., to deposit tailings in Sidney Gulch; and from A. W. Whitney and C. Y. Hepler, in the Miocene Mine, near Crescent Mills, Plumas Co., to deposit tailings in Rush Creek, gives notice that a meeting will be held at Room 59, Flood Building, San Francisco, Cal., on October 15, 1900, at 1:30 P. M.

ERICSSON SWEDISH TELEPHONES



Seem to possess almost human intelligence. They respond to every requirement in a smooth, positive fashion that shows what a perfect telephone can do. Besides this they have unequalled strength and durability. Their reputation as "STANDARD OF THE WORLD" is built on merit. Is the best too good for you?

ERICSSON TELEPHONE CO. 296 BROADWAY NEW YORK.

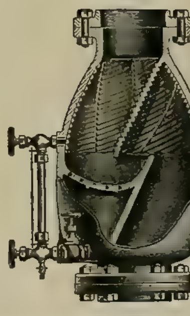
Fuel Economy is An Important Item,

but the waste in steam delivery is a still more serious matter. We not only make a saving for you in fuel, but insure you delivery of steam free from moisture.

The Austin Separator

does this because it's built on a practical and scientific basis. IT FULFILLS ITS MISSION.

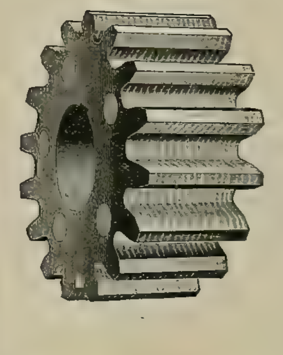
Shipped to any point in the United States on 30 days' trial.



Vertical. Sizes 1½ to 12 in.

AUSTIN SEPARATOR CO.,
27 W. Woodbridge St.,
Detroit, Mich., U. S. A.

STOP THAT NOISE!



New Process Raw Hide

PINIONS

are Noiseless and Durable. We make Spur, Bevel and Friction Gears for use on Hoists, Pumps, Air Compressors, Motors, Drills, and all kinds of geared machinery.

—THE—

New Process Raw Hide Co.,

Patentees and Sole Manufacturers, SYRACUSE, N. Y.

UNION IRON WORKS,

★ ★ 222 Market Street, San Francisco, Cal. ★ ★

Manufacturers of All Classes of MINING MACHINERY.

COPPER AND LEAD-SILVER SMELTING PLANTS,

Latest Improved Water Jacket Furnaces,

CONVERTERS AND ROASTING FURNACES,

Hoisting and Pumping Machinery,

AIR COMPRESSORS,

Stamp Mills and Concentrating Plants,

HIGH GRADE ENGINES AND BOILERS.

DANGER! BEWARE! ZERO WEATHER IS AT HAND!

EVERY MINE SHOULD BE PROVIDED WITH THE LIFE-SAVING

RUNDLE POWDER THAWER.

AN ABSOLUTELY SAFE DEVICE FOR THAWING HIGH EXPLOSIVES.

OPEN.

Every stick of powder entirely surrounded by water, thus keeping it in constant working condition. Each Thawer has a capacity of twenty sticks, and on account of the horizontal position there is no danger from glycerine, as is the case in Thawers having powder in a vertical position. Heat is supplied by candle snuffs.

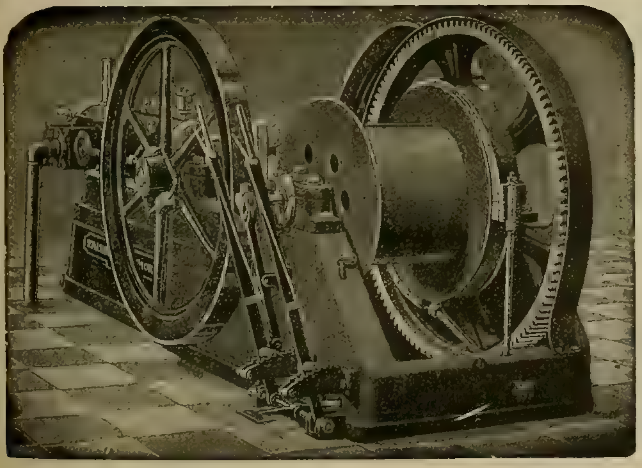
CLOSED.

Order a Sample Thawer. Net Price $5.00 f. o. b. Cars Denver.

——MANUFACTURED AND SOLD BY——

The Hendrie & Bolthoff M'f'g & Supply Co.

DENVER, - - - - - - COLORADO.



FAIRBANKS-MORSE GASOLINE-DISTILLATE GEARED HOISTER.

An efficient and reliable combination of a Fairbanks-Morse Gasoline-Distillate Engine on the same base with a Friction Hoist. Modern and up to date. We publish a special catalogue describing our Hoister which we gladly mail prospective purchasers.

FAIRBANKS-MORSE GASOLINE-DISTILLATE ENGINES.

ALL SIZES UP TO AND INCLUDING 54 HORSE POWER.
For Pumping, Milling, Lighting, Air Compressors, Etc.

FOR CATALOGUES AND FULL INFORMATION, ADDRESS

FAIRBANKS, MORSE & CO.,

310 MARKET ST., SAN FRANCISCO, CAL.
201 N. LOS ANGELES ST., LOS ANGELES, CAL.
FIRST AND STARK STS. PORTLAND, OGN.
1600 SEVENTEENTH ST., DENVER, COL.
FRANKLIN AND MONROE STS., CHICAGO, ILL.

RISDON IRON WORKS,

SAN FRANCISCO, CALIFORNIA.

Cable: "Risdon's." Code: A. B. C. & Leiber's.

MANUFACTURERS OF

Gold Dredging Machinery

And COMPLETE EQUIPMENT for Placer Mines OUR SPECIALTY.

We build **GOLD DREDGES COMPLETE IN RUNNING ORDER** to handle 2500 cubic yards per day at a cost of 3 cents per cubic yard.

We excavate 50 feet below water, 20 feet above water and handle boulders up to one ton weight.

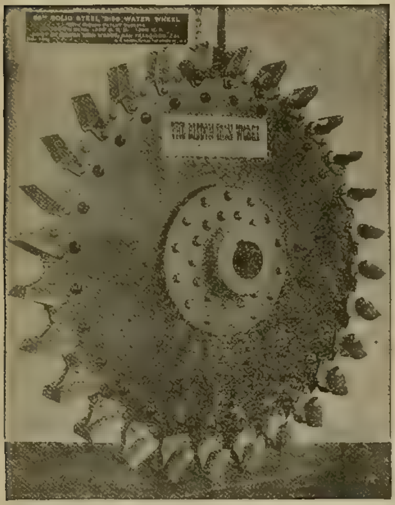
Send for Dredging Catalogue No. 17.

—WE ALSO BUILD—

All kinds of Mining, Milling, Concentrating, Pumping, Air Compressing, Hydraulic, Water Wheel and Hoisting Machinery.

EVANS HYDRAULIC GRAVEL ELEVATORS.

We publish sixteen catalogues. Write for one in the line you are interested in.

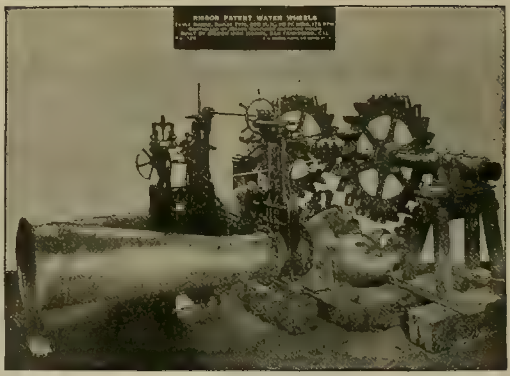


TANGENTIAL WATER WHEELS

MANUFACTURED BY

RISDON IRON WORKS,

SAN FRANCISCO, CALIFORNIA.



We build Water Wheels for any head and for any power. Complete electrical power generator wheels a specialty. Large wheels up to 50 feet diameter for driving compressors.

SEND FOR CATALOGUE NO. 4.

Westinghouse Electrical Apparatus.

The Standard of Excellence.

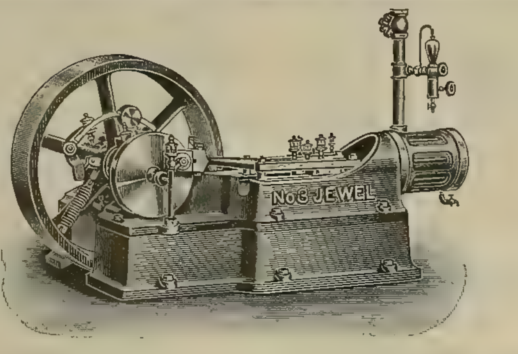
Has demonstrated its economy and efficiency in all the principal mining districts.

Westinghouse Electric & Manufacturing Co.

All Principal Cities in U. S. and Canada. Pittsburg, Pa.

651

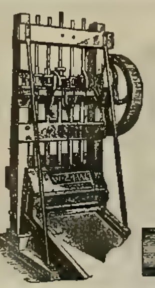
JEWEL ENGINES



A THOROUGHLY RELIABLE, SIMPLE, HIGH CLASS, PERFECTLY GOVERNED AUTOMATIC ENGINE AT A REASONABLE PRICE.

BAKER & HAMILTON,

SAN FRANCISCO, SACRAMENTO, LOS ANGELES.



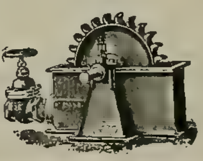
HYDRAULIC, MINING AND DREDGING MACHINERY, RIVETED STEEL PIPE,

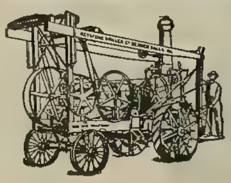
WRITE FOR PRICES AND ESTIMATES

AMERICAN IMPULSE WATER WHEELS, ETC.

WOLFF & ZWICKER IRON WORKS

PORTLAND OREGON





Prospecting Machinery.

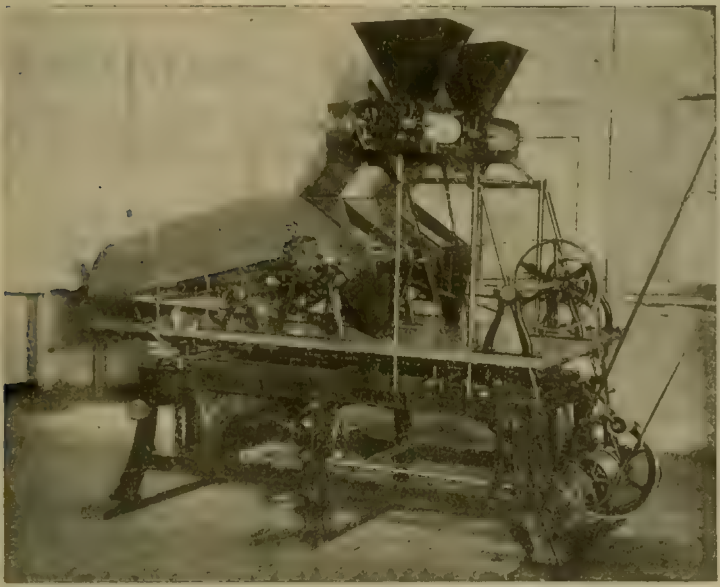
Multitudes in use for testing for minerals. Sizes and equipments to suit any and all conditions. Unexcelled for Placer Testing, Oil Wells, Water Wells, testing for Lead and Zinc, Iron and Coal; goes through anything; brings up everything. Large sizes drill as much as 1500 feet. In use all over the world. Every purchaser pleased. Used on boats for testing river and lake beds. Water no hindrance. No skilled labor required.

KEYSTONE DRILLER CO., Beaver Falls, Pa., U. S. A.

CROWN GOLD MILLING CO.

Manufacturers of the "CROWN" CONCENTRATOR and CROWN ORE SIZER. A dry process of sizing and concentrating ore, sand or gravel. Designed to accord fully with the laws of specific gravity, and especially adapted to refractory ore or localities where there is no water.

The chief claims for the Crown Concentrator are that it occupies less floor space and has nearly four times the capacity of any wet concentrator; that it will concentrate ores containing base and refractory metals that ordinarily slime and carry off values; that it effects a saving of values far above the ordinary methods of concentration.



We have, now in operation, a complete plant for crushing, sizing and concentrating ores by the

Crown Dry Milling Process.

Mine owners desiring tests made can forward us, freight prepaid, not less than 1000 lbs. nor more than 4000 lbs. of sample, for which a charge of $20 will be made. (This amount includes assaying, etc.)

Ores for which this process is adapted and of which consignments are solicited are any concentratable ores, pulps, tailings, or sands, carrying sufficient values, whether they have heretofore been profitably concentrated or not.

* * *

Office,..............................230 Post St.
Works,.................23 Stevenson St.
SAN FRANCISCO, CAL.

Finlayson {Patent Aerial} {WIRE ROPE} TRAMWAY

FOR TRANSPORTATION OF ORE, COAL, DIRT, TIMBER, ETC.

Perfect Grip Clip,
Absolutely Safe,
Loads Automatically,
Unloads Automatically,
Operated by One Man,
Cost of Maintenance Low,
Capacity Largest Obtainable.

ALSO SOLE MANUFACTURERS
PATENT FLATTENED STRAND
HERCULES WIRE ROPE
[TRADE MARK REGISTERED.]
—AND—
Wire Rope
OF EVERY DESCRIPTION.
MANILLA, SISAL, BLOCKS, ETC.

A. LESCHEN & SONS ROPE CO.,

Home Office: 920-922 North Main St., ST. LOUIS, MO. Branch Office: 47-49 South Canal St., CHICAGO, ILL.

GEO. E. DOW PUMPING ENGINE CO.

(Successors to DOW STEAM PUMP WORKS.)

COR. FIRST AND NATOMA STS., - - SAN FRANCISCO, CAL.

MANUFACTURERS OF

DOW PUMPS

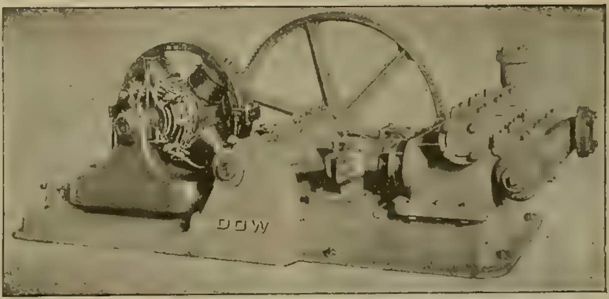
FOR MINING PURPOSES,

Operated by STEAM, AIR, ELECTRIC or WATER POWER.

VERTICAL SINKING PUMPS, BUCKET OR DOUBLE PLUNGER PATTERN.

DEEP MINE STATION PUMPS.

PUMPING MACHINERY FOR EVERY POSSIBLE DUTY.



HOR. TRIPLEX MINE STATION PUMP WITH ELECTRIC MOTOR.

SELBY SMELTING AND LEAD CO.,

REFINERS OF GOLD AND SILVER BARS, GOLD DUST, ETC.

Buyers of Gold, Silver, Lead and Copper Ores, Gold Concentrates, Lead Bullion, Cyanide Product, Etc.

ORE AND BULLION ASSAYERS.

Works at VALLEJO JUNCTION, CAL. Office, 416 MONTGOMERY ST., SAN FRANCISCO, CAL.

THE MINE AND SMELTER SUPPLY CO.,

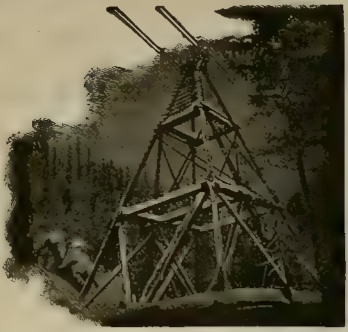
DENVER, - - COLORADO.

Mining and Milling Machinery and Supplies.

We beg to call your attention to

THE FINLAYSON PATENT WIRE ROPE TRAMWAY—

the latest and best system of double-rope automatic aerial tramway in the market. If interested in the most economical system of transporting ores from mine to mill and to shipping stations, send for our special tramway catalogue.



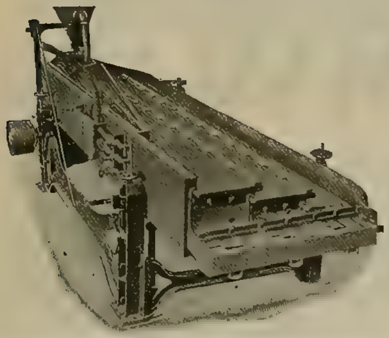
We carry a complete stock of Machinery and Supplies for immediate delivery.

Send for our special catalogues on Mining Machinery, Milling Machinery, Wilfley Concentrators, Tramways, Power Transmission Machinery, Machine Tools, Etc.

THE MINE AND SMELTER SUPPLY CO.,......................Denver, Colorado
THE MINE AND SMELTER SUPPLY CO.,................Salt Lake City, Utah
THE MEXICO MINE AND SMELTER SUPPLY CO.,
No. 16 San Francisco St., City of Mexico.

BOILERS, ENGINES, STEAM HOISTERS, ELECTRIC HOISTERS, ROLLS, CRUSHERS, WILFLEY TABLES, CARS, CAGES, ORE BUCKETS, RAIL, PIPE, FITTINGS, BELTING, ETC., ETC.

THE IMPROVED BARTLETT CONCENTRATING TABLE.



The BARTLETT CONCENTRATING TABLE has been GREATLY IMPROVED recently by the substitution of iron in place of wood wherever possible. It is now built with SOLID IRON TOP, PLANED TO A TRUE SURFACE AND POLISHED; all parts are made by template and EACH PART BEING INTERCHANGEABLE. As now constructed, the table has no special wearing parts and will last for many years. It has a CAPACITY OF FROM FIFTEEN TO FORTY-FIVE TONS IN TWENTY-FOUR HOURS, according to the class of ore worked. It is the only table in the world which will take the place of jigs and do away with all costly and complicated machinery.

It is Especially Designed for Separating Zinc from Lead.

Send for our illustrated catalogue, containing all the latest information on the concentration of ores.

THE COLORADO IRON WORKS CO.,

Established 1860. DENVER, COLO., U. S. A.

THE HALLIDIE ROPEWAY

For Transporting Ore, Fuel, Earth, Sugar Cane, etc., by Wire Ropes.

SIMPLE, ECONOMICAL, PRACTICAL, DURABLE.

LOADS MECHANICALLY. DUMPS AUTOMATICALLY.

WIRE TRAMWAYS (Single and Double Rope Systems),

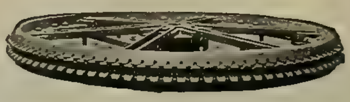
Cableways, Transmission by Wire Ropes,
Incline Planes, Cable Grips,
Logging by Cables, Automatic Loaders,

PLOWING, SCRAPING AND TRANSPORTING by Wire Ropes,

DESIGNED, SUPPLIED AND ERECTED. Estimates Furnished.

Improved GRIP PULLEY.

Patents Nos. 483,442; 610,853.



EFFECTIVE, SIMPLE, AUTOMATIC.

Saves Wear on Wire Rope and Cable.

Send for Illustrated Pamphlet.

Correspondence Solicited.

CALIFORNIA WIRE WORKS, - 9 Fremont St., San Francisco, Cal.

CHAS. C. MOORE & CO.,

—ENGINEERS AND DEALERS IN—
MAGNOLIA ANTI-FRICTION METAL,
HAMILTON CORLISS ENGINES, N. Y. SAFETY AUTOMATIC ENGINES,
BABCOCK & WILCOX BOILERS, McINTOSH & SEYMOUR ENGINES,
GREEN'S ECONOMIZERS, HOPPES LIVE STEAM PURIFIERS,
WHEELER CONDENSERS, BARNARD-WHEELER COOLING TOWERS,
EDMISTON FEED WATER FILTERS, BUNDY STEAM TRAPS,
SNOW STEAM PUMPS, QUIMBY SCREW PUMPS,
GOUBERT FEED WATER HEATERS, STRATTON STEAM SEPARATORS,
SPENCER DAMPER REGULATORS, HYATT ROLLER BEARINGS.

Contracts for Installation of Power Plants, Any Capacity.

SEND FOR CATALOGUES AND FULL INFORMATION.

32 FIRST STREET, SAN FRANCISCO, CAL.

SEATTLE BRANCH.............313 FIRST AVE. SOUTH.
LOS ANGELES BRANCH.......103 SOUTH BROADWAY.

SULPHURIC ACID

MANUFACTURED BY
THE WESTERN CHEMICAL CO
DENVER, COLO.

For Chlorination, Refining and other processes. Also Muriatic and Nitric Acids, Blue Vitriol, Copperas Commercial and C. P. Our chemically pure Acids and Ammonia are guaranteed perfect.

MINE BELL SIGNALS.

Adopted, Used and in Force in Accordance with Law.

We print in legal size, 12x36 inches, the Mine Bell Signals and Rules provided for in the Voorhies Act passed by the California Legislature. The law is entitled "An Act to Establish a Uniform System of Bell Signals to Be Used in All Mines Operated in the State of California, for the Protection of Miners." We furnish these Signals and Rules, printed on cloth so as to withstand dampness. **50 Cents a Copy.**

MINING AND SCIENTIFIC PRESS, 330 Market St., San Francisco, Cal.

Fraser & Chalmers,

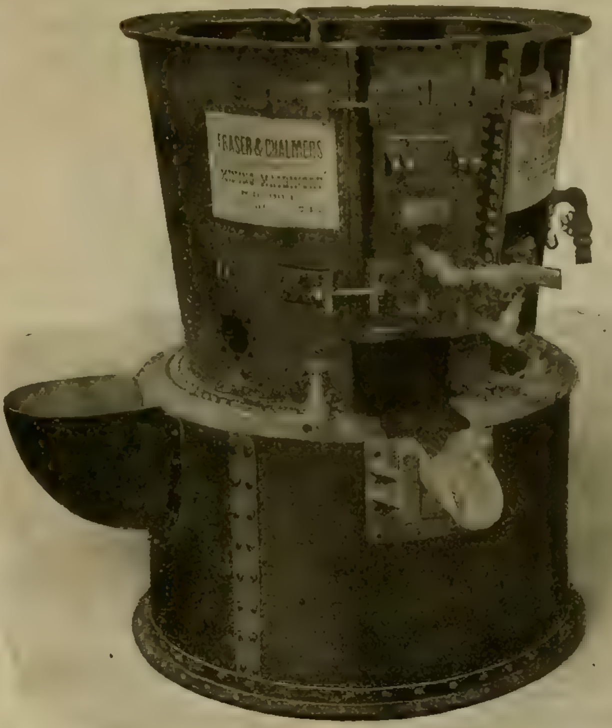
CHICAGO, ILL., U. S. A.

The accompanying cut shows curb and jackets of our Standard 36″ Steel Water Jacketed Blast Furnace of the Round Type for Lead Ores.

We make also Copper Matting, and every description of approved smelting and roasting furnace plant.

Our Catalogue No. 3 gives particulars, and we will be glad to have you write us for estimates.

FRASER & CHALMERS,
CHICAGO, ILL.



The Bleichert Wire Rope Tramway,

AND OTHER SYSTEMS OF AERIAL TRANSPORTATION,

MANUFACTURED BY

The Trenton Iron Co.,

TRENTON, N. J.

Engineers and Contractors, and sole licensees in North America for the Bleichert System.
Also, Wire Rope Equipments for Surface and Underground Haulage, etc.

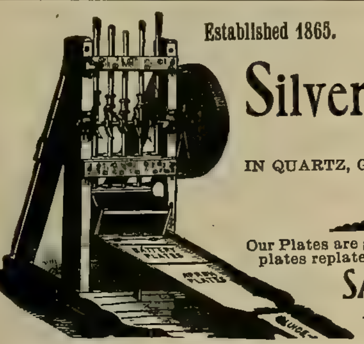
NEW YORK OFFICE—Cooper, Hewitt & Co., 17 Burling Slip.
CHICAGO OFFICE—1114 Monadnock Building.

For Particulars, Address

Newton M. Bell, Agent,
308 MARKET ST., SAN FRANCISCO.

A full stock of the Trenton Iron Co.'s Wire Ropes, made from "SPECIAL" Crucible and Plough Steel, carried in San Francisco.

Bleichert Tramway of the Cambria Steel Co., Johnstown, Pa., showing guard-bridge across Penna. R. R.



Established 1865. **NOTICE TO GOLD MINERS.** Incorporated 1890.

Silver-Plated Copper Amalgamated Plates

FOR SAVING GOLD

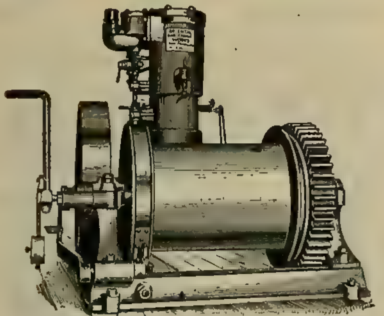
IN QUARTZ, GRAVEL OR BEACH MINING. MADE OF BEST SOFT LAKE SUPERIOR COPPER.

AT REDUCED PRICES.

Our Plates are guaranteed, and by actual experience are proved, the best in weight of Silver and durability. Old Mining plates replated, bought, or gold separated. THOUSANDS OF ORDERS FILLED.

SAN FRANCISCO NOVELTY AND PLATING WORKS,

☞SEND FOR CIRCULARS. Telephone Main 976. **68, 70, 72, 74 and 76 FIRST STREET, COR. MISSION, SAN FRANCISCO, CAL.**



This cut illustrates our 4 H. P. to 8 H. P. **HOISTING PLANT.**

Larger sizes built to suit the demands of our customers.

It is strong and exceedingly simple and durable, being entirely under the control of the operator, by the use of a single hand lever for hoisting, while the lowering is governed by a foot lever and brake.

No better device has been designed for this purpose. For prices and further information address the builders.

Oriental Gas Engine Co., 227 Folsom St., S. F.

THE WM. HAMILTON MANUFACTURING CO.,
LIMITED,

MINING MACHINERY,

PETERBOROUGH, ONTARIO,

CANADA.

GENERAL PHOTO-ENGRAVING CO.
[SUCCESSORS TO DEWEY ENGRAVING CO.]

FINE ZINCOGRAPHS, HALF-TONES, AND DESIGNING.

ENGRAVINGS OF MACHINERY OUR SPECIALTY.

SEND FOR SAMPLES AND PRICES.
TELEPHONE BLACK 1466.

NO. 536 CLAY STREET,
SAN FRANCISCO, CAL

JEFFREY ELEVATING CONVEYING MACHINERY

NEW ILLUSTRATED CATALOGUE NOW READY.

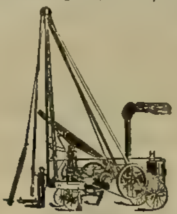
SEND FOR COPY.

ADDRESS:
THE JEFFREY MFG. COMPANY,
COLUMBUS, OHIO, U. S. A.

BRANCHES:
41 DEY ST., NEW YORK.
544 EQUITABLE BLDG., DENVER.

A BORE HOLE

is the cheapest, quickest, most direct, and most effective way to test lands for minerals, oil, gas, salt, sulphur, borax, water, etc.



THE STAR DRILLING MACHINES

excel for these uses. They will drill a hole through anything to any depth from 250 to 2500 feet The only machines made that are absolutely without annoying springs. They are simple, powerful and efficient. Easy to handle at work or on the road. Used in every State and Territory and in many foreign countries.

We also make full line of drill tool-bits, reamers, sand pumps, spuds, etc., etc. Write for illustrated free catalogue.

Star Drilling Machine Co.,
Akron, Ohio.

DENVER & RIO GRANDE R.R.
SCENIC LINE OF THE WORLD

The ∴ Mining Man's Favorite Route

BETWEEN

Denver, Colorado Springs, Pueblo and Florence, Cripple Creek, Leadville, Glenwood Springs, Aspen, Gunnison, Lake City, Creede, Durango, Silverton, Telluride and Ouray,

Reaching all the Mining, Milling, Cyaniding, Chlorinating and Smelting centers in Colorado and Utah, and all mining points in California, British Columbia and the Pacific Northwest by close connections and a perfect system of through car service.

Pullman Palace and Tourist Sleeping Cars between Denver and San Francisco and Los Angeles, and Pullman Palace and Tourist Sleeping Cars and Free Reclining Chair Cars between Denver and Portland. : : A Perfect Dining Car Service on All Through Trains. : :

For Illustrated Pamphlet, address

W. J. SHOTWELL,
G. A. D. & R. G. R. R.,
126 California St.,
San Francisco, Cal.

S. K. HOOPER,
G. P. & T. A.,
Denver,
Colo.

THE MINES OF

Eastern Oregon

Which are now attracting so much attention are reached only by the lines of the

OREGON RAILROAD & NAVIGATION CO.

For Descriptive Pamphlets, Through Rates, Etc., Address

E. C. WARD, Gen. Agt.,
630 Market Street, San Francisco.

COLORADO'S GOLD

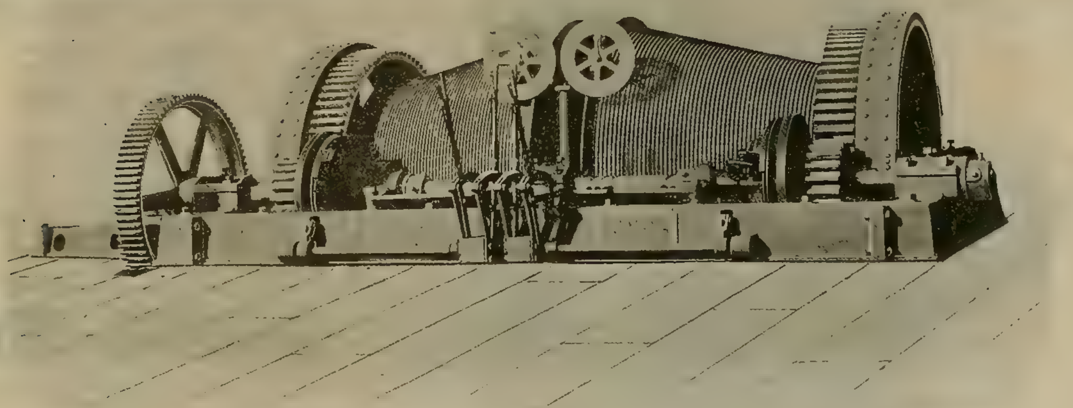
Output for 1899 is unequaled by any State in the Union. Cripple Creek, Leadville, and all the important mining towns are reached by

THE COLORADO & SOUTHERN RY...

For copies of our publications on the Swandyke and Pine Creek Gold Districts, or our pamphlet "Hints to Prospectors," address

T. E. FISHER, GEN. PASS. AGT.,
DENVER, COLO.

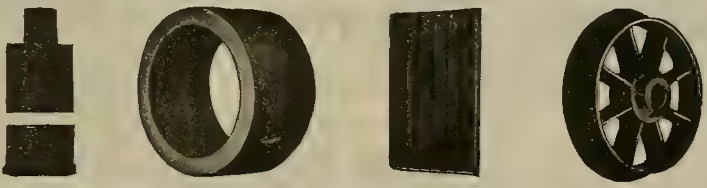
MODERN ELECTRIC HOIST IN SUCCESSFUL OPERATION.
Send for Bulletin No. 1003.



200 H. P. DOUBLE DRUM ELECTRIC HOIST, OPERATED BY 60-CYCLE, 3-PHASE INDUCTION MOTOR.
Three of These Built for the British-American Corporation, Ltd., Rossland, B. C.

DENVER ENGINEERING WORKS,—SHEPARD & SEARING,—DENVER, COLO., U. S. A.

HARD ☘



TOUGH

TAYLOR IRON AND STEEL COMPANY,

HIGH BRIDGE, NEW JERSEY, U. S. A.

Sole Licensees in America under the HADFIELD System and Patents for **MANGANESE STEEL,**

Best Metal Known for Roll Shells, Stamp Shoes and Dies, Crusher Plates and Side Liners, Toggles and Toggle Bearings, Gyratory Cones and Concaves, or Liners, Mine Car Wheels, Coal Crushing Rolls, Etc.

PACIFIC COAST PARTIES INTERESTED PLEASE ADDRESS PARKE & LACY CO., SAN FRANCISCO, CAL.

WRITE FOR INFORMATION AND PRICES.

Our U. S. and Foreign Patent Agency presents many and important advantages as a Home Agency over all others, by reason of long establishment, great experience, thorough system, intimate acquaintance with the subjects of inventions in our own community, and our most extensive law and reference library, containing official American reports, with full copies of U. S. Patents since 1872. All worthy inventions patented through DEWEY, STRONG & CO.'s Patent Agency will have the benefit of a description in the *Mining and Scientific Press.* We transact every branch of patent business, and obtain patents in all countries which grant protection to inventors. The large majority of U. S. and foreign patents issued to inventors on the Pacific Coast have been obtained through our agency. We can give the best and *most reliable* advice as to the patentability of new inventions. Our prices are as low as any first-class agencies in the Eastern States, while our advantages for Pacific Coast inventors are far superior. Advice and circulars free.

DEWEY, STRONG & CO.,

PATENT AGENTS,

330 Market Street, San Francisco, Cal.

The only roofing without a fault

P & B Ready Roofing

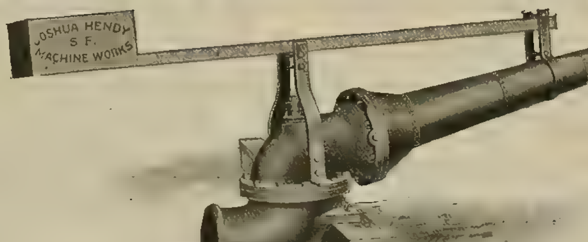
Paraffine Paint Co
116 Battery Street—San Francisco

The best builders in America use P & B Ready Roofing

Shingles may warp, slate may chip, tin may sweat, tar may run, or iron expand, but P & B will stand any climatic condition — the weather of the west requires it

Demand it of your dealer

Double-Jointed Ball-Bearing Hydraulic Giants.

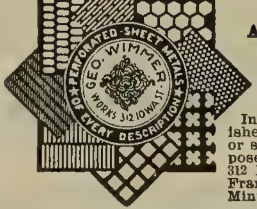


The above presents an improved **Double-Jointed Ball-Bearing Hydraulic Giant** which we build. The improvement consists of the introduction of a **Ball Bearing** by which the pressure of the water is reduced to a minimum and the direction of the nozzle changed at will with ease.

Catalogues and prices of our specialties of HYDRAULIC MINING MACHINERY furnished upon application. **JOSHUA HENDY MACHINE WORKS, 38 to 44 Fremont St., San Francisco, Cal.**

For Best Satisfaction and Lowest Prices
—IN—
PERFORATED METALS
—AND—

MINING SCREENS
PLACE YOUR ORDERS WITH
Fraser & Chalmers,
CHICAGO, ILL., U. S. A.
SEND FOR SAMPLES, MENTIONING THIS PAPER.

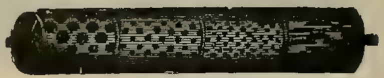


Mining Screens
A SPECIALTY.

Diagonal Slot,
Straight "
Burred "
Round Holes.

In American planished or Russian iron or steel for all purposes. GEO. WIMMER, 312 Iowa Street, San Francisco. Telephone Mint 1332.

QUARTZ SCREENS
A specialty. Round, slot or burred slot holes. Genuine Russia Iron, Homogeneous Steel, Cast Steel or American planished Iron, Zinc, Copper or Brass Screens for all purposes. CALIFORNIA PERFORATING SCREEN CO., 145 and 147 Beale St., S. F.

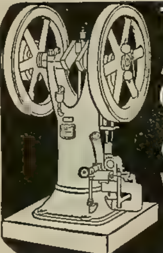


—EASTERN PRICES BEATEN.—

SAN FRANCISCO
Pioneer Screen Works,
JOHN W. QUICK, Prop.
Improved Facilities! Finest Work! Lowest Prices!
Perforated Sheet Metals, Steel, Russia Iron, American Planish, Zinc, Copper and Brass Screens for All Uses.
MINING SCREENS A SPECIALTY.
221 and 223 First Street, San Francisco, Cal.

Mining, Mill, Driving Lamps
—AND—
Locomotive Headlights.
◆◆◆◆◆◆
SIZES ON HAND:
24-inch,
20 "
17 "
14 "
12 "
10 "
8 "
6 "

Boesch Lamp Co.,
Pacific Lamp and Reflector Factory,
585 MISSION STREET, : : : : : SAN FRANCISCO.



THE WEBSTER
2½
ACTUAL HORSE POWER
GASOLINE ENGINE
GUARANTEED
CATALOGUE MAILED FREE
WOODIN & LITTLE
312 MARKET ST.
SAN FRANCISCO,
— CAL. —

Notice the Shape of
GLOBE BOX---THE BEST BABBITT.

J. M. HAYDEN & CO.
GRAND RAPIDS MICH.
GLOBE METAL
THE BEST BABBITT.

Send for trial order, Ladle free.
The Globe wire lace makes the smoothest joint, runs the stillest and lasts the longest of any lacing. Sent on approval. Write us for booklet with instructions, etc. J. M. HAYDEN & CO., 58 Pearl St., Grand Rapids, Mich.

BULLOCK DIAMOND DRILLS

If you are interested in prospecting send for our new Diamond Drill Catalogue (No. 33).

BULLOCK MINING MACHINERY

PORTABLE HOISTS—Send for our new Catalogue (No. 40). CHAMPION MINE VENTILATORS—Send for our new Catalogue (No. 35).
HOISTING AND HAULAGE PLANTS, ORE CARS, SKIPS, CAGES, ETC., ETC.

PARKE & LACY CO., Agent,
21 & 23 Fremont St., San Francisco, Cal.

M. C. BULLOCK MFG. CO.,
1172 West Lake St., Chicago, Ill., U. S. A.

THE RAND DRILL COMPANY,

PIONEERS IN ROCK DRILLING AND AIR COMPRESSING MACHINERY,

100 BROADWAY, NEW YORK.
223 FIRST ST., SAN FRANCISCO, CAL.
1328 MONADNOCK BLK., CHICAGO, ILL.

Has been awarded

THREE GOLD MEDALS

at the

PARIS EXPOSITION

for

AIR COMPRESSORS and ROCK DRILLS.

THE JACKSON HAND POWER ROCK DRILL.

Works in Any Rock, in Any Position.

Write for Circulars and References.

THE JACKSON DRILL & M'F'G CO.,
1756 Larimer Street, DENVER, COLO.

Sole Licensees for all Foreign Countries and Eastern United States: THORNTON N. MOTLEY COMPANY (INC.), 43 John St., New York.

AGENTS: CHAS. B. BOOTHE & CO., 126 SO. LOS ANGELES ST., LOS ANGELES, CAL.

FIRTH'S DRILL STEEL.

USE THE BEST.

Has no equal in Hard Rock Drilling.

ABNER DOBLE COMPANY, GEN. AGTS.,
FREMONT AND HOWARD STS., SAN FRANCISCO.

Sold by Seattle Hardware Co., Seattle, Wash.

Established 1837.

I. C. Yawger,

Successor to VICTOR BISHOP & CO.

IMPORTER OF CARBONS FOR DIAMOND DRILLS.

21 Maiden Lane, - NEW YORK

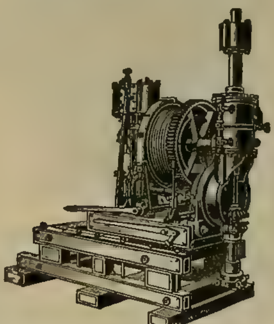
DIAMOND DRILLS
FOR PROSPECTING.
AMERICAN DIAMOND ROCK DRILL CO.
120 LIBERTY ST N.Y.

MACHINERY BARGAINS.

I have some splendid Air Compressors, Hoisting Engines, Rock Drills, Rock Crushers, Channeling Machines, Steam Pumps, Boilers, Steam Shovels, Locomotives and Relaying Rails, all in splendid condition. Send for printed list and specify your requirements. I can save you money. WILLIS SHAW, 627 New York Life Building, CHICAGO.

TELEPHONE MAIN 5303
Union Photo-Engraving Co.
DESIGNING HALF-TONES ZINC ETCHING
523 MARKET ST
SAN FRANCISCO, CAL.

SULLIVAN



"N" Drill, capacity 2000 ft.
Cable Address, Diamond, Chicago.
Codes: A. B. C., 4th Edition. Postal Directory. Western Union. Liebers.

Diamond Core Drills

FOR PROSPECTING. Catalogue 29.

The most extensive line of sizes and styles ever offered.

CONTRACTORS FOR PROSPECTING WITH DIAMOND DRILL.

ROCK DRILLS

FOR MINING. Catalogue 30.

Superior valve and ratchet motions. The highest possible grade.

Send for Our New Catalogues.

Sullivan Machinery Co.,

New York. Pittsburg. Claremont, N. H.

Main Office, CHICAGO..........ROOMS 1220-1221, 135 ADAMS ST.
Western Office DENVER................332 SEVENTEENTH ST.
Pacific Agency, SAN FRANCISCO. HENSHAW, BULKLEY & CO.
Northwest Office, SPOKANE, WASH........ 101 S. HOWARD ST.

CANTON STEEL COMPANY,

—— Manufacturers of ——

CANTON DRILL STEEL.

UNEQUALED FOR TOUGHNESS AND ROCK-CUTTING QUALITIES. WRITE FOR 1900 STEEL LIST, CONTAINING ENDORSEMENTS AND USEFUL INFORMATION.

Works: CANTON, OHIO. Branch Warehouse: DENVER, COLO.

TO SECURE GOOD RESULTS BUY

JESSOP'S STEEL

FOR TOOLS, MINING DRILLS, ETC.

Chief American Office,
91 John St., New York, N. Y.

Wm. Jessop & Sons, Ltd.
Manufactory, Sheffield, England.

I. WILLARD BEAM, Agent,
29 MAIN STREET,
SAN FRANCISCO, CAL.

SCREENING MACHINERY FOR ALL PURPOSES.

VIBRATORY, SHAKING, REVOLVING, STATIONARY AND MECHANICAL HAND SCREENS FOR ALL MATERIALS.

SCREENS SPECIALLY ....ADAPTED FOR.......... MINING PURPOSES.

COMPLETE PLANTS ERECTED.

SEND FOR DESCRIPTIVE MATTER.

WESTERN MACHINERY & SUPPLY CO., Engineers and General Machinists,
161 La Salle Street, CHICAGO.

Trommel Screens
THE ROBERT AITCHISON PERFORATED METAL CO.
303 TO 305 DEARBORN ST. CHICAGO, ILL.

SMOOTH-ON
TRADE MARK
CASTINGS.

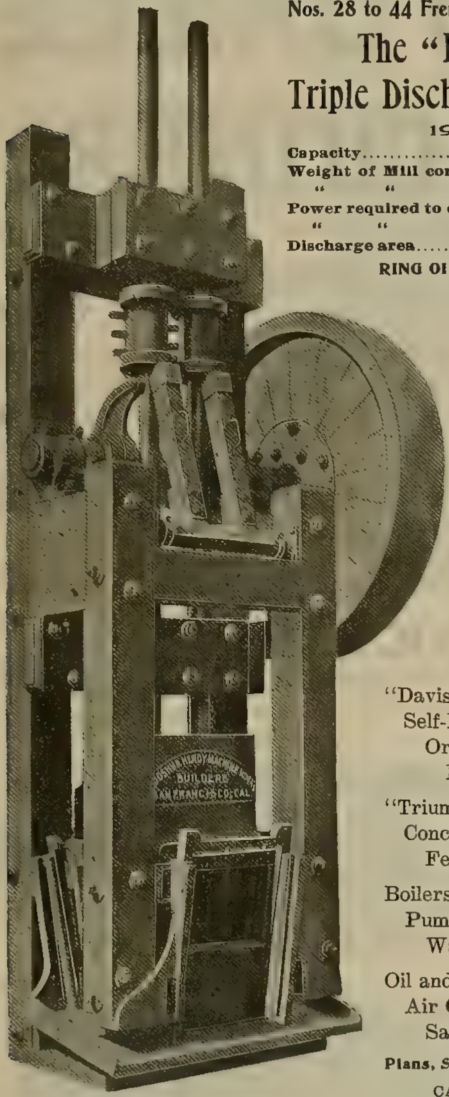
An iron cement for repairing leaks or fractures in steam or hydraulic work. When hard it will withstand a red heat, steam, water or oil, and expands and contracts with heat and cold the same as iron, insuring a tight joint at all temperatures. Difficult flange connections can easily be made with Smooth-On, as it adapts itself to the flanged faces whether parallel or not. Connections are easily taken apart. Unequaled for boiler patching, and repairing blemishes in iron castings. Write for catalogue and prices. Sole proprietors and manufacturers: Smooth-On Mfg. Co., Jersey City, N. J., U. S. A.

MESSRS. MADISON, BRUCE & SELLERS,
34-36 STEUART ST., SAN FRANCISCO, CAL......................AGENTS FOR PACIFIC COAST.

JOSHUA HENDY MACHINE WORKS,
Nos. 28 to 44 Fremont St., San Francisco, Cal.

The "Hendy Improved"
Triple Discharge Two Stamp Mill.
1900 MODEL.

Capacity..............................6 to 10 tons per day.
Weight of Mill complete with 850-lb. stamps, 8300 lbs.
" " " " 1000-lb. " 9000 "
Power required to drive 850-lb. stamp mill....... 5 H. P.
" " " 1000-lb. " " ....7 H. P.
Discharge area.......................465 square inches.
RING OILING CAM SHAFT BOXES.



Mining
Machinery
and
Supplies.

"Davis" Horse Power Hoisting Whims, Self-Dumping Ore and Water Skips, Ore and Water Buckets, Mining Cars and Tee Rail.

"Triumph" and "Hendy-Norbom" Concentrators, Ore Crushers, Ore Feeders, Crushing Rolls.

Boilers, Engines and Pumps; Hoisting, Pumping and Irrigating Plants, Water Wheels and Water Motors.

Oil and Gasoline Engines and Hoists, Air Compressors and Rock Drills, Sawmill Machinery.

Plans, Specifications and Estimates Furnished.
CATALOGUES ON APPLICATION.

McFARLANE & CO.,
1734 FIFTEENTH ST., DENVER, COLO.
Mining and Milling Machinery.
STAMP AND CONCENTRATING MILLS BUILT AND ERECTED.

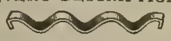
STEAM AND ELECTRIC HOISTS, CRUSHERS, ROLLS, REVOLVING SCREENS, JIGS. ORE CARS, CYANIDE TANKS, CORNISH PUMPS, CORLISS ENGINES.

STEEL RAILS, TRACK FIXTURES,
PRODUCT PENNSYLVANIA STEEL COMPANY.

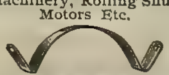
BAR, SHEET AND BOILER STEEL,
STRUCTURAL MATERIAL,
Cold Rolled Shafting.

GEORGE W. GIBBS COMPANY,
33-39 Fremont Street, 38-40 Beale Street,
CORRESPONDENCE SOLICITED. SAN FRANCISCO, CAL.

CARY SPRING WORKS,
240 & 242 WEST 29th STREET, NEW YORK, U. S. A.
Telephone, 3346—38th St.
WIRE
SPRINGS
OF EVERY DESCRIPTION.



MANUFACTURERS OF
All kinds of ROUND AND FLAT
WIRE, TEMPERED AND
UNTEMPERED.
SPRINGS
For Machinery, Rolling Shutters,
Motors Etc.



MUSIC BOX AND FINE SPRINGS OUR SPECIALTY.

California Vigorit Powder Co.
——Manufacturers of——
Dynamite High Explosives and "Vigorit Low" Blasting Powder.
OFFICE: 208 CALIFORNIA STREET, SAN FRANCISCO, CAL.
WORKS: POINT ISABEL, CONTRA COSTA CO., CAL.

THE GEAR THAT MADE THE
FULTON PUMP
RENOWNED.

HIGHEST EFFICIENCY.
MINIMUM POWER REQUIRED.

CONTINUOUS FLOW.
NO WATER HAMMER.

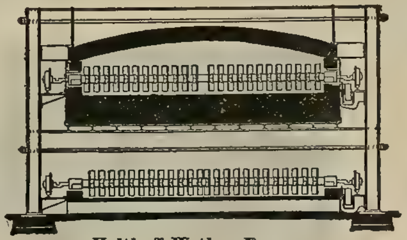
If your LIFT PUMP is not a
FULTON PUMP
you haven't a continuous flow Pump.

Manufactured by A. T. AMES, GALT, CAL.

ROASTING FURNACES.

WE MANUFACTURE TWO TYPES:

THE WETHEY MULTIPLE DECK and
HOLTHOFF-WETHEY STRAIGHT LINE.



Holthoff-Wethey Furnace.

THESE FURNACES ARE BUILT FROM ORIGINAL DESIGNS EMBODYING MANY NEW FEATURES IN THE CONSTRUCTION OF ORE ROASTING FURNACES, AND DO NOT IMITATE ANY OF THE OLD AND FAULTY MODELS.

THESE FURNACES ARE FULLY COVERED BY PATENTS WHICH WE CONTROL AND WILL PROTECT ALL USERS AGAINST CLAIMS FOR INFRINGEMENT.

MINING MACHINERY
—AND—
REYNOLDS CORLISS ENGINES.

WE INVITE CORRESPONDENCE.

THE EDWARD P. ALLIS COMPANY,
MILWAUKEE, WIS.

PIPE BARGAINS.

Suitable for Water Mains, Mining, Irrigation, Air, Oil, etc., etc. New Spiral Welded Asphalted Steel Pipe with any style coupling desired.
460 ft. 6-in. 3,480 ft. 10-in. 1,828 ft. 14-in. 1,077 ft. 18-in.
50,000 " 8 " 2,428 " 12 " 520 " 16 " 1,623 " 24 "

All Sizes Wrought Pipe, Well Casing and Straight Riveted Pipe in Stock. Equipment of All Kinds for Mine, Railroad and Contractors' Outfits. Write for Prices and Particulars.

BOWES & CO., 23 Lake St., Chicago, Ill.

The "Stop for Repairs"
to Mining Machinery,

Especially if it is a conveying plant, is a considerable item of expense. Many of these expensive pauses are made to repair or adjust faulty belting. To economize in this respect, use the

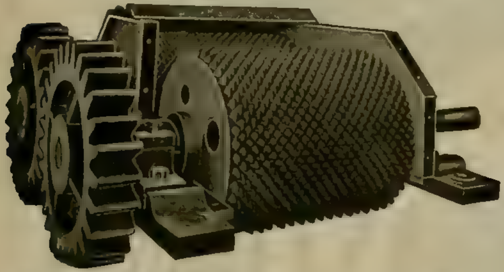
LEVIATHAN
CONVEYOR BELT.

It is not only adapted to the heaviest service, but will run under any conditions in underground, drippings, extreme heat or cold.

IT WILL OUTLIVE ANY OTHER BELTING.

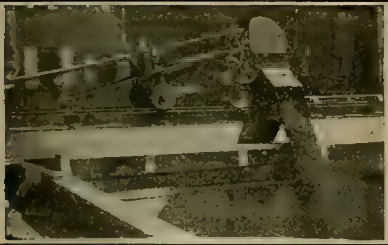
MAIN BELTING COMPANY,
1225–41 Carpenter Street, Philadelphia.
55–57 Market St., Chicago. 120 Pearl St., Boston.
SEND FOR PRICE LISTS AND SAMPLE.

LINK-BELT ELEVATORS —AND— CONVEYORS.



BREAKER ROLLS,
PICKING TABLES,
MALLEABLE IRON BUCKETS
SHAFTING, PULLEYS,
GEARING, CLUTCHES, Etc.
Catalogue Upon Application.

LINK-BELT MACHINERY CO.,
Engineers, Founders, Machinists,
CHICAGO, U. S. A.
DENVER, 1328 17th St.,
A. E. LINDROOTH, Manager.



ROBINS BELT CONVEYORS
HANDLE
ORE, GRAVEL, TAILINGS, DREDGINGS.

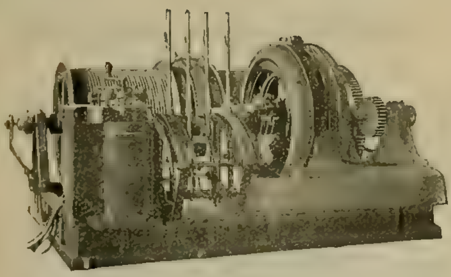
Cut shows conveyor elevating and distributing coal in storage.

New Catalogue Now Ready.

ROBINS CONVEYING BELT CO.,
Park Row Building, NEW YORK.

GENERAL ELECTRIC COMPANY'S

Electric Mine Hoists



Double Drum Hoist Direct Connected to GE Induction Motor.

fitted with either polyphase or direct current motors give uniform and reliable service with minimum attention.

General Office: Schenectady, N. Y.
San Francisco Office: Claus Spreckels Bldg. Denver Office: Kittredge Building.

TELL US WHERE YOU'RE AT.

4 Cents Per Ton Per Mile

is what it costs to transport Ore with our systems of Aerial Wire Rope Tramways.

We'd like to send you our book telling you all about it, but we can't do it unless you write us

WHERE YOU'RE AT.

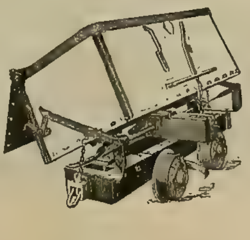
THE J. H. MONTGOMERY MACHINERY CO.,
DENVER, COLO., U. S. A.

OUR CARS HAVE BEEN IN USE FOR NINE YEARS.

TRUAX

CARS ALWAYS IN STOCK TO FILL RUSH ORDERS.

ORE



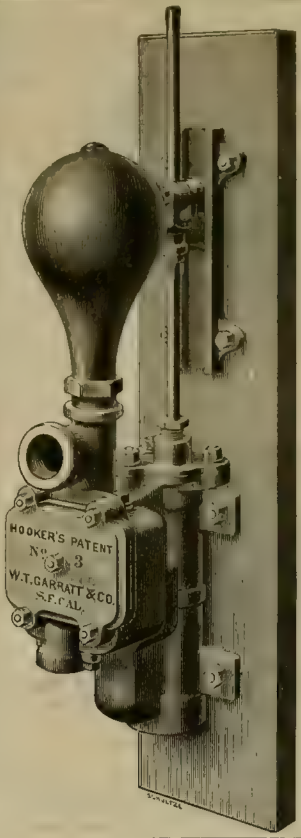
CARS

CUT REPRESENTS OUR SIDE DUMP CARS.

SEND FOR PAMPHLET.

CARS MADE FOR ALL KINDS OF WORK.

TRUAX MFG. CO. 69 Stevenson St., S.F.

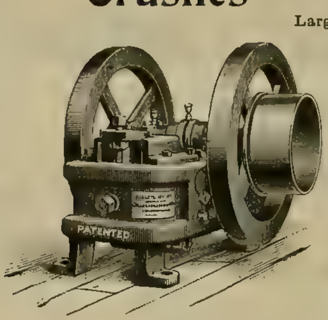

HOOKER'S PATENT
No. 3
W.T.GARRATT & CO.
S.F.CAL.

A GOOD MINING PUMP.

The Hooker Double Acting Pump.
Well Built, Simple, Durable, Efficient.
All Working Parts Easy of Access.
Duplicate Parts in Stock.
We furnish these pumps with suction pipes, hose and strainers complete. Estimates on application.
Can furnish up to number three with double brake for hand power.
Just the pump for a small mine.
Larger sizes, larger capacities.
Send for our catalogue on pumps.

W. T. GARRATT & CO.,
Cor. Fremont and Natoma Sts.,
SAN FRANCISCO, CAL.

Crushes Large Rock to $\frac{1}{4}$ inch.



Roll Jaw Crusher.

Send for cir.

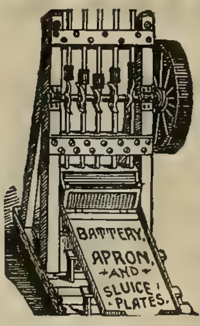
STURTEVANT MILL CO., 113 Clayton St., Boston, Mass.

The Best MINE PUMPS in the World.
COMPOUND CONDENSING AND TRIPLE EXPANSION STATION PUMPS.
We carry in our Denver store a stock of Improved Pattern Sinkers and Duplex Station Pumps, with duplicate parts for repairs.

Write for Catalogue and Estimates.

Jeanesville Iron Works Co.,
JEANESVILLE, PA.

Western Office,
Columbia Hotel Building,
1328 17th St.
Denver, Colo.
Telephone 2298 A.
A. MIDDLEBROOK, Manager.

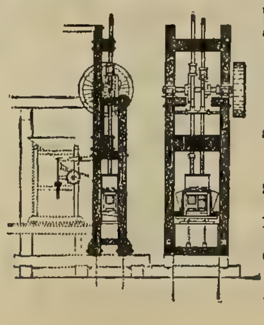


To Gold Miners!

Silver Plated Copper Amalgamating Plates
For Saving Gold in Quartz and Placer Mining.

ONLY BEST COPPER AND REFINED SILVER USED. OLD MINING PLATES BOUGHT OR TAKEN IN EXCHANGE FOR NEW PLATES. GOLD EXTRACTED FROM OLD PLATES AT A MODERATE COST. OLD PLATES REPLATED. GOLD, SILVER, NICKEL, COPPER AND BRASS PLATING.

Denniston San Francisco Plating Works,
652 Mission Street, Cor. Annie, San Francisco, Cal.
E. G. DENNISTON, ... Proprietor.
—:Send for Circular.—



MODERN MINING MACHINERY.
QUARTZ MILLS of any capacity,
IN UNITS OF TWO AND FIVE STAMPS.
Acme Amalgamators for CAPE NOME
and other placer mining. Successfully applied to quartz mills in addition to or displacing plates.

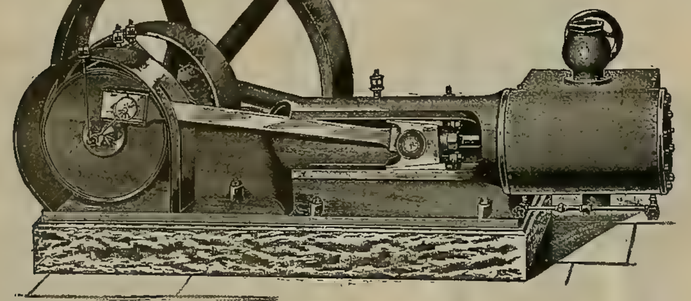
SUCCESSFUL GRAVEL MILL RECENTLY IMPROVED.

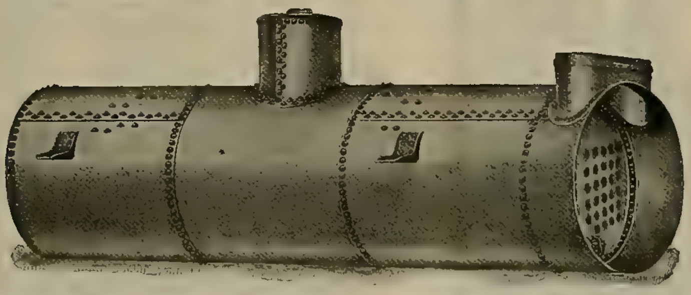
Special Gold Dredging Pumps and Machinery. Concentrators, Feeders, Rock Breakers and Power Plants.

Largest manufacturers of Irrigation and Reclamation Pumps in the United States.

Catalogues: No. 20, Pumps; No. 22, Cape Nome; No. 25, Mining.

KROGH MANUFACTURING CO.,
9-17 Stevenson St. and 134-136 Main St., SAN FRANCISCO, CAL.





ENGINES, BOILERS,

UP-TO-DATE MACHINERY.

WRITE US FOR PARTICULARS.

THE COMPRESSED AIR MACHINERY CO., 11-13 First St., San Francisco, Cal.

THE

Pelton Water Wheel Company

Gives exclusive attention to the development and utilization of water powers by the most modern, economic and improved methods. An experience of more than fifteen years, involving both the theory and practice of hydraulic engineering as relates to power development in its widest range of application, is at the service of its customers.

Nine Thousand Wheels Now Running,

Averaging some 700,000 H. P.

ELECTRIC POWER TRANSMISSION.

Pelton wheels afford the most reliable and efficient power for such service and are running the majority of stations of this character in the United States, as well as most foreign countries. Highest efficiency and absolute regulation guaranteed under the most extreme variations of load.

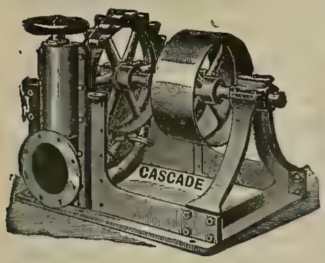
The Pelton Water Wheel Company,

121 & 123 MAIN STREET, SAN FRANCISCO, CAL.

TURBINE AND CASCADE WATER WHEEL

Adapted to all Heads from

3 Feet to 2000 Feet.

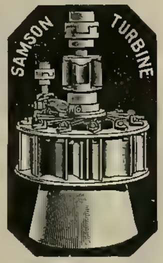


Our experience of 38 YEARS building Water Wheels enables us to suit every requirement of Water Power Plants. We guarantee satisfaction.

State your Head and requirements. Send for pamphlet.

JAMES LEFFEL & CO.

SPRINGFIELD, OHIO, U. S. A.



THE HUG WATER WHEEL

has a guaranteed EFFICIENCY OF 86%, as shown by Test Curves from Cornell University.

Most Economical Wheel on the Market.

No Loose Buckets Possible.

Manufactured by D. HUG,

Denver, Colo., U. S. A.

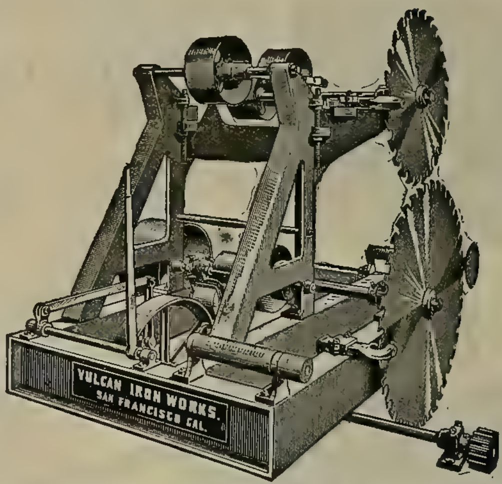
Portable Saw Mills.

No. 0
Single Circular.
4000 – 6000 feet per day.

No. 1
Single Circular.
8,000 – 10,000 ft. per day.

No. 2
Double Circular.
15,000–20,000 ft. per day.

No. 3
Double Circular.
20,000–25,000 ft. per day.

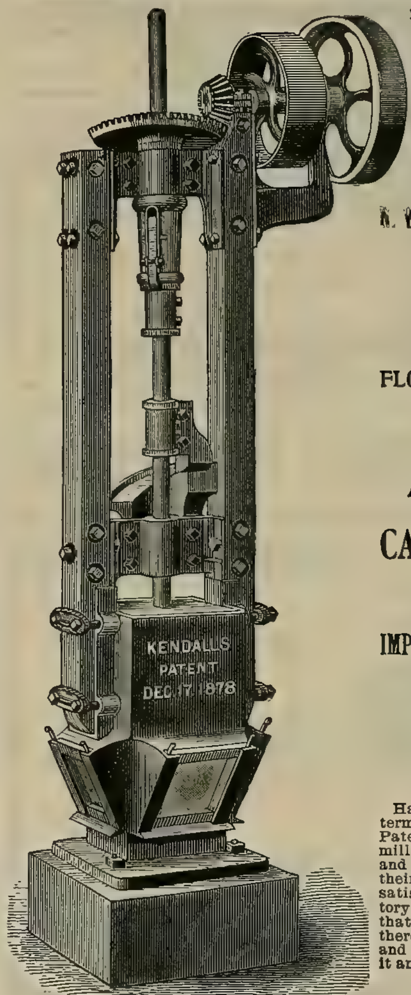


For
Mining Companies
—OR—
Other Consumers of Lumber at Remote Points.

SEND FOR CATALOGUE.

Manufactured by

VULCAN IRON WORKS, Office, 505 Mission Street, SAN FRANCISCO, CAL.



L. C. MARSHUTZ. T. G. CANTRELL.

NATIONAL IRON WORKS,

N. W. Cor. Main & Howard Sts., San Francisco.

MANUFACTURERS OF

STATIONARY AND COMPOUND

ENGINES,

FLOUR, SUGAR, AND QUARTZ MILL

MACHINERY.

AMALGAMATING MACHINES.

CASTINGS AND FORGINGS

OF EVERY DESCRIPTION.
All work tested and guaranteed.

IMPROVED PORTABLE HOISTING ENGINES

Sole Manufacturers of

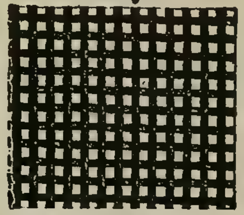
Kendall's Patent Quartz Mills.

Having renewed our contract on more advantageous terms with Mr. S. Kendall for the manufacture of his Patent Quartz Mill, we are enabled to offer these mills at **Greatly Reduced Prices.** Having made and sold these mills for the past 16 years, we know their merits, and know that they have given perfect satisfaction to purchasers, as numbers of commendatory testimonials prove. We feel confident, therefore, that at the prices we are now prepared to offer them, there is placed within the reach of all a light, cheap and durable mill that will do all that is claimed for it and give entire satisfaction.

MARSHUTZ & CANTRELL

Send for Circulars and Price List.

"The Perfect"



DOUBLE CRIMPED STEEL MINING CLOTH

USE "THE PERFECT"

Double Crimped Mining Cloth,

MANUFACTURED BY

THE LUDLOW-SAYLOR WIRE CO.,

Fourth and Elm Sts , ST. LOUIS, MO.

MINERS' STEEL CANDLESTICKS.

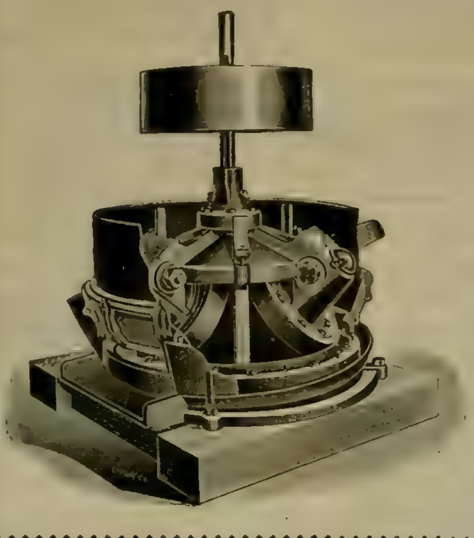
THE BUCYRUS COMPANY,

DESIGNERS AND BUILDERS OF

DREDGES, STEAM SHOVELS, EXCAVATING MACHINERY, WRECKING CARS, LOCOMOTIVE CRANES, PILE DRIVERS, CENTRIFUGAL PUMPS, WITH SIMPLE, COMPOUND OR TRIPLE EXPANSION ENGINES,

MACHINERY FOR PLACER MINING.

SOUTH MILWAUKEE, WISCONSIN.



THE GRIFFIN

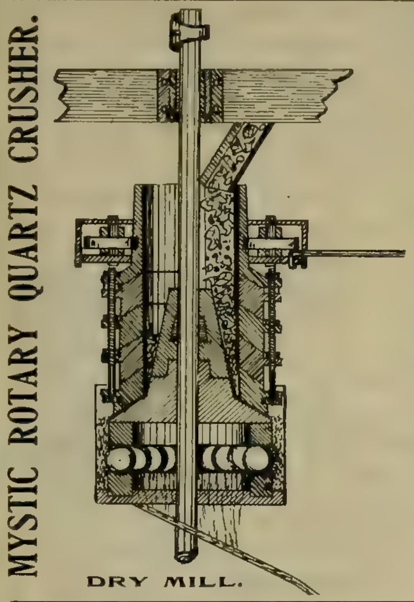
THREE ROLLER

ORE MILL.

The Griffin Three Roller Ore Mill is a simply constructed Mill, suitable for working all kinds of ores that require uniformly fine crushing by the wet process. This Mill is a modification of the well-known Chilian Mill, but the rollers run upon a crushing ring or die, which is inclined inwardly at an angle of about 30 degrees, the rollers themselves also being inclined to the central shaft of the Mill, thus utilizing the centrifugal force, as well as the weight of the rollers themselves as a crushing agent. The Griffin Three Roller Ore Mill is therefore a Mill of great strength, and has few wearing parts. We construct these Mills with extreme care, using only the best of raw materials, which are most carefully worked by men who are specialists as mill builders. We sell the Griffin Ore Mill on its determined merits, and will gladly supply full information regarding it to any one.

SEND FOR FREE ILLUSTRATED AND DESCRIPTIVE CATALOGUE TO

Bradley Pulverizer Co., Boston, Mass.



E. N. TAILLEUR. C. G. TAILLEUR. B. I. TURMAN.

Novelty Mining and Milling Machinery Company,

Telephone Main 1357. **Office, 118 Montgomery St., San Francisco, Cal.**

MINING AND MILLING MACHINERY OF ALL DESCRIPTIONS.

Mystic Rotary Quartz Crusher, Rock Breaker and Pulverizer, Combined.

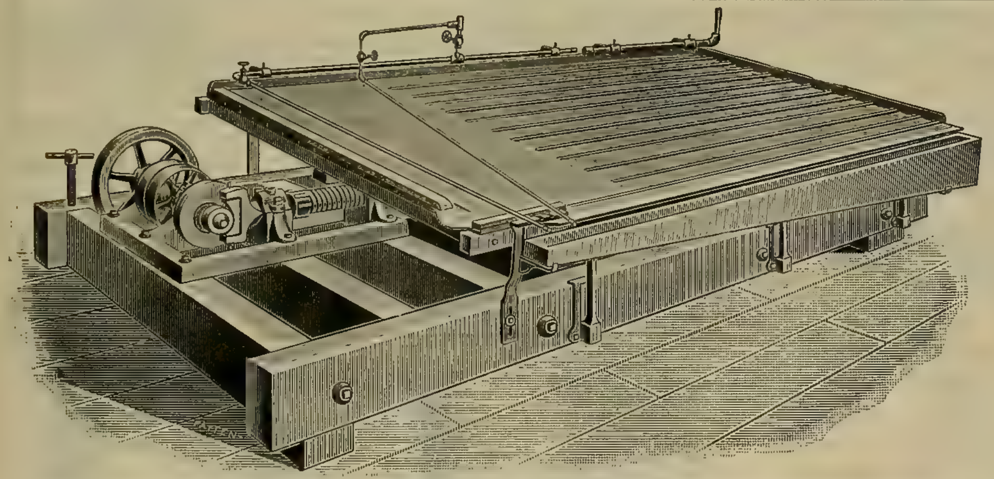
USED FOR BOTH WET AND DRY PULVERIZING. RELIABLE, DURABLE, ECONOMICAL.

STANDARD CONCENTRATOR, Best and Cheapest. CELLULAR ASBESTOS STEAM COVERING, Unequaled. OIL WELL TOOLS, from the most complete manufactory on the coast. CYANIDE TANKS, etc.

New Articles Being Added Continually. **Send for Circular.**

SOUTHERN CALIFORNIA OFFICE FOR MYSTIC ROTARY QUARTZ CRUSHER:

T. J. HAMPTON, 132 S. Broadway, Los Angeles.



WOODBURY'S IMPERIAL CONCENTRATING TABLE.

THE Imperial Concentrating and Amalgamating Table is the latest invention of Mr. Geo. E. Woodbury, whose fame as one of the pioneer concentrator builders is world wide, machines of his manufacture being in general use in every country on the globe where the milling of ores is carried on. This Table is, however, built on entirely new lines, differing materially from either the well-known belt or bumping table types of concentrators.

SIMPLE IN ITS CONSTRUCTION. SAVES FINE SULPHURETS.

WITHOUT LOSS IN TAILINGS.

MAKES HIGH PRODUCT. CAPACITY FROM 5 TO 10 STAMPS.

GEORGE E. WOODBURY,

Send for Catalogue. *'Phone Main 1766.* 223 First St., San Francisco, Cal.

TANKS!

LUMBER AND HOUSE FINISH.
TANKS FOR WATER, WINE OR OIL.

Jig Frames, Jig Screens, Zinc Boxes,

and Tanks of Every Description for Mining Purposes.

WRITE FOR ESTIMATES ON YOUR WANTS.

THE EXCELSIOR REDWOOD CO.,
FOURTH AND CHANNEL STREETS,
SAN FRANCISCO, CAL.

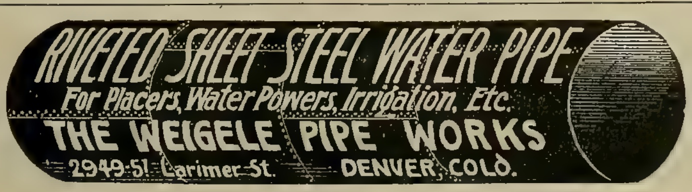
C. A. HOOPER & CO., Agents,
204 Front Street, San Francisco, Cal.

MINING HOISTS.

Engines, Boilers,
Saw Mills, Hoe Saws,
Mill Supplies.

TATUM & BOWEN,

34-36 Fremont Street, San Francisco, Cal. 29-35 First Street, Portland, Or.



RIVETED SHEET STEEL WATER PIPE
For Placers, Water Powers, Irrigation, Etc.
THE WEIGELE PIPE WORKS
2949-51 Larimer St. DENVER, COLO.

T.P. G.W.P. J.P. E.P.
PENNINGTON
TRADE MARK
SAN FRANCISCO, CAL.

OUR SPECIALTIES ARE:

Hammered Steel Shoes and Dies,
Cam, Crank and Steamboat Shafts,
Rock-Breaker Plates,
Connecting Rods, Well-Boring Tools,
General Blacksmithing.

Correspondence Solicited, and Circulars Mailed Upon Request.

GEO. W. PENNINGTON & SONS,
218 and 220 Folsom St.,............San Francisco, Cal.

PROFESSIONAL CARDS.

R. H. POSTLETHWAITE, M.I.E.E.
❦ **Hydraulic Mining Engineer.** ❦
River Dredging for Gold a Specialty.
1316 Leavenworth St........San Francisco, Cal.

THEO. F. VAN WAGENEN, E. M.
Consulting Mining and Hydraulic Engineer.
1508 Fillmore St., DENVER, COLO.

D. B. HUNTLEY,
Mining Engineer and Metallurgist,
De Lamar, Owyhee Co., Idaho.

BERNARD MACDONALD,
Consulting Mining Engineer.
General Manager British America Corporation, Ltd., Rossland, B. C.

A. F. WUENSCH, M. E.
Inspection and Valuation of Mines.
Ref. D. H. Moffat, Pres. 1st Nat'l Bank, Denver.
827 Equitable Bldg..................Denver, Colo.

Established 1879.
CHAS. B. GIBSON,
Chemist, Metallurgist and Mining Engineer,
81 CLARK ST., CHICAGO, ILL.

W. C. WYNKOOP, M. E.
Woodbury (Cochiti District),
New Mexico.
Economic Geology and Mine Examinations.

WM. VAN SLOOTEN,
Consulting Mining Engineer and Metallurgist.
Cable address: "Yadoplata."
35 WALL STREET........... ....NEW YORK, N. Y.

E. H. BENJAMIN, Mining Engineer.
A. M. HUNT, Mechanical & Hydraulic Engineer.
WYNN MEREDITH, Electrical Engineer.
C. L. CORY, Electrical & Mechanical Engineer.
EXPERT EXAMINATIONS. ADVISORY REPORTS.
CONSTRUCTION SUPERVISION.
331 Pine Street,..........San Francisco, Cal.
Telephone Main 1870. Cable Address "Edben."

DANIEL G. JEWETT.
Specialty: The Mining and Smelting of Copper or Lead Ores.
General Manager of Boston G. M. & M. Co., Venture G. M. & M. Co., The Boston Tunnel.
P. O. BOX 5, GUFFEY, PARK CO., COLO.

ABBOT A. HANKS,
CHEMIST AND ASSAYER.
Successor to Henry G. Hanks, est. 1866. The supervision of sampling of ores shipped to San Francisco a specialty.
—531—
California Street,
San Francisco.

RICHARD A. PEREZ, E. M.
Assayer and Analytical Chemist,
120 North Main St., - Los Angeles, Cal.

S. W. TYLER,
Mining and Metallurgical Engineer,
6 Windsor Hotel Block.
Cable: Retyl, Denver. DENVER, COLORADO.

The SPOKANE BUREAU OF MINING,
N. E. LINSLEY, Manager.
SPOKANE, : : WASHINGTON.
Consulting Mining and Milling Engineer.
Will Examine and Report on Mines.

FRANK C. MANDELL,
MINING ENGINEER,
U. S. Deputy Mineral Surveyor for Idaho and Oregon.
Mine Examinations, Surveys and Reports.
HAILEY, IDAHO.

CLARENCE HERSEY,
Assayer and Chemist,
(Established 1879.) LEADVILLE, COLO.
Gold, Silver and Lead...................$1.00.
Any two of above 75c; any one of above 50c.
Copper analysis...............................$1.00.
Platinum, Nickel or Tin, each..............$5.00.
Twenty-one years successful experience in the mining metropolis of Colorado.
Write for mailing envelopes and price list.

ALMARIN B. PAUL, M. E.,
ROOM 27, CROCKER BUILDING, SAN FRANCISCO.
Will act as AGENT for the sale of RELIABLE Mining Property. SPECIAL AGENT FOR
MacArthur-Forrest Cyanide Process
for California north of and including Mono, Madera and Merced counties; also for State of Nevada. Will act as agent for Eastern parties owning mining interests in California.

F. H. HARVEY,
GALT, CAL.,
Mining and Metallurgical Work in All Branches.
Assays, Chemical Analysis of Ores and experiments on rebellious ores for treatment by cyanide or other processes. Surveys and reports upon mining properties.

Simonds & Wainwright,
Mining Engineers,
Assayers and Chemists,
159 Front Street,
NEW YORK.

HUDSON H. NICHOLSON,
Consulting Mining Engineer,
Rooms 216 and 217, Boston Building,
DENVER, COLO., U. S. A.
Cable address: Aichen, Denver.
Expert examinations of and advisory reports on mining propositions.
Specialty: The chemical treatment of ores

CHAS. BUTTERS & CO., Limited.
E. S. LEAVER, Manager.
Ore Testing Works, ❦ ❦ ❦
Chemical and Metallurgical Laboratory,
Assay Office, ❦ ❦ ❦ ❦
DOOLY BLOCK, - SALT LAKE CITY, UTAH.

Telephone, MAIN 5104. ——◆ ESTABLISHED 1869. ◆—— A. H. WARD.
Cable Address, LUCKWARD.
C. A. LUCKHARDT CO.,
NEVADA METALLURGICAL WORKS,
71 & 73 STEVENSON STREET, - - - - SAN FRANCISCO, CAL.
Assaying, Analyses, Sampling.
PRACTICAL WORKING TESTS OF ORE BY ALL PROCESSES.
STAMP MILL AND CONCENTRATOR IN OPERATION ON PREMISES.

Thomas Price & Son,
Assay Office, Sampling Works
And Chemical Laboratory.
526 Sacramento Street, San Francisco, Cal.

DAVIDGE & DAVIDGE, Attorneys and Counsellors at Law, Corcoran Building, Washington, D. C. Practice in the Supreme Court of the United States, the Court of Claims, the Courts of the District of Columbia, and the General Land Office. Western Union Code.

W. J. ADAMS, E. M.,
Mining Engineer and Metallurgist.
Graduate of Columbia School of Mines.
Author of "Hints on Amalgamation," etc., etc.
ROOM 14, 434 CALIFORNIA STREET,
SAN FRANCISCO, CAL.

EDWARD L. HAFF,
MINING ENGINEER,
U. S. DEPUTY MINERAL SURVEYOR.
Mine Examinations and Reports.
National Annex Block,
P. O. Box 21. CRIPPLE CREEK, COLO.

RALPH E. STEVENS,
ATTORNEY AND COUNSELOR,
43-44 Jacobson Building, DENVER, COLO.
Special attention to examination of titles. Corporation, commercial, mining law. Collections receive prompt attention. Notary in office. Refers to Denver representative of Mining and Scientific Press.

ERNEST H. SIMONDS,
Late Instructor in Assaying, University of California.
ASSAYS AND ANALYSES.
LABORATORY TESTS OF ORES.
Special Attention Given to the Instruction of Students.
521 Sacramento St., Cor. Leidesdorff. S. F., Cal.

HOWARD E. BURTON,
ASSAYER and CHEMIST,
111 E. Fourth St., LEADVILLE, COLO.
Specimen prices: Gold, 50c; Gold and Silver, 75c; Gold, Silver and Lead, $1.00; Silver or Lead, 35c; Copper or Zinc, $1.00.
Mailing envelopes sent to any address.

SAM'L A. RANK,
MINING ENGINEER,
U. S. DEPUTY MINERAL SURVEYOR.
Mine Examinations and Reports.
514 Cooper Building,
DENVER........................COLORADO.

T. D. KYLE & CO,
Assayers and Chemists.
Mill Tests of all kinds. Cyanide, Amalgamation and Concentration a specialty. Mail orders given prompt attention.
106 E. Fifth St., Leadville, Colo.

School of Practical Mining, Civil,
Mechanical and Electrical Engineering.
Surveying, Architecture, Drawing, Assaying, Cyanide Process and Metallurgy.
933 Market St., S. F., Cal. OPEN ALL YEAR.
A. VAN DER NAILLEN, President
Assaying of Ores, $25; Bullion and Chlorination Assay, $25; Blowpipe Assay, $10. Full course of Assaying, $50. Established 1864.
☞ Send for Circular.

LOUIS FALKENAU,
STATE ASSAY OFFICE,
538 Sacramento St., below Montgomery.
Analysis of Ores, Metals, Soils, Waters, Industrial Products, Foods, Medicines, etc., etc.
Court Experting in all branches of Chemical Technology. Working Tests of Ores and Investigation of Metallurgical and Manufacturing Processes. Consultations on all questions of applied chemistry. Instructions given in assaying and all branches of chemistry.

J. BELL,
MINES AND MINING,
630 Market St., opp. Palace Hotel,
San Francisco, Cal.

WM. A. AKERS,
Consulting Mining Engineer,
521 Dooly Block, SALT LAKE CITY, UTAH.

R. J. WALTER,
1452 Blake St., DENVER, COLO.
Mining Engineer and Metallurgist.
Reports on mining properties.
Assay office and chemical laboratory. Established in Colorado 1879.

LETSON BALLIET,
Mining and Civil Engineer,
Chemist and Metallurgist,
508 California St., San Francisco, Cal.
Special attention to treatment of low grade and refractory ores by all chemical and mechanical processes.

MINERS' ASSAY OFFICE.
(JNO. HARRIGAN)
10 Stevenson Street, - San Francisco, Cal.
Telephone Clay 972.
Assaying, Analyses, Sampling, Grinding and Pulverizing of all kinds.
Practical Working Tests of Ore by all Processes. Mining Machinery Bought and Sold. Check Assays. Instructions given in Assaying. All Work Guaranteed. **Mines Examined, Sampled and Reported on by M. P. BOAG, M. E. and Cyanide Expert.**

J. W. RICHARDS,
(Late of Aspen, Colo.)
ASSAYER AND CHEMIST. 1754 Champa Street, DENVER, COLO.
Ore Shippers' Agent. Write for Terms.

JAMES ANGUS SNEDAKER,
Mining Engineer,
721-722 Equitable Building, Denver, Colo., U. S. A.

HERMANN J. VAN DIEREN,
Assayer and Metallurgist,
1407 Seventeenth St., DENVER, COLO.
Stamp Mill and Reduction Works: 19th St. and Platte River.
Buyer of every description of Ores and Precious Stones. Rights for sale for process of treating refractory gold ores; also process for treating low grade copper ores. Write for particulars.

RELIABLE ASSAYS.

Gold................	$ .50	Gold and Silver....	$ .75
Lead	.50	Gold, silver, copper	1 50

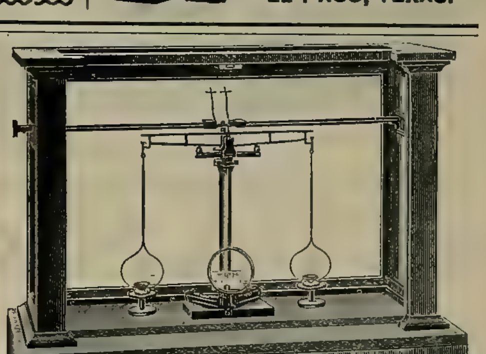
Samples by mail receive prompt attention.
Rich Ores and Bullion Bought.
OGDEN ASSAY CO.,
1429-16th St., Denver, Colo.

Independent Assay Office.
ESTABLISHED 1886.
D. W. Reckhart, E. M., Proprietor.
Agent for Ore Shippers.
Assays and Chemical Analysis.
Mines Examined and Reported Upon.
BULLION WORK A SPECIALTY
P. O. Box 88. Office and Laboratory:
Cor. SAN FRANCISCO & CHIHUAHUA Sts.
EL PASO, TEXAS.

Operator taking courses or horizontal angles with BRUNTON'S PAT. POCKET MINE TRANSIT.

If you wished to find the angle between two points below the horizontal with a sighting compass or an ordinary transit, you would first have to set up your tripod or staff and then level up your instrument. All this takes time.

If you only wanted to get the angle within a degree or so, you could take a BRUNTON TRANSIT, and, holding it in the position shown, take your readings in less time than you can dlace any other instrument. Send for descriptive catalogue B to



No. 044 BUTTON BALANCE. Sensibitity 1-100 milligramme. If you are in the market for the very best balance obtainable at a moderate price, write us for particulars about the No. 044. You will be surprised to find how cheaply it can be purchased for cash. While we cannot recommend this balance for fine gold work, a great many assayers are using it for such successfully. Send for illustrated catalogue A, for complete description and prices, to

WM. AINSWORTH & SONS,
(Successors to WM. AINSWORTH.)
DENVER, COLO., U. S. A.

F. W. Braun & Co., Los Angeles, Cal., Agents for balances and the Brunton Patent Pocket Transit.
John Taylor & Co., San Francisco, Cal., Agents for balances and the Brunton Patent Pocket Transit.
H. S. Crocker Co., San Francisco, Cal., Agents for the Brunton Patent Pocket Transit.
Pacific Optical Co., Los Angeles, Cal., Agents for the Brunton Patent Pocket Transit.

Ammonia Process.

The practical success of this process is well known and is demonstrated chemically, technically and mechanically in every detail on a large scale. Refractory ores and tailings containing gold, silver, copper and zinc are extracted successful and profitable. Mail average sample and $10 and receive full report about the extraction.

Pocketbook, Ammonia Process, full description, $1.

Instructions in Chemistry and all successful and practical Lixiviation Processes.

Office and Laboratories:

334 KEARNY STREET, SAN FRANCISCO, CAL.
H. HIRSCHING,
Mining Engineer and Chemist.

HENRY E. WOOD, ASSAYER,

1734 Arapahoe St., DENVER, COLO.

Ore Tested in Carload Lots.

Write for Circular.

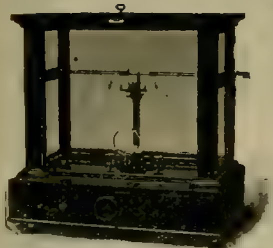
ALVIN PHILLIPS & CO.,

Chemists, Mining and Metallurgical Engineers,

1761 MARKET STREET,

DENVER, - COLO.

Complete Ore-Testing Works — capacity ten pounds to two tons. Modern Methods of Lixiviation, Cyanide and Chlorination. Concentration on Bartlett Table. Assaying and Bullion Refining. Chemical Analyses of Oils, Coal, Water, and all solutions. WRITE FOR PRICES.



SMITH & THOMPSON,

Manufacturers of Fine

ASSAY BALANCES.

Write for Catalogue.

2219 Stout St.,
Denver, Colo.

Hoskins' Patent Hydro Carbon Blow-Pipe and Assay Furnaces.

No dust. No ashes. Cheap, effective, economical, portable and automatic.

SEND FOR PRICE LIST TO

W. HOSKINS, 81 South Clark St., Room 55, CHICAGO, ILL.

HEALD'S

BUSINESS COLLEGE.

24 Post Street, - - - San Francisco.

MINING AND CIVIL ENGINEERING DEPARTMENT: Mathematics, Draughting, Strength of Material, Chemistry, Assaying, Blow-Pipe Analysis, Geology, Mineralogy, Surveying, etc., under the direction of Prof. O. H. Packer, an engineer of national reputation.

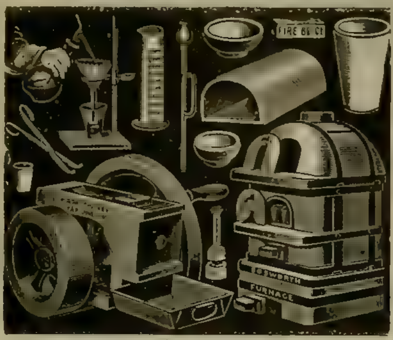
ELECTRICAL DEPARTMENT: Theory and Practice; Construction,

BUSINESS: Bookkeeping, Shorthand, Typing, Modern Languages, etc.

Twenty teachers; individual instruction; can enter at any time; Catalogue and Journal free.

THE DENVER FIRE CLAY CO.,

1742 to 1746 Champa St., DENVER, COLO.



Manufacturers, Importers and Dealers in **Chemicals, Apparatus and Assayers' Supplies. Fire Brick and Tile.**

Sole Agents for the "AINSWORTH BALANCES."

WRITE FOR CATALOGUES.

THE ROESSLER & HASSLACHER CHEMICAL CO.,

100 William Street, New York.

THE ROESSLER & HASSLACHER CHEMICAL COMPANY · NEW YORK · CHEMISTS

CYANIDE

Peroxide of Sodium

Hyposulphite of Soda

Chloride of Lime

Sulphide of Iron

And Other Chemicals for Mining Purposes.

The State Ore Sampling Co.

DENVER, COLO.

We buy Gold, Silver, Lead, Copper, Bismuth, Uranium, Wolframite, Cobalt, Molybdenite and Antimony Ores. We have modern sampling mills, also test ore for the new processes of ore reduction.

Our long experience in the market enables us to obtain the highest prices for all marketable ores. Write for our "Reference Book." Send analysis of your ore for prices and information.

BAILY & MONNIG, Managers.

Globe Engineering Company,

(INCORPORATED.)

STIRLING WATER=TUBE BOILERS.

Unequaled for Mines and Mills.

Easily Transported. Quickly Cleaned.

EXETER HOISTING ENGINES; CORLISS, SLIDE VALVE AND AUTOMATIC CUT-OFF ENGINES; BOILERS; STEAM PUMPS; SINKING PUMPS; HIGH DUTY PUMPING ENGINES; AIR COMPRESSORS; FEED WATER HEATERS AND PURIFIERS; JET AND SURFACE CONDENSERS; WALKER'S METALLIC PISTON ROD PACKING; LOCKE DAMPER REGULATORS; REFRIGERATING MACHINERY.

STEEL MILLS, ROCK AND SHAFT HOUSES.
OTTO AERIAL ROPEWAYS.

COMPLETE DESIGNS for STEAM PLANTS for MINES and MILLS.

GLOBE ENGINEERING COMPANY,

Mechanical, Civil and Mining Engineers, 509 Mission St., San Francisco, Cal.

ESTABLISHED 1856.

Controls AND Check Assays

(A SPECIALTY.)

MARINER & HOSKINS,
ASSAYERS AND CHEMISTS,
Mining Engineers and Metallurgists.

81 South Clark Street.
Rooms 51-55,
CHICAGO, ILLINOIS.

SEND SAMPLES BY MAIL OR EXPRESS.
MAILING SACKS ON APPLICATION. : :

THE CAL. ANTI-CALORIC COMPANY,

Tel. Main 5752. Office, 217-219 Mission St., San Francisco, Cal.

Sole Manufacturers of CAL. ANTI-CALORIC SECTIONAL COVERINGS AND BLOCKS FOR BOILERS. PLASTIC (dry) for Steam Domes, Etc. Sole Agents for the Boston Asbestos Paper Co. Asbestos Goods of All Kinds. Send for Information. Factory, Potrero.

Dearborn Compounds for That Oil Getting Back Into Boilers.

DEARBORN DRUG & CHEMICAL WORKS,
MANUFACTURING AND ANALYTICAL CHEMISTS,

ANALYZERS OF EVERYTHING.
OIL CHEMISTS.

MAKERS OF BOILER COMPOUNDS.
WATER CHEMISTS.

Offices and Laboratories:

29, 30, 31, 32 and 33 Rialto Bldg. - - - CHICAGO, ILL.

IMPROVED BONE ASH.

It is 100% better than Bone Ash now being used; will absorb more lead, will never crack or split in the Muffle, can be dropped before or after using without breaking. Cupels can be made and used at once; no drying required. Excessive heat has no effect on them. Will stand shipping any distance. It takes up none of the precious metals in cupeling. Cupels much quicker. Once used always used. Sold under a positive guarantee or money refunded. Now being used by all smelters and assayers who have tried it.

Correspondence solicited.

Samples given if required.

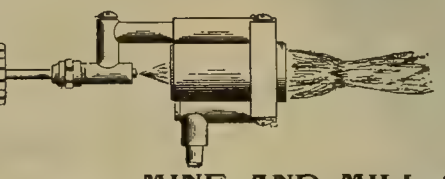
J. J. CUMMINGS & CO., Sole Mfrs.,

Telephone Clay 972. 10 STEVENSON ST., SAN FRANCISCO, CAL.

For Sale also by Justinian Caire Co., Dealers in Assay Goods and Mining Supplies, 521-523 Market St.

Taylor's Coal Oil and Gasoline Burner

(PATENTED)



A new heating burner for Assayers and Chemists, or for brazing, in which coal oil at 33 deg. to 45 deg., Beaume and 150 deg. fire test, or gasoline at 74 deg. test can be used for fuel. Adapted to crucible, muffle and brazing work. Price $6. For sale by

JOHN TAYLOR & CO.,

63 FIRST STREET,
SAN FRANCISCO, CAL.

MINE AND MILL SUPPLIES.

Importers and Manufacturers of Assayers' Materials, Chemicals and Acids, Etc.

CATALOGUE ON APPLICATION.

TRADE MARK.

(M'ARTHUR-FORREST PROCESS.)

CYANIDE PROCESS.

The MacArthur-Forrest Cyanide Process is the Best

For the Treatment of Refractory and Low Grade Gold and Silver Ores and Tailings. We are the Originators of the Cyanide Treatment, and have kept up with the times in all Improvements in Cyanide Methods.

Successful Plants in Operation in all Western Mining States.

Samples Assayed and Fully Reported Upon. Properties Examined. Designs Furnished. For Terms and Particulars, Address

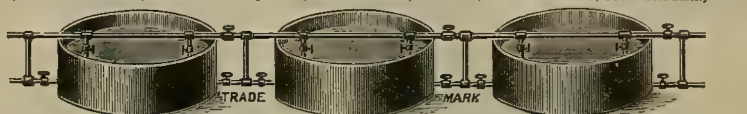
The Gold and Silver Extraction Co. of America, Ltd.
GEO. A. ANDERSON, General Manager,
208-210 McPhee Building, Denver, Colo.

Testing Works: 1716 Blake Street, Denver, Colo.

ALMARIN B. PAUL, Agent, 27 Crocker Building, San Francisco, Cal.

"PNEUMATIC" CYANIDE PROCESS.

(Patented in U. S., So. African Republic, New Zealand, Victoria, New So. Wales, So. Australia.)



WILL DO IN 7 HOURS WHAT REQUIRES FROM 2 TO 6 DAYS BY OLDER METHODS.

SEND FOR PAMPHLET.

THE PNEUMATIC CYANIDE PROCESS CO., 306 Boston Bldg., Denver, Colo.

New Process of Copper Extraction.

CHEAP, CLEAN AND EFFECTIVE.

THE GARDINER LEACHING PROCESS

FOR COPPER ORES.

TESTS MADE ON ANY QUANTITY OF ORES AT REASONABLE RATES.
FULL PARTICULARS ON APPLICATION.

THE AMERICAN COPPER MINING & EXTRACTION CO., DENVER, COLO.

ST. LOUIS SAMPLING & TESTING WORKS,

1225 and 1227 Spruce St.,

ST. LOUIS, MO.

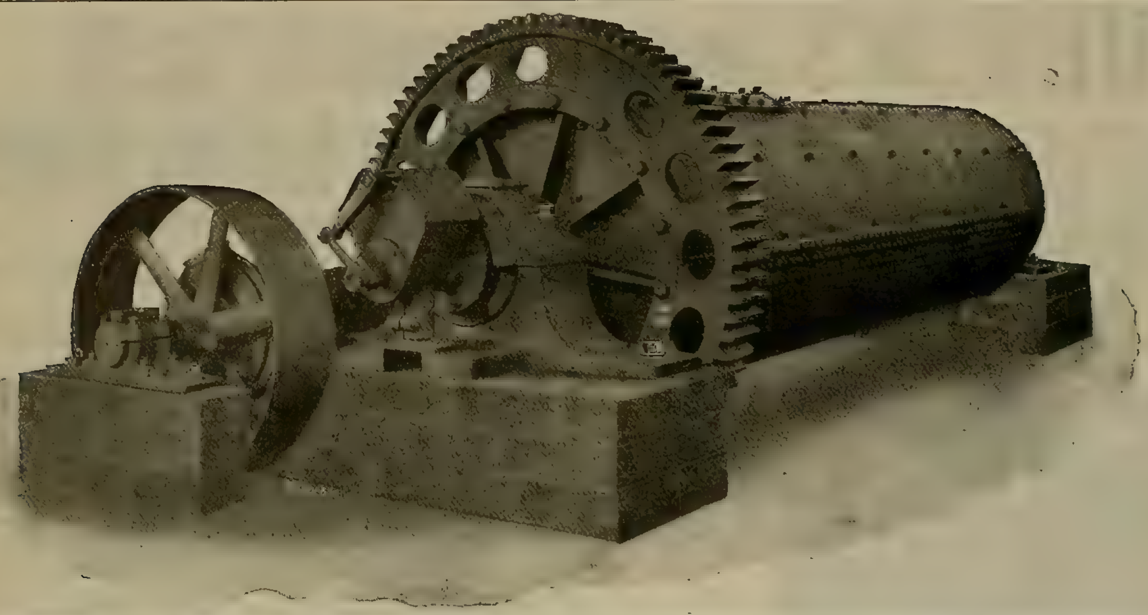
The Largest and Most Complete Ore Testing Works in Existence for Making all Kinds of Practical Working Tests of Ore, etc., to Determine the Most Suitable Method of Treatment.

PLANT FOR COAL WASHING, COKING AND STEAMING TESTS OF FUELS. ASSAYS, ANALYSES, CHEMICAL AND PHYSICAL INVESTIGATIONS OF ALL KINDS. MINERAL PROPERTIES, MINES AND METALLURGICAL PROCESSES EXAMINED AND REPORTED UPON. CORRESPONDENCE SOLICITED.

Are You Confronted With a Difficult Ore=Separating Problem?

THE WETHERILL MAGNETIC SEPARATING PROCESS

may prove the solution. **Apply to Wetherill Separating Company, 52 Broadway, N. Y.**



GATES IRON WORKS.

Sole Manufacturers of the

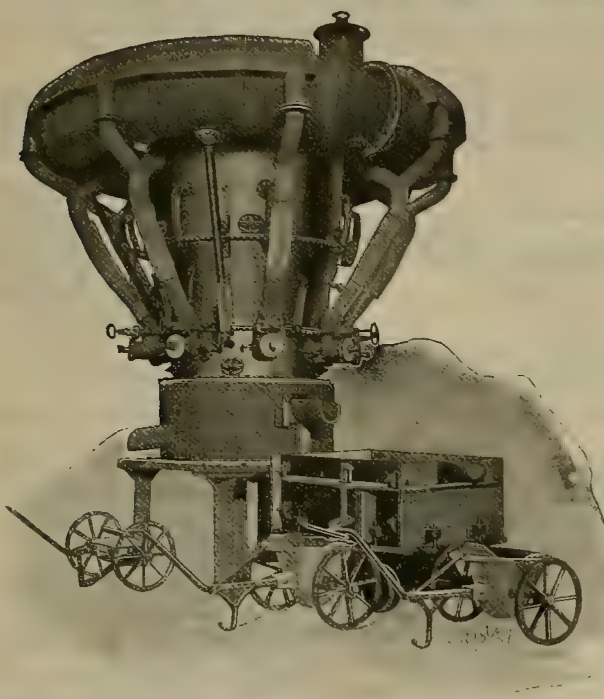
Clark Patent Tube Mill.

The simplest and most durable machine for very fine grinding of ores either wet or dry.

Catalogue No. 15 describes it.

—Address—

650 Elston Ave., Chicago.



THE COPPER FURNACE

Here illustrated has OUR PATENT

WATER VAPORIZING ATTACHMENT.

Experience has proven this to be the best of all methods for applying water for the cooling of jackets. It has the further great advantage of using only about one-eighth the usual amount of water needed for that purpose, and all jackets are kept at the same temperature.

We Manufacture Smelting Furnaces and Equipments

FOR THE TREATMENT OF

GOLD, SILVER, LEAD, COPPER and NICKEL ORES.

of any desired tonnage capacity above forty tons per day, and put them into successful operation under guarantee. Write for catalogue showing different styles of furnaces.

We also design, manufacture and erect Smelter Sulphide Mills for crushing and sampling ores. We are the originators of the Narrow Face, Large Diameter, High Speed Crushing Rolls. A full description of our Crushing Machinery is given in a special catalogue, which will be sent on application.

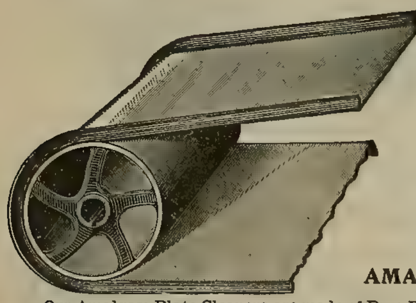
THE COLORADO IRON WORKS CO.

ESTABLISHED 1860.

DENVER, COLO., U. S. A.

SPADONE'S CONCENTRATOR BELTS.

PATENTED.



This illustration shows the edge flanging outwardly as it passes over the pulley. This relieves the strain from the top and bottom of the edge by directing the strain automatically to the inside face surface of the edges. Heretofore all belts have been so constructed that when they pass over the pulleys or rolls, a direct strain comes upon the top or at the base of of the edges, causing the edges to break away from the body of the belts in a very short time. *We avoid this Mechanical Defect by our Spadone Curved Edge.* Belts made to fit any machine—4, 5 and 6 feet wide. Prices and samples on application.

AMALGAM PLATE CLEANERS.

Our Amalgam Plate Cleaners are made of Pure Rubber in moulds, thus insuring a plate cleaner which will not scratch the plates and a perfect edge which will clean the Amalgam plates evenly. They are made 6 inches long, 3 inches wide and ½ inch thick, making a convenient size to handle. Price by mail to any address, each 75 cents. Correspondence solicited.

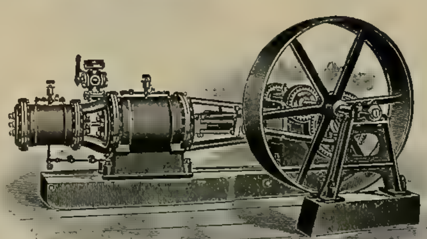
Send us your order for Water, Air Drill, Steam, Suction and Fire HOSE, RUBBER BELTING, RUBBER PACKING and LEATHER BELTING.

THE GUTTA PERCHA RUBBER AND M'F'G CO ,

30 and 32 FREMONT STREET. Telephone Main 1813. SAN FRANCISCO, CAL.

WHY NOT AIR DRILLS OR COMPRESSORS?

have our catalogues, specifications and prices before you purchase



Our guarantees are strong; our customers are satisfied. We can satisfy YOU.

J. Geo. Leyner,

729 Seventeenth St.,

DENVER, COLO.

THE MARION STEAM SHOVEL CO.,

Steam Shovels Dredges and Traction Dredges

Suitable for all kinds of **Excavating Work,** making a specialty of

PLACER MINING MACHINES,

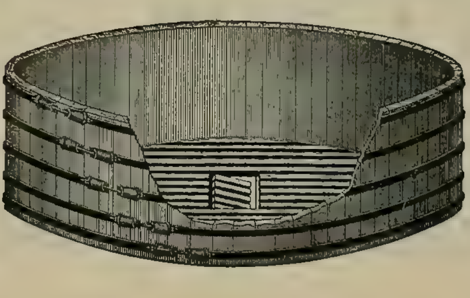
separate or self-contained, either as a dry land excavator or floating dredge.

The Marion Steam Shovel Co.

MARION, OHIO.

GEO. W. BARNHART, No. 4 Sutter St., San Francisco, Cal.

FOR CYANIDE PLANTS OR MINING—TANKS



OF ANY DESCRIPTION.

Write to

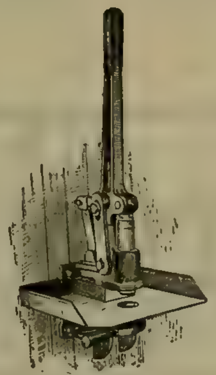
PACIFIC TANK CO.,

348 E. 2nd Street, Los Angeles. 35 Beale Street, San Francisco.

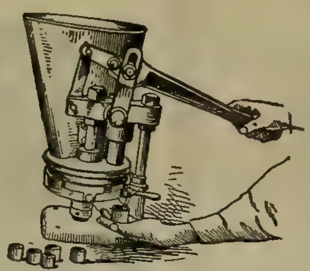
Illustrated Catalogue Mailed Free.

ONE OF OUR MANY SPECIALTIES FOR ASSAYERS.

The Calkins Cupel Machine.



WALL PATTERN.
In position for filling mold.



THE AUTOMATIC.
Showing finished cupel being expelled.

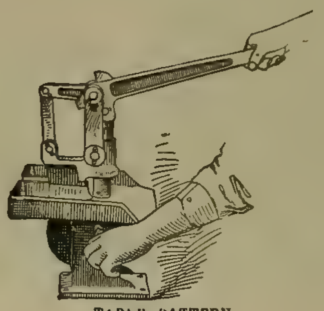


TABLE PATTERN.
Showing position of lever when greatest compression is obtained.

To Assayers:

With these machines perfect cupels can be made by anyone with great ease and rapidity.
They are the greatest labor-saving machine of the Assayer that can be had.
Compact, easily operated, can't get out of order, everlasting.

WRITE FOR OUR NEW, DESCRIPTIVE PAMPHLET IN WHICH ALL OUR SPECIALTIES ARE FULLY DESCRIBED.

F. W. BRAUN & CO.,
Manufacturers of Modern Appliances for Assayers,
LOS ANGELES, CAL.

ADAMANTINE SHOES AND DIES.

✦✦✦✦✦CHROME CAST STEEL.✦✦✦✦✦

CANDA Improved Self-Locking CAMS.

TAPPETS, BOSSES, ROLL SHELLS AND CRUSHER PLATES.

These castings are extensively used in all the mining States and Territories of North and South America. Guaranteed to prove better and cheaper than any others. Orders solicited subject to the above conditions. When ordering, send sketch with exact dimensions. Send for Illustrated Circular.

Manufactured by CHROME STEEL WORKS, Brooklyn, N. Y.

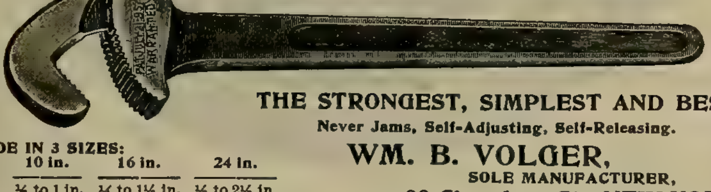
H. D. & H. W. MORRIS,
AGENTS,
Room 194 Crocker Building, San Francisco, Cal.

Canda Cam.

OUR 24-INCH WRENCH IS ESPECIALLY ADAPTED FOR MINE WORK.

The Johnston Patented Pipe Wrench.

A Strictly High-Grade Tool---Drop-Forged---Warranted.



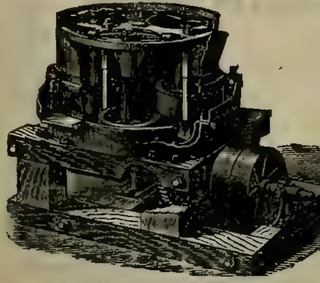
THE STRONGEST, SIMPLEST AND BEST.
Never Jams, Self-Adjusting, Self-Releasing.

MADE IN 3 SIZES:

	10 in.	16 in.	24 in.
Pipe	⅛ to 1 in.	¼ to 1½ in.	½ to 2½ in.
List	$2 25	$3.00	$6.00

WM. B. VOLGER,
SOLE MANUFACTURER,
88 Chambers St., NEW YORK.

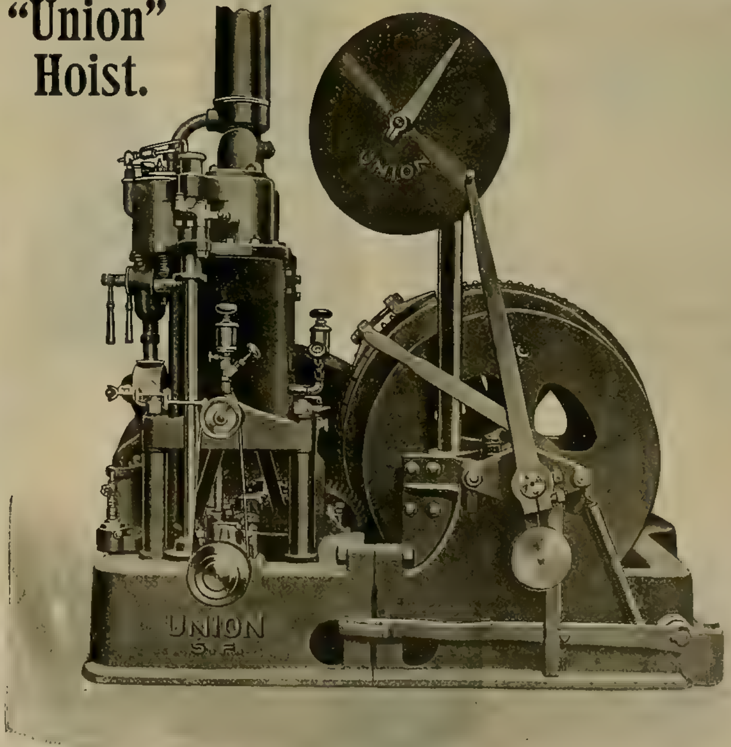
Agencies: THE MINE & SMELTER SUPPLY CO., Denver and Salt Lake City.



Centrifugal Roller Quartz Mill.

F. A. HUNTINGTON,
—Manufacturer of—
CENTRIFUGAL
Roller Quartz Mills.
CONCENTRATORS and ORE CRUSHERS.
Mining Machinery of Every Description.
Steam Engines, Shingle Machines.
Room 1, 3d Floor, Mills Building,
SAN FRANCISCO, CAL.

"Union" Hoist.



The above illustrates the 25 H. P. double cylinder, single drum "Union" hoist, with all the latest improvements.

THE UNION GAS ENGINE CO.
—BUILD THE—
"Union" Gas Engines,
Which use either MANUFACTURED or NATURAL GAS, ORDINARY STOVE GASOLINE (NAPHTHA or BENZINE), DISTILLATE or KEROSENE.
STATIONARY ENGINES for All Kinds of Work in Sizes from 3 to 300 h. p in actual use.
"UNION" COMBINED HOISTS in Sizes from 2 to 130 h. p. in actual use.
"UNION" COMBINED COMPRESSORS—20, 30, 40 h. p.
HOISTS and COMPRESSORS Can Be Built in Larger Sizes to Order.
"UNION" MARINE ENGINES, 4 to 200 h. p., of Single, Double and Four-Cylinder Types.
FIFTEEN YEARS' EXPERIENCE Building Gas and Oil Engines.
"UNION" ENGINES Are In Use All Over the United States.
"UNION" ENGINES Are Simple, Durable and Economical.
Office, 248 First Street. Works, Corner First and Clementina Streets. SAN FRANCISCO, CAL.

Founded by Mathew Carey, 1785.

HENRY CAREY BAIRD & CO.,
INDUSTRIAL PUBLISHERS, BOOKSELLERS & IMPORTERS,
810 Walnut St., Philadelphia, Pa., U. S. A.

☞ *Our New and Revised Catalogue of Practical and Scientific Books, 92 pages, 8vo; a Catalogue of Books on Steam and the Steam Engine, Machinery, etc.; a Catalogue of Books on Sanitary Science, Gas Fitting, Plumbing, etc., and our other Catalogues and Circulars, the whole covering every branch of Science applied to the Arts, sent free and free of postage to any one in any part of the world who will furnish his address.*

BRANNT'S PRACTICAL TREATISE ON THE MANUFACTURE OF VINEGAR, ETC.

NEARLY READY.

A Practical Treatise on the Manufacture of Vinegar. With special Consideration of Wood Vinegar and other By-Products Obtained in the Destructive Distillation of Wood; Fabrication of Acetates; Cider and Fruit Wines; Canning and Evaporating of Fruit; Manufacture of Catsups, Fruit Butters, Marmalades, Jellies, Pickles and Mustards; Preservation of Meat, Fish and Eggs. By WILLIAM T. BRANNT. Illustrated by Upwards of 100 Engravings. 8vo., 550 pages. Price $5.00.

By mail free of postage to any address in the world.

☞ *An elaborate circular showing the full table of contents of this important book will be sent to any one furnishing his address.*

☞ *Advance orders solicited.*

HENRY CAREY BAIRD & CO.,
INDUSTRIAL PUBLISHERS, BOOKSELLERS & IMPORTERS,
810 Walnut St., Philadelphia, Pa., U. S. A.

DELINQUENT SALE NOTICE.

MAMMOTH GARFIELD GOLD MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Shasta County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment levied on the 5th day of June, 1900, the several amounts set opposite the names of the respective shareholders, as follows:

Name.	No. Cert.	No. Shares.	Amt.
Andrew Corbin	13	20,000	$3500 00
Philip Corbin	14	20,000	3500 00
Charles Glover	16	1,750	306 25
Jos. S. Silver	5	5	87
J. M. Spring	15	2,000	350 00

And in accordance with law, and an order from the Board of Directors, made on the 5th day of June, 1900, so many shares of each parcel of such stock as may be necessary, will be sold at public auction, at the office of the company, Rooms 54 and 59, No. 120 Sutter street, San Francisco, California, on TUESDAY, the 2nd day of October, 1900, at the hour of 2 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

SAM W. CHEYNEY, Secretary.

Office—Rooms 54 and 59, No. 120 Sutter street, San Francisco, California.

POSTPONEMENT.

The date of sale of the above described delinquent stock has been postponed to THURSDAY, the 1st day of November, 1900, at the hour of 2 o'clock P. M. of said day. By order of the Board of Directors

SAM W. CHEYNEY, Secretary.

Office—Rooms 54 and 59, No. 120 Sutter street, San Francisco, California.

DELINQUENT SALE NOTICE.

EUREKA CONSOLIDATED DRIFT MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Placer County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 26) levied on the 9th day of August, 1900, the several amounts set opposite the names of the respective shareholders, as follows:

Name.	No. Cert.	No. Shares.	Amt.
Geo. W. Carpenter	143	200	$2 00
Geo. W. Carpenter	218	33	33
Guy C. Earl	73	800	8 00
Guy C. Earl	161	320	3 20

And in accordance with law, and an order from the Board of Directors, made on the 8th day of September, 1900, so many shares of each parcel of such stock as may be necessary, will be sold at public auction at the office of the company, room 31, No. 214 Pine street, San Francisco, California, on TUESDAY, the 9th day of October, 1900, at the hour of 1 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of the sale.

GEO. W. DIXON, Secretary.

Office—Room 31, No. 214 Pine street, San Francisco, California.

ASSESSMENT NOTICES.

MARIPOSA COMMERCIAL AND MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Mariposa County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 31st day of August, 1900, an assessment (No. 18) of Ten ($10) Dollars per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 320 Sansome street, room 24, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 10th day of October, 1900, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on THURSDAY, the 8th day of November, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

JOSEPH H. MOOSER, Secretary.

Office—320 Sansome street, room 24, San Francisco, California.

ALLIANCE EXPLORATION & MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Ophir, Placer County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 3d day of August, 1900, an assessment (No. 3) of five (5) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 236 Sutter street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 11th day of September, 1900, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 2nd day of October, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

S. GOLDSMITH, Secretary.

Office—236 Sutter street, San Francisco, California.

POSTPONEMENT.

By order of the Board of Directors, the day of delinquence in the above assessment has been postponed to October 11th, 1900, and the day of sale to THURSDAY, the 1st day of November, 1900.

S. GOLDSMITH, Secretary.

Office—236 Sutter street, San Francisco, California.

MARINA MARSICANO GOLD MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Sunny Hill, Shasta County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 15th day of September, 1900, an assessment (No. 24) of 2 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, 217 Sacramento street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 23d day of October, 1900, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 12th day of November, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

CHAS. BOVONE, Secretary.

Office—217 Sacramento street, San Francisco, California.

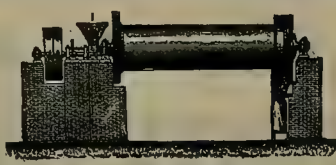
12 H. P. $500
C. O. Bartlett & Co.
CLEVELAND,
OHIO.

SHOES and DIES
of **SUPERIOR** quality and at prices 20 to 30% lower than any other maker.
FURNISHED BY
ARTHUR KOPPEL,
66 Broad St., N. Y. City.
Write for Particulars.

MINING CARS of every description.
PORTABLE RAILWAYS,
Rolling Stock, Railway Outfits for Mines of every description.
Export Work a specialty.
ARTHUR KOPPEL,
66 Broad St., N. Y. City.
Send for Catalogue and Estimates.

Pacific Coast Agents, BAKER & HAMILTON, SAN FRANCISCO and SACRAMENTO.

FOWLER'S AIR SPACE
and Asbestos Sectional Covering.
As a Non-Conductor, Unequaled.
Special Rates for Steam Boilers and Drums.
G. C. Fowler, 656-58 Howard St., S. F.



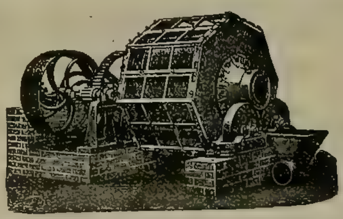
THE DAVIDSEN PATENT TUBEMILL.

FOR FINE GRINDING,
Uniformity of Output, Effectiveness, Simplicity, or Economy of Operation and Maintenance, "THE DAVIDSEN" HAS NO EQUAL.
ENORMOUS GRINDING SURFACE. ✤ SLOW SPEED. ✤ ANY DEGREE OF FINENESS.
WRITE FOR CATALOGS.

F·L·SMIDTH & CO
ENGINEERS
66 MAIDEN LANE, NEW YORK
COPENHAGEN, VESTERGADE 29.K. LONDON. 9 BRIDGE ST., S.W.

THE SMIDTH BALLMILL
Crushes, Grinds and Sifts in One Operation, Working Continuously.
AMONG ITS SPECIAL FEATURES OF MERIT ARE:
Maximum Output, Slow Speed, Low Horse Power, Absolute Uniformity, Ease of Access, Slight Cost of Repairs.
OUR AUTOMATIC FEEDER INSURES REGULARITY AND EFFECTIVENESS.

THE SMIDTH BALLMILL.
BEST.
CHEAPEST.
MOST SIMPLE.



JOHN A. ROEBLING'S SONS Co.
IRON & STEEL
WIRE ROPE
TELEGRAPH WIRE
COPPER WIRE
Works at Trenton, N.J.
WAREHOUSES,
117 LIBERTY ST., NEW YORK.
25 FREMONT ST., SAN FRANCISCO.
173 LAKE ST., CHICAGO, ILL.
INSULATED ELECTRIC WIRES.
MAGNET WIRE
&

FULDA'S PATENT SELF-TIGHTENING TANK.

Fulda's Planing Mills and Tank Manufactory,
30-40 SPEAR STREET, SAN FRANCISCO, CAL.
—MANUFACTURERS OF—
RAILROAD, MINING, OIL, WATER, WINE, TANKS.
Chemical and Cyanide Vats a Specialty.
WRITE FOR PRICE LIST.

DEWEY, STRONG & CO., Patent Solicitors, 330 Market St., San Francisco, Cal.

Most reliable for controlling steam and other fluids. Can be reground, if necessary, while valve is inposition on steam pipe.

—MADE BY—

The Wm. Powell Co.,
CINCINNATI, O.

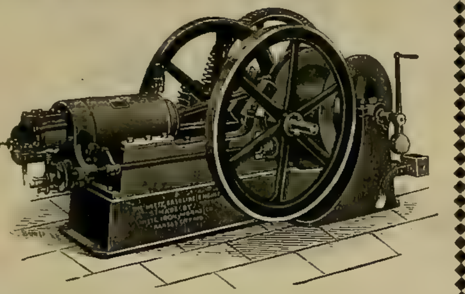
Carried in stock by Miller, Sloss & Scott, San Francisco.

D. Campbell Davies & Co.,
REPRESENTING THE LARGEST
EUROPEAN and AMERICAN
MANUFACTURERS
— OF —
Mills, Mine and Smelting
Machinery Supplies.

EXPORT TRADE A SPECIALTY.

Apartado No. 83,
DURANGO, - - - MEXICO.

WITTE GASOLINE HOISTS
ARE MONEY EARNERS.



Made for use in places far from factory. Are built in parts and in duplicate. Renewals easy and quick to get. Strong, substantial and reliable.

Operate on GAS, GASOLINE or DISTILLATE.

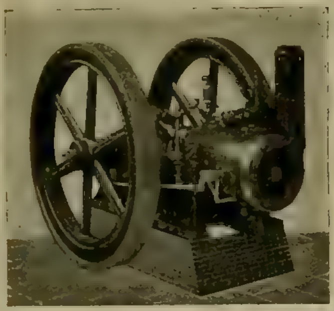
There Are Others, but None as SAFE AND RELIABLE.

Write for Illustrated Catologue G.

WITTE IRON WORKS CO.,
515 WEST 5th ST.,
KANSAS CITY, MO., U. S. A.

Hendrie & Bolthoff Mfg. & S. Co., Denver, Colo.
C. B. Boothe & Co., Los Angeles, Cal.
Tracy Engineering Co., San Francisco, Cal.

WE CAN SHOW YOU A

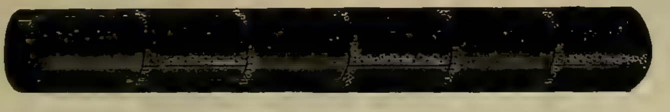


HERCULES
Gasoline Engine

Running on less than ⅛-gallon of fuel per H. P. hour, with a speed regulation of 2½%.

JOHN WIGMORE & SONS CO.,
117-123 S. LOS ANGELES ST.,
LOS ANGELES, CAL.

RIVETED IRON AND STEEL PIPE



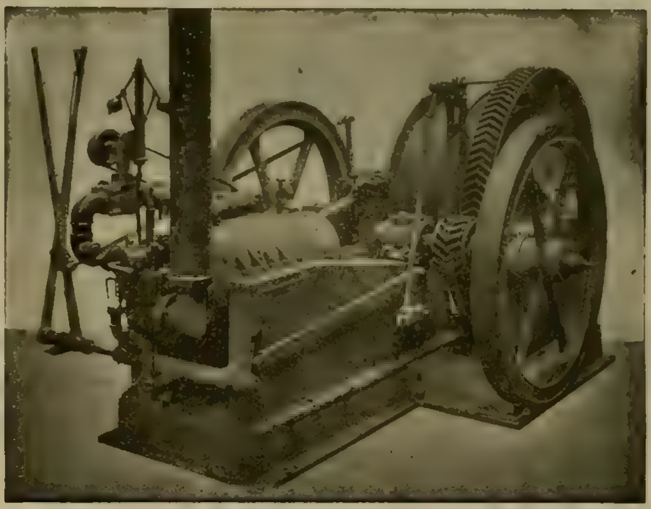
FOR HYDRAULIC MINES, IRRIGATION AND POWER PLANTS. Manufactured from the best grades of IRON or STEEL by MODERN MACHINERY.

AGENTS FOR THE Celebrated CANTON STEEL.

Schaw, Ingram, Batcher & Co.,
539 Mission St., SAN FRANCISCO.
211 to 219 J St., SACRAMENTO.

ANY BOOK
ON ANY SUBJECT
Connected with Mining, Metallurgical, Mechanical or Industrial Interests,
WILL BE SENT ANYWHERE, POSTPAID,
AT PUBLISHER'S PRICES.
SEND FOR CATALOGUE OF LINE DESIRED.
ADDRESS BOOK DEPT. MINING AND SCIENTIFIC PRESS,
NO. 330 MARKET STREET, SAN FRANCISCO, CAL.

HERCULES HOISTS Are Sold the World Over.



Hercules Gasoline Hoist--Speed 385 Ft.; Load 2500 Lbs.

HERCULES GAS ENGINE WORKS,............141-143 FIRST STREET, SAN FRANCISCO, CAL.

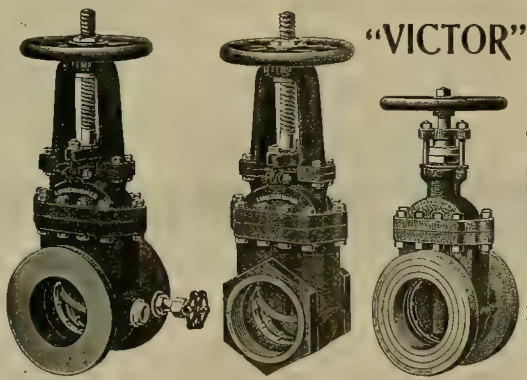
A GASOLINE OR OIL "HOIST"

that does its work without any fuss or bother is the "Weber." Correctly designed and built, in sizes from 6 to 150 H. P., with Single or Double Drum, for Gasoline, Gas or Distillate. Unexcelled for mining, quarry, or ship use. State sizes wanted and for what use.

WEBER GAS & GASOLINE ENGINE CO.,
P. O. Box 1132-I,
Kansas City, Mo.

See our PUMPING PLANTS.

THE LUNKENHEIMER
"VICTOR" GATE VALVES



Are modern high-pressure valves, strictly first class and constructed to give satisfaction. Made 2 to 16 inches, screw and flange ends, with stationary or rising spindles, with and without yoke and patent by-pass, for 175 lbs. working pressure.

All wearing parts made of bronze.

Compact, heavy, durable, low-priced. Specify them. Write for catalog of high grade brass and iron engineering specialties.

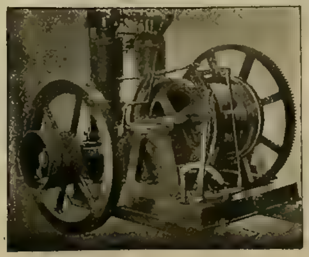
THE LUNKENHEIMER COMPANY,
SOLE MAKERS AND PATENTEES,
Main Office and Works: CINCINNATI, O., U. S. A.
BRANCHES: New York, 26 Cortlandt St.; London. 35 Great Dover St., S. E.

ALL ABOUT
Sight Feed Lubricators.

Our new catalogue for 1900 is ready for distribution. It explains in detail the principles governing the operation of **Sight Feed Lubricators,** using sectional view to show the internal construction, and containing cuts of the different styles in parts before being assembled into the complete lubricators, thus enabling every one to understand their construction and operation thoroughly.

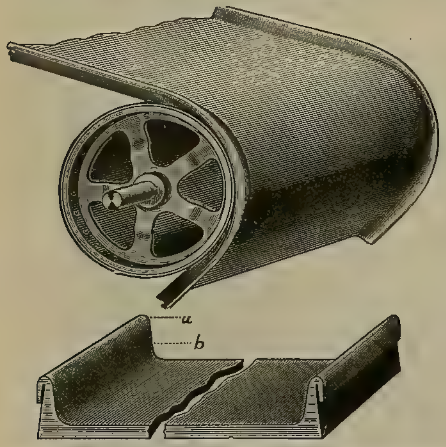
In addition it shows our full line of **Glass Oilers, Oil Pumps, Oiling Devices, Multiple Oilers, Valves, Etc.** It will be sent to any address on application.

DETROIT LUBRICATOR CO., DETROIT, MICH.



Mining Hoist.
THE GOLDEN GATE GAS ENGINE
Will raise more ore than any other **AT LESS COST.**
MANY IN USE, Giving Satisfaction.
Built for any Capacity and for any Purpose.
Pumping Water, Propelling Boats, Hoisting Ore, Machine Shop Power, Etc.
Send for Particulars and Catalogue.
ADAM SCHILLING & SONS,
213 & 215 Main St., San Francisco, Cal.

THE BROWNELL "PATENT LIP" FLANGE FRUE VANNER BELTS.



It has taken years of ceaseless testing and experimenting to produce the superior belt which we now offer, with elastic flanges and pliable body reinforced with specially woven duck. Every belt is manufactured by experienced workmen, and carefully tested on machines especially built for that purpose; consequently we are to-day manufacturing the best belts that mechanical ingenuity, combined with honesty of construction, can possibly produce.

SUPT. OFFICE WILDMAN GOLD MINING COMPANY,
SUTTER CREEK, AMADOR CO., CAL., Feb 22, 1897.

MR. JAS. S. BROWNELL, 132 Market St., San Francisco, Cal.—DEAR SIR: Replying to your favor of the 18th inst., will say that in the two mills operated by this company we have nineteen of your Patent Lip flange concentrator belts in use; some of them have been in constant use for the past two years and have given entire satisfaction. I know of no better flange for a side shake machine.

Yours truly, JOHN ROSS JR., Superintdenent.

MEXICAN MILL. EMPIRE, NEV., March 28, 1897.

MR. J. S. BROWNELL, San Francisco, Cal.—DEAR SIR: For some years we have used three different styles of belts on our Frue vanner at the Mexican mill, and for smooth working and endurance the Brownell Patent Lip flange belt has proved its superiority over all others, and I unhesitatingly recommend it to all who are using Frue machines.

Yours truly, EUGENE MAY, Foreman.

For any information regarding Frue Vanner or Belts, call on or address

JAS. S. BROWNELL, Western Agent FRUE VANNING MACHINE CO.

(Successor to Adams & Carter.) 132 MARKET STREET, ROOM 15, SAN FRANCISCO.

The Copper King, Limited.

Pacific Coast Smelting and Refining Works.

Works:
Seal Bluff Landing,
Cal.

Mines:
Fresno County,
Cal.

Purchasers, Samplers and Smelters
of
Gold, Silver and Copper Ores, and Furnace Products.

Offices:

222 Sansome St.,
San Francisco, California.

Basildon House, 7-11 Moorgate St.,
London, E. C., England.

ATTENTION! USERS OF PIPE WRENCHES.

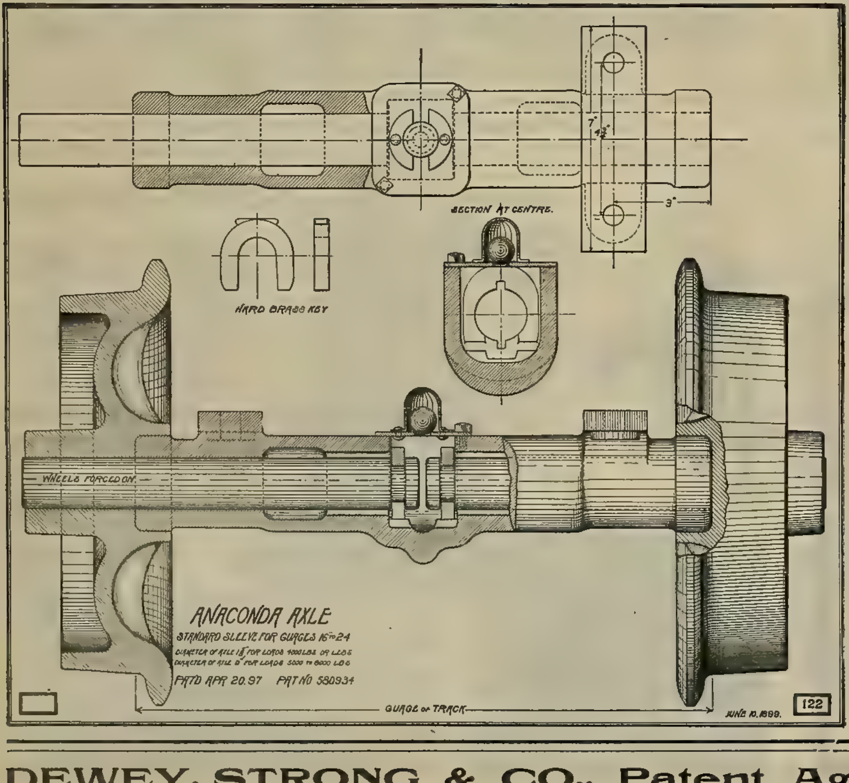
THE LATEST, BEST AND CHEAPEST PIPE WRENCH.

No Threads to Strip. No Nuts to Jam.
Made of Special Wrench Steel, and Drop Forged.

The good qualities of Chain Pipe Wrench and Screw Pipe Wrench combined, without the faults of either. Quick, effective and positive in adjustment. Cannot slip, crush or lock on the pipe. Made in four sizes: 10, 18, 24 and 36 inches. Handling from ⅛ of an inch wire to 4½-inch pipe. Price no higher than other pipe wrenches on the market.

ATLAS PIPE WRENCH CO.,
Flood Building, San Francisco.

NEW YORK OFFICE, 121 LIBERTY ST. WORKS, NEW HAVEN, CONN.


SECTION AT CENTRE.
7"
4½"
3"
HARD BRASS KEY
WHEELS FORCED ON.
ANACONDA AXLE
STANDARD SLEEVE FOR GAUGES 16 TO 24
DIAMETER OF AXLE 1⅞ FOR LOADS 4000 LBS OR LESS
DIAMETER OF AXLE 2" FOR LOADS 5000 TO 8000 LBS
PATD APR 20.97 PAT NO 580934
GAUGE OF TRACK
JUNE 10.1899.
122

Anaconda Self Oiling Axles
FOR MINE CARS.

Over 5000 cars equipped with these axles are being used by the Anaconda Copper Mining Co. in Montana, and large numbers are in use at other mines in the Western States. Axles are made to suit any gauge from 18-inch to 40-inch. Wheels of any type or size can be supplied. The wheel usually furnished is 12-inch in diameter with chilled tread, of form as shown in cut.

PARKE & LACY CO.,

21 & 23 FREMONT ST., SAN FRANCISCO, CAL.

Mining Machinery and Supplies,

SOLE AGENT FOR

INGERSOLL-SERGEANT ROCK DRILLS AND AIR COMPRESSORS,
KNOWLES PUMPS AND PULSOMETER PUMPS,
BULLOCK DIAMOND DRILLS.

is Paper not to be taken from the Library. ++++

CALIFORNIA STATE

MINING AND SCIENTIFIC PRESS.
AND PACIFIC ELECTRICAL REVIEW.

No. 2099.—VOLUME LXXXI. Number 15. SAN FRANCISCO, SATURDAY, OCTOBER 13, 1900. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

How This Paper Grows.

The accompanying illustration graphically portrays the growth of this paper. In the picture is seen on the left the volume for the last half of 1894, which contained 416 pages. In the middle is the volume for the last half of 1896, which consisted of 540 pages. On the right is portrayed the volume of the paper for the last half of 1899, which contained 772 pages. The present volume, for the last half of 1900, will be still larger. This shows the growth in the size of the paper. There is even greater proportionate growth in the number of its readers. It would take considerable space to show this; but that fact is well understood by the advertisers. Of course, the better the paper the more readers, and the more readers the more advertisers. The circulation of this paper is among men who not only can afford to pay for it, but who can also afford to buy what they see advertised therein, and that is the kind of circulation that pleases readers and advertisers, as it insures a publication of value to all. In its latest noted reference to this paper the American Newspaper Directory, through Printer's Ink, said:

> Among the engineering and mining papers in California, none has credit for so large a regular issue as is accorded to the Mining and Scientific Press, published weekly at San Francisco. In fact, it fully equals five times the combined issue accredited to all the others. In all the States of the Far West and the Pacific Slope, consisting of California, Oregon, Washington, Idaho, Montana, Wyoming, Colorado, New Mexico, Arizona and Utah, the largest circulation credited to any publication devoted to engineering and mining is accorded to the Mining and Scientific Press.

The above, from the highest authority on the subject, was, of course, pleasant to know. That was said some considerable time ago. Doubtless were similar reference made now the comparison would be even more flattering to this paper.

Formation of Lode Matter.

In the issue of the 22nd ult. it was stated on page 339 that "sulphide of mercury may be found at Sulphur Bank, Colusa Co., Cal., where also may be seen in decomposed volcanic rocks fissures from which issue steam and hot alkaline water, the sulphur springs depositing siliceous sinter which contains cinnabar and sometimes gold, as do Steamboat Springs, Nevada, where can be seen ore deposits in process of formation." In the issue of Feb. 17, 1900, it was stated on page 175: "The origin of ore deposits and mode of deposition can be conveniently observed at Steamboat Springs, Nevada, where clouds of steam issue from many vents, over a bare rocky space half a mile long, in a narrow valley lined by volcanic ridges on each side. The vents are separated, but occur in parallel lines, showing that they are connected by fissures, filled with opaline quartz. The fissures traverse a continuous crust of deposited quartz, some open, some partly filled with quartz, water issuing from a narrow middle crevice. Some are wholly filled with quartz and have become true quartz-fissure veins. Some of these larger fissures are half a mile long, a foot wide, open and parallel, about 25 feet apart, and, descending downward to the bottom of the quartz crust 30 feet, can be followed no farther because they have deposited quartz in such abundance as to cover up their original vents in the underlying rock. Water does not issue from all the fissures, but can be seen and heard 8 or 10 feet below in violent agitation rom steam and carbonic acid gas. The quartz filling these fissures in the hottest parts is gelatinous, in others spongy and in others hard, or in layers of agate, chalcedony or sugar quartz. Everywhere there is the same distinct ribbon or banded structure, resulting from successive layers of quartz being laid on the sides of the fissure by watery solutions. The quartz in these fissures contains sulphides of iron, copper, cinnabar and even free gold. The metallic contents, as in old fissure veins, are in much less proportion than the quartz veinstone."

These statements have given rise to considerable inquiry and discussion. The brief facts were stated. Some interesting theories as to the formation of lode matter are formulated.

The solution of such questions is an interesting study. Many theories as regards their formation have been advanced since geology has been recognized as a science. Werner's theory, the descension theory, explains the formation of lode matter through infiltration of water holding the metals in solutions from higher situated rocks. It offers, however, no explanation as to where the metallic content of the water is derived from. The descension theory may still be recognized in cases where is found an ore deposit in caverns, and where the presence of the metals above can be proved with certainty.

HOW THIS PAPER GROWS.

Two are often discussed: the ascension and lateral-secretion theory. The ascension theory supposes, in all cases, the lode matter to be brought from a greater depth into the fissures, either by ascending mineral springs or by sublimation. The material found in the lode must be therefore different from that found in the country rock, and must only occur there in the form of impregnation on the sides of the lodes.

There are many ascending acidic mineral springs which contain, besides sulphates, organic matter, and deposit no sulphides in the fissures. The formation of sulphides could only take place by gradual reduction of the sulphate with a larger amount of organic matter than is at present in the spring. Such springs never have been, and never will be, the medium of the lode formation. Many springs, acidic and thermic, issue from fissures in a lode, and are therefore taken as the means by which the lode has been formed. This, however, is not correct, for if it were the case one would find newly formed ore on the walls of these fissures.

Ascending mineral springs, coming from lodes, no matter of what temperature, should not be regarded as the means of bringing the ore into the fissure. They use the lodes, just as any other fissure, simply as the shortest way to the surface, where they deposit the substances, leached out of the rocks, as ochre.

There is, however, another class of mineral springs, and especially thermal springs, of high temperature, which precipitate, besides silver and sulphur, smaller argentiferous or iron pyrites, and even native gold; these springs are found in California and Nevada, and two of them were referred to as above. They are of interest to the practical man, as in some of them one may observe the formation of mineral veins at the present time. The cinnabar deposits of California are of different character, and should not be discussed as a whole, but in groups. For instance, in the Rattlesnake mine, Sonoma Co., Cal., is found mercury, together with liquid petroleum, similar to the deposits of Idria, as an impregnation on clay. In other places, again, it occurs as an impregnation on sandstone. More frequently cinnabar, together with selenium mercury, forms deposits of the stock work or lode form, which, as a rule, are not of large dimensions, but which sometimes, as in Lake Co., Cal., are of some length and thickness. All important deposits are ordinarily accompanied by quartz, sometimes also by opal and brannite, as in the Redington, Cal., mine.

The country rock is serpentine. Of course, only after petrographical and chemical examination can one say what is meant by "serpentine" in this case. It has often been proved that not only have different rocks been mistaken for serpentine, but also that serpentine is not a primitive rock, but a product of metamorphosis of olivine, pilirite, gabbro, and hornblende rocks. To obtain knowledge of the connection existing between the cinnabar deposits and the serpentine rock, one has not only to examine the petrographical and chemical state of the so-called serpentine, but also that of the rocks from which it has been derived. The same will be the case with the sedimentary rocks in contact with the serpentine.

Few of the Californian quicksilver deposits contain native sulphur. They are not interspersed in siliceous sinter, but form compact masses. In their exterior appearances they offer no signs of having been formed by ascending springs, although from some of them carbonic acid and hot water issue from fissures. In the vicinity of Sulphur Bank, Cal., is an extinct volcano, 4500 feet high, whose slopes are covered by trachyte and obsidian. It is surrounded on all sides by hot springs, 72° C., which exhale carbonic acid and sulphuretted hydrogen, and which precipitate borax, siliceous sinter, and sulphur in large quantities. Especially the hills on the southeast shores, which consist of tufa and trachyte, have obtained the name of "Sulphur Bank," as large deposits of sulphur are found on them. Phillips found here decomposed volcanic rocks, from whose fissures the above-named gases, also steam and hot alkaline waters, issue. Sulphur is found everywhere, and contains commonly a little sulphide of mercury. The walls of the fissures are sometimes covered with a layer of amorphous silica, below

MINING AND SCIENTIFIC PRESS.
ESTABLISHED 1860.
Published Every Saturday at 330 Market St., San Francisco, Cal.
ANNUAL SUBSCRIPTION:
United States, Mexico and Canada..........$3 00
All Other Countries in the Postal Union..........4 00
Entered at the S. F. Postoffice as second-class mail matter.
J. F. HALLORAN..........Publisher.
Special Representatives:
EASTERN.
E. H. HAVEN..........150 Nassau St., New York City.
MIDDLE WEST.
CHAS. D. SPALDING..........153 La Salle St., Chicago, Ill.
INTER-MOUNTAIN.
W. A. SCOTT..........43 Jacobson Building, Denver, Colo.
SOUTHERN CALIFORNIA.
W. D. CURTIS..........223 W. Second St., Los Angeles, Cal.

San Francisco, October 13, 1900.

TABLE OF CONTENTS.

ILLUSTRATIONS.—How This Paper Grows, 429. Electric Winze Hoist; Electric Hoist "Cripple Creek Standard;" Electric Winze Hoist, 433. Mining and Metallurgical Patents, 434-435. "Runabout" Automobile; Victoria Top Automobile; "Locosurrey" Automobile, 436. Smith-Vaile Deep Well Power Pump; Bickford Crucible Furnace; Improved Electrical Furnace, 438.
EDITORIAL.—How This Paper Grows, 429. A Mining Decision; Mine Consolidation; Miscellaneous, 430.
MINING SUMMARY.—439-440-441.
LATEST MARKET REPORTS.—442
MISCELLANEOUS.—Formation of Lode Matter, 429. Concentrates, 431. Machine Mine Rock Drills on the Pacific Coast; By-Products of Coke Production, 432. Electric Mine Hoists; Deep Mining in California, 433. Mining and Metallurgical Patents, 434-435. Antiquity of Man in California; Source and Origin of Values; Big Railroad Tunnel; Greatest Quantity of Iron Ore Mined in Any Country, 435. Working an Asbestos Mine; Progress at the Anaconda; New Process of Steel Manufacture; Of Increasing Use; Explosives—Constant Care Necessary, 436. Characteristics of California Petroleum, 437-438. Crucible Furnace; Deep Well Working Head; American Coal for Europe; Boulders in Mines; A New Electrical Furnace, 438. List of U. S. Patents for Pacific Coast Inventors; Notices of Recent Patents; Personal; Recently Declared Mining Dividends; Catalogues Received; Books Received; Obituary, 44'-442.

which is a layer of chalcedony, and lastly one of crystalline quartz. These siliceous layers contain frequently iron pyrites, and quantities of cinnabar, or they appear to be covered with drops of a hydrocarbon. The places richest in ores are found to be those where the rocks have been most decomposed by the gases, and where they have been changed into a clay with an acid reaction, and containing sulphur. According to this the mercury is first found in the deeper regions of the decomposed tufa, where it gradually changes into a sandy conglomerate of iron pyrites, quartz, clay and cinnabar. The sulphur springs in Colusa county also deposit siliceous sinter, which contains cinnabar, and sometimes gold, as do Steamboat Springs. The deposits of silica on the walls of the fissures show a regular structure of layers, ore deposits in the course of formation, deposits of a singular kind, and which only can be compared to the small metallic deposits from solfataras and fumaroles and from gas exhalation from the surface of lava streams, all of which exhale sulphuretted hydrogen.

There are probably no other ore deposits which carry such an amount of native sulphur, and especially in lode matrix which is composed of silica, and nowhere in the country a clay with an acid reaction. A comparison with the true solfataras is here complete, for these only exhale vapor, but no siliceous alkaline water. On no other volcano has cinnabar been observed in considerable quantity as a product of solfataras or fumaroles. The product of fumaroles consists, as a rule, of different bodies. The fumarole products of the Vesuvius, which contain copper, cobalt and lead, have their origin in the olivines and augites of the lava, which contains these metals as silicates, and which have been decomposed by acid vapors; the trachyte of Sulphur Bank may also contain silicates carrying mercury. This is a question of interest, as mercury has been found in the decomposed trachyte rocks of Hungary, Toscano and Peru; small quantities are also found in ore lodes of propylite in Schemnitz and Kremnitz, Germany. But even then the presence of the hydrocarbons in the siliceous sinter deposits is yet unexplained, nor is there any explanation for the cinnabar-carrying sinter of Steamboat Springs, which have basalt instead of trachyte. It may be that the mercury ores and the gold and silver of these springs have their origin in older lodes, or in sedimentary rocks impregnated with these ores, which have been dissolved by the water and a second time deposited in the sinter. This process would be similar to that in ascending mineral springs which issue from lodes, and which deposit the dissolved metals as ochre. It is remarkable that the sinter springs only deposit such metals as are present in the older ore deposits of California and Nevada, and also that they are accompanied by hydrocarbons, which are never observed in siliceous sinter, but which seem to be very frequent in these older ore deposits of California, and whose origin may be the sedimentary rocks leached out by the geysers. Sulphide of mercury is easily soluble in alkaline sulphides and in sulphide of barium, as it forms with these distinct compounds (RS HgS+5 aqu.), and this at a temperature of 45° C., which is considerably lower than that of the Sulphur Bank, 72°, which goes to explain the leaching out of these older mercury deposits by such waters. The solubility of sulphide of gold in alkaline sulphides is also to be noted. Solutions which contain, besides alkaline carbonates, also alkaline sulphides, deposit first, on cooling, by former dissolved silica, and undergo then, by contact with the air, an oxidation to a thiosulphate, which further is decomposed into native sulphur and a sulphate. The large quantity of native sulphur of Sulphur Bank is the result of the decomposition of the thiosulphate and of the oxidation of the sulphuretted hydrogen. The above-mentioned double sulphide of mercury and an alkali also contributes, for it is decomposed into an alkaline sulphate, sulphur and mercury sulphide. The sulphide of gold, dissolved in sodic sulphide, and deposited by the spring, is decomposed by the air into native gold and sulphuric acid. This, at least, is believed to be the way in which the siliceous sinter and ore deposits of the Sulphur Bank and similar localities in California and Nevada are formed, so long as it has been found that the trachyte of the Sulphur Bank and the basalt of the Steamboat Springs contain mercury in the form of primitive silicates.

A Mining Decision.

In San Francisco this week the U. S. Circuit Court of Appeals discovered and passed on a kink in the extralateral endless chain of U. S. mining law, so expensive to litigants, so full of promise to mining lawyers. The law has only been in operation twenty-eight years, and it is expected that before 2000 A. D. is reached two or three other little points will be made clear.

The case noted was brought up over the famous old Tom Cruse mine, the Drum Lummon of Montana. The St. Louis M. & M. Co. sued an alien corporation, the Montana M. Co., Ltd., alleging trespass on the part of the defendant and claiming damages. The Montana court awarded damages to plaintiff in the sum of $33,000. The plaintiff considered the sum insufficient and appealed for a new trial.

The Court of Appeals on the 8th inst., in an order of affirmance, says:

> The question under present consideration is when a secondary or incidental vein crosses a common side line between two mining locations at an angle, and the apex of the vein is of such width that it is for a given distance partly within one claim and partly the other, to whom does such portion of the vein belong? This question does not appear to have been ever directly passed upon by the courts. A mining claim can have but two end lines, and, having been once established, they become the end lines for all veins found within the surface boundaries. This court has already determined that the line E. C. D. shown in the diagram introduced on the trial is a side line common to the two claims, and, therefore, it cannot be considered the end line of the Drum Lummon vein. If, then, in construction of law the vein in the 25 feet in controversy must be either upon the one location or the other, and if the senior location has priority of title, it would follow that the right of lateral pursuit would remain with the senior locator within a plane parallel to the end line of the senior claim and up to the point of departure of the apex; or, in this case, the front wall. Inasmuch as neither statute nor authority permits a division of the crossing portion of the vein, and the weight of authority favors the senior locator, the entire vein must be considered as apexing under the senior location until it has wholly passed beyond its side line.

It is a travesty on human intelligence that such a jumble of mystifying, expensive and vexatious "legislation" as the U. S. mining "law" should be allowed to continue. One of the principal reasons that so many practical miners sniff at "science" as applied to mining is because all this ridiculous jumble about apex and apices and extralateral rights was put in the mining law by "scientists." The miners themselves never had anything to do with putting this mass of absurdity into the working statutes that govern their affairs, and instinctively reject the hindrance.

The surprising thing is that public opinion permits the continuance of such a law. In its relations to modern mining, it is about the same as if an up-to-date mine with a double-compartment shaft 2700 feet deep should put up with a hand windlass for its entire hoisting facilities.

Mine Consolidation.

A Colorado correspondent thinks that the tendency to consolidation in gold mining in that State and elsewhere is "a menace and an injury to our free institutions." He also thinks that they are "opposed to the best interests of miners." His statements are unaccompanied by argument and are mere assertions, not backed by anything beyond expression of personal belief. Without attempting to discuss the bearing of the question on our institutions, free or otherwise, but looking at the matter solely from what might be styled the mining business point of view, this paper sees nothing to add of relative value to what it has already said on this subject—namely, that the natural tendency of the times is to make the machine do all it can in actual mine work and to elevate the man to make him more capable of directing such work. A part of that tendency is to concentrate and centralize.

In the case of adjoining mining properties, each one with an entire nineteenth century system of operation, separate plant, distinct administration, etc., the twentieth century tendency is to have one large organization operate and administer the entire property as a whole—that is, if the ore now costs $2.30 a ton to treat at one mine and $2.15 at an adjoining one, if the owners of both mines can come together on the same proposition to enable them to treat all the ore of both properties for $1.95 per ton, they figure they can make some money. In this, as in everything else, the tendency of all legitimate mining trends toward economy of production and operation, just the same as in the case of the department store or the large manufactory. The plan in its operation would tend toward the development of other mining properties adjoining, unprofitable under the present system, but of possible profit if worked under more favorable conditions by a consolidated management, which, by reason of its magnitude and scope of operations, could work the present unprofitable property for much less cost than were it prospected and developed as an independent proposition; and if anything were found worth further exploitation, it could be produced at a proportionately greater profit by reason of the fact that it was being worked by a company having other profitable properties adjoining; which is only another way of saying that combined capital can make possible what to an individual would be impossible.

THERE are risks in mining investments as in any other form of investment. It is, however, the business of the intelligent investor who understands his business to see that those risks are reduced to the minimum. But as against the risks common to all commercial ventures may be set the fact that the mining investment is relieved of many onerous elements of risks attendant on mercantile investments. Buying goods to sell again, notwithstanding competition, taking chances on bad debts, are things that do not concern the mine operator but are among the hundred attendant risks that must be taken by the merchant.

THE practical man makes the best theorist, for his theories prove more feasible, being predicated on substantial bases. Theory usually precedes practice, and yet the practice of theory is most satisfactory and effective in the case of the practical men whose theories amount to something. Nearly every successful machine or device in mining or other work is an example of practical application of mechanics and design to theoretical ideas and discoveries.

TO READERS of the article by Prof. A. S. Cooper, California's State Mineralogist, on petroleum, on pages 437 and 438, will doubtless occur the thought that California petroleum in the variety of its possible by-products may be made worth even more by refining and distillation than for fuel. Its great economic value is manifest.

Concentrates.

TWENTY pounds steam should develop 1¼ H. P. per hour.

ONLY mineral oils are used in vessels of the United States navy.

A CHIMNEY 100 feet high has 10-: 8.66=1.154 times the capacity of one 75 feet high.

THE United States offers no bounty or reward for the discovery or production of any metal.

THIS paper is the most widely read and quoted of any weekly mining journal in the United States.

AN idle mine is often an opportunity for a little nerve, knowledge and money to make a profit.

A 54-INCH circular saw, running 800 revolutions per minute, without cutting, would require 1.35 H. P.

QUICKSILVER is produced in two places in British territory—Savonas, B. C., and Jamieson, Victoria, Australia.

THE chief objection to the extraction of gold by the bromine process seems to be the high price of that solvent.

THE Denver branch pays 63⅞ cents per fine ounce of silver contained in gold bars, equal to 57 cents per standard ounce.

ONE of the longest railroad tunnels in California is the San Bernardino tunnel, 7000 feet, tile-drained on each side the track.

WHERE no demand is proven, a note payable on demand bears interest only from the date of the commencement of the suit.

TO DRIVE a triple discharge 2-stamp mill, 5 H. P. ought to be sufficient where the stamps weigh 850 pounds each; if 1000-pound stamps, it would take about 7 H. P.

AT Sisquoc, Cal., an electrically operated dredger digs asphalt. The current is supplied by an overhead trolley line. A large searchlight illumines the asphalt mine at night.

NIAGARA FALLS, N. Y., is now regularly supplying the equivalent of 50,000 H. P. to various manufacturing establishments at a cost to the latter of about $750,000 per annum.

THE largest coke plant in the world is at the Standard Shaft mine, Mt. Pleasant, Pa. There are 908 coke ovens; the daily consumption of coal is 3000 tons; daily coke output, 125 carloads.

A UNITED STATES PATENT to a mining location can be successfully attacked only by a direct proceeding on the part of a United States court on the charge of fraudulent procurement.

GLASS, such as is used for window panes, is produced by the fusion at a very high temperature of purified white sand, lime, sulphate of soda, arsenic, manganese, salt cake and "cullet," or broken glass.

W. C. DAY of Swarthmore College, near Philadelphia, claims to have succeeded in producing from herrings and sawdust a substance precisely similar in appearance, composition and attributes to Utah gilsonite.

A DAY'S WORK put into the necessaries of life will produce more than it would twenty-five years ago; but a day's work saved and turned into capital will now only earn half what it would twenty-five years ago.

OTHER things being equal, gold ore carrying five ounces of silver per ton would probably yield better commercial results with the cyanide process than by chlorination, the silver being lost in the latter process.

AT the time of cessation of work at the Rand, South African gold mines, the consumption of dynamite was about 250,000 cases of fifty pounds each per annum; the price of dynamite No. 1 was about 75 shillings ($18.25) per case.

A MAN can vote at the coming election only at his place of residence. A man who emigrated to the United States as a minor and is now otherwise suitably qualified, has a right to vote at the next election if his father had become naturalized.

THERE are two La Belle mines—one is in Taos Co., N. M.; it is developed by a 700-foot tunnel; the main vein, 4 feet in width, carries low-grade sulphides. The other La Belle mine is in Nevada Co., Cal., with a ledge of fair ore and a mill on the property.

THE recent advance in the price of bleaching powder is due to a combination by the principal European producers. In Europe that is a trade combine; in this country it would be a "trust." In Lancashire, England, the price has advanced to $34 per ton.

IN Riverside county, Cal., water at the present time for irrigation is sold at 75 cents an inch—that is, the amount that would run out of an inch pipe in twenty-four hours under ordinary pressure, say, four pounds to the inch. This is estimated to be 12,960 gallons.

In the United States purchase of bullion all quotations as to price per ounce are made for pure or fine gold and silver; in Great Britain all quotations per ounce are made, not for the pure metal, but for metal at the British mint standard of purity: this with them is 925 fine for silver and 916⅔ fine for gold.

THE term "horse power" applied to a steam boiler is only relative and is designed to convey the idea of the horse power of an engine which a boiler of certain size can supply with steam. The evaporative power of a boiler is determined as follows: Multiply the area of the grate in square feet by the weight of coal burned per hour on square foot, and by 8.2, the product will be the evaporation in pounds per hour.

EVERY representative body of metal miners in convention in the last four years have resolved in favor of revision of the American mining law, and such proposed revision has been variously drafted, but so far none other than tentative effort has been made to secure legislation thereon.

THE meeting of the American Institute of Mining Engineers in San Francisco was in September, 1899; the next after that was in Washington, D. C., February, 1900; the latest in eastern Canada, last August. The next one will be in Richmond, Va., and the next one after that will be in the City of Mexico.

UTAH miners say there is more profit in operating a silver-lead mine now with silver at 63⅞ cents than when it was 90 cents an ounce. Improved and cheaper methods, economic processes, reduced expenses, better transportation facilities, improved machinery, utilization of all mine products, are among the stated causes.

IT has been held (Lockhart vs. Wills, 50 Pac. Rep., 318) that abandonment can not be charged against the locator of a mining claim if, while he is in possession, and before the expiration of the time within which he may perfect his location under the laws of the United States, the claim is seized by another, who holds possession adversely to him.

SEVENTY-FIVE PER CENT of the circulation at Nome and other Alaskan points is in Canadian currency; in the Klondike American bills are at a premium. J. N. Garner, special agent Treasury Department, says: "In Nome I found that about 75% of the money in circulation was Canadian money. About 15% only was American and 10% gold dust."

THE American Smelting Co. in its first year is credited with having smelted at its various plants about 1,500,000 tons of ore: it used 600,000 tons of fuel and 400,000 tons of flux: the output of the refineries was 1,200,000 ounces of gold, 40,500,000 ounces of silver, 160,000 tons of lead; total value, about $64,000,000, of which gold constituted nearly $25,000,000.

"WE need No. —, Vol. —, to complete our file of the MINING AND SCIENTIFIC PRESS," is the daily statement from some quarter. Thousands through the years file and bind their volumes of this paper, advertisements and all. A concern advertising herein that expects to be in existence ten years from now has reasonable assurance of having its business announcement referred to during that entire period.

BARIUM OXIDE at 700° C. takes up an atom of oxygen from the air to form barium dioxide. This second atom is given off at 1000° C., leaving the barium oxide. In the commercial method of preparing oxygen by means of this agent, it is heated to 750° C., under increased pressure. The air is then withdrawn by means of a force pump, causing the atom of oxygen to be given up. This process is repeated until required amount of oxygen is obtained.

ANYONE holding a United States patent to mineral land need do no further work upon it, nor is there any further tax or expenditure so far as the federal government is concerned. But a patented claim, like any other real estate, is liable to local taxation. Sometimes such local taxation is more than the $100 annual development work would be, and the likelihood of such taxation has been a fruitful cause of delay in completing title to mining property.

TO MEN working where they are liable to be "leaded," whether in mine or smelter, barley water is recommended as a corrective. It should be used right along. A good antidote for lead poisoning is dilute sulphuric acid. A drop in a glass of water should afford relief. The ordinary case of lead poisoning is inhalation of the oxide of lead, and the sulphuric acid in the water drank immediately converts it into a sulphate of lead that passes out of the system.

A READY method for determining the amount of asphaltum present in bituminous rocks is afforded by digesting the powdered rock with carbon bisulphide, the asphaltum being thus completely dissolved out. As oil shales and coal were found when treated in this way to contain no asphaltum, the carbonaceous matter being of animal and vegetable origin, it is concluded by some that true asphaltum is of deep-seated origin, and results from mineral reactions such as the double decomposition of water and metallic carbides.

THE Mount Bischoff mine, in the northwest of Tasmania, is, perhaps, one of the most remarkable tin deposits in the world. The average grade of the ore is 3%. The concentrates average about 70% tin, yielding an average of 68% in smelting. The crushing and dressing expenses amount to about 1s 3d per ton of ore treated. This is considered the greatest tin paying mine in the world. The Mount Bischoff plant is a combination of sluicing and ore dressing appliances befitting its mixed alluvial and lode character, consisting of a mill with seventy-five stamps, Spitzluten and Spitzkasten, jigs and round tables.

TO DETERMINE silver in gold bullion by volumetric assay, one-half gramme of the alloy may be melted in a porcelain crucible over a burner or in the muffle, five grammes of cyanide of potassium having been previously placed in the crucible. When fused, two and one-half grammes cadmium are to be added, and after perfect alloying with the bullion the crucible is cooled and the cyanide dissolved in water. The clear button is then put into a dissolving bottle and 25 c.c. nitric acid of 32° added. When the cadmium and silver dissolve the silver may be determined by sulpho-cyanide, or NaCl solution, after sufficient pure silver is added to make the entire quantity present about 1.004 milligramme. Such amount of pure silver added is to be deducted in final determination of the silver contained in the bullion.

WHEN diluting sulphuric acid with water the acid should be poured slowly and carefully into the water, while the mixture is constantly stirred. If the water be poured into the acid, the heat produced where the water and acid contact may occasion spattering. What is called "marsh-gas," "fire-damp," etc., is a methane. It is found in nature in petroleum, which gives it off when the pressure of the earth is removed. It is of constant presence in coal mines. It is a carbon dioxide, and when mixed with air explodes if a flame or spark comes in contact with it, being a constant cause of coal mine explosions. The scientific article sent is mistaken, as carbon is the principal component of this deadly gas.

QUESTIONS normally difficult to accurately answer are sometimes rendered still more difficult by the lack of detail in the question or the possibility of latitude in the surroundings. An example of such latter style of query is afforded in the simultaneous inquiry from Lillooet, B. C., and Silverton, Colo., desiring "Concentrates" to say: "Would gold which passed through a 60-mesh screen be visible to the naked eye? At what mesh would gold be in such a fine state of division as to be almost invisible?" Off-hand, one might say in answer to the first question "Yes." In answer to the second, "100." But, manifestly, there are conditions that would make such answers only approximately correct. Some men have better eyesight than others; what might be invisible to one man might be distinctly visible to another. A Trinity county, Cal., miner says he can see gold that has passed through a 120-mesh screen. A Tooele county, Utah, miner says it is hardly possible to make a mesh so fine as to render the gold passing through it invisible. Individual conditions have much to do with these things. Gold too fine to be ordinarily visible in the pan would become prominently visible with a background of ebony, or black tile, as used by some miners. The question, of course, hinges on the idea conveyed by the elastic term "visible."

THE Ashcroft process has been repeatedly described and illustrated at great length in this and other technical journals. Its most extensive use has been in treatment of the refractory lead-zinc ores of the Broken Hill mine, New South Wales. This ore contains 30% each of lead and zinc as sulphides, and 25 to 30 ounces silver per ton, the sulphides being so intimately mixed as to render separation by concentrating machinery commercially impossible. The ore is ground and roasted, then leached in suitable vats with a solution containing per. salts of iron and salts of zinc. The iron is precipitated as ferric hydrate by the action of the zinc oxide of the ore, while the latter passes into solution as sulphate of chloride. The iron remains partly in the leaching vats with the lead and silver and partly separates on heating the effluent. The residue is smelted for the two latter metals in the usual manner. The solution from the leaching vats, which must be quite free from iron, is then passed through two sets of cathode chambers, and one-third of its contents of zinc is obtained as metal deposit on the cathodes. It is now passed through the two sets of anode chambers of the same depositing vats, in the first of which iron anodes and in the second of which carbon anodes are employed. Solution of the anode with formation of ferrous sulphate occurs in the former series, and oxidation of this to the ferric state in the latter. The effluent from the double series of vats is then ready for use again in the leaching vats.

WHERE a person or company has or may run a tunnel for the purpose of developing a lode or lodes owned by said person or company, the money so expended in said tunnel shall be taken and considered as expended on said lode or lodes, and such person or company shall not be required to perform work on the surface of said lode or lodes in order to hold the same. The annual labor of $100 on each claim may be performed under the above section by work done on a tunnel, cutting, or which is driven to cut, such claims. The patent expenditures of $500 may also be made in such tunnel. A party may patent one lode on the line of his tunnel for each $500 of labor spent in driving the tunnel. There is no provision of law for patenting a tunnel site. But it may maintain an adverse claim for the protection of its line and tunnel rights. Every tunnel, whether a crosscut or run upon a vein, is presumed to be for the development of lode claims, and in each case its rights are very closely defined by law. If the proper notice has been posted on the site, establishing the boundary lines thereof, stakes set, etc., and the record only made, the work must be prosecuted with reasonable diligence; the land office rules that "a reasonable diligence in prosecuting the work is one of the essential conditions of the implied contract. Negligence or want of due diligence will be construed as working a forfeiture of their right to all undiscovered veins on the line of the tunnel." A tunnel may, like any other kind of claim, be abandoned; but neglect to work does not effect an abandonment; such neglect only operates to deprive it of tunnel rights along its line.

Machine Mine Rock Drills on the Pacific Coast.

Written for the MINING AND SCIENTIFIC PRESS
by A. E. CHODZKO.

Rock drills have come nowadays into such general use that no mine claiming to have passed the prospecting stage would be considered in working order without them; and while hand drilling is still and probably will always be the only practicable method under special circumstances, machine work is more and more used for tunneling, for drifting, for sinking and for stoping.

In this country, as in Europe, where mechanical rock drilling originated in 1856 at the Mont Cenis tunnel, it was from the start applied on a large scale to railroad work; and one would hardly recognize in the trim little stoping drill of to-day a kin of the huge and clumsy machines of yore, mounted on their ponderous carriages.

And yet these obsolete tools have marked such a decided improvement in the time-honored methods prevailing at that time that the wonderful developments of low-grade mining during the last third of this century may be directly traced to the introduction of machine drilling.

A description of all the varieties of rock drills, either of the reciprocating or of the rotary class, in this country and abroad, would furnish ample material for a good size treatise, a large portion of which should be devoted to American machines.

Less ambitious is the scope of this paper, and the writer will limit his attention to the rock drills obtainable to-day in San Francisco.

Electric drills, much advertised in other parts of the country, are not likely, at least in the near future, to supplant the compressed air machines for underground work on the Pacific slope; at any rate, they do not seem to have made dangerous inroads into the field occupied by the latter.

It is not intended to take up the comparative arguments set forth in favor of either. The fact is that at the present date air drills are practically in exclusive use on this coast, and it is thought that a short description of these machines might prove interesting to the mining reader, the more so as a majority of them are of home manufacture, and have been designed and improved with special knowledge of and regard for local requirements.

When a machine of this class is put on the market it is an almost invariable custom to introduce it by sending a number of specimens on trial to various mines, where the new drill generally works side by side with other machines in regular use at the place. Not only has it to withstand the same rough usage as its older competitors, but, besides, it must make its way to prominence against the natural prejudice of men disturbed from their familiar work, to learn how to handle the newcomer to best advantage.

It is not going too far to call it an unwelcome guest with the miner, however favorably inclined the owners of the mine may be, and the builder may safely expect a tendency to emphasize the defects of his machine rather than to overlook them.

After a while the drill is returned to its maker, if not a complete wreck, at least more or less bruised, and charged with an imposing array of shortcomings, which will have to be made good before it is granted the favor of another trial.

Not uncommonly will these modifications amount to an entire remodeling of the primitive design, and the ordeal is repeated, till finally the ambitious drill comes out victorious on a last trial, which simply means that it is now fit for practical use, a privilege which it is sharing with a number of others.

Nor is now the drill maker entitled to what he might consider as a well-earned rest. Competition will hereafter require his constant watchfulness to outdo every progress heralded by a rival builder. and while a well-known firm is always solicitous, even at a distance. for the successful operation of its machines, yet there is no questioning the fact that the local manufacturer is more directly interested in perfecting his own, not only as a purely commercial matter, but also on the ground of professional prominence among customers with whom he frequently comes in personal contact.

Of the several rock drills sold in San Francisco, some are made in the East and others are manufactured in that city. All belong to the reciprocating class.

In describing the construction of these machines, from information furnished by the dealers and manufacturers at the writer's request, the latter proposes, for obvious reasons, to abstain from any expression of personal opinion as to the comparative merits of the various features involved in their design.

There is no implied desire to advertise any particular make. It is simply intended to point out the fact that this region is fully up to date in the matter of rock drilling machinery.

The first machines to appear on the Pacific coast were the old style Burleigh, brought here by Messrs. Parke & Lacy about 1871. These were succeeded by the Ingersoll tappet drill, brought out in 1876 and 1877 by John B. Reynolds of Reynolds, Rix & Co. Then came the Ingersoll Eclipse, brought out by Reynolds, Rix & Co., soon followed by the Richmann, the first rock drill of local manufacture (W. T. Garratt & Co.), which went out of use after a few years of existence.

Next came the National, brought out by Reynolds & Rix. This drill and the Ingersoll Eclipse were the standard machines on this coast for a number of years, till the National was replaced by the Phœnix drill, built in this city by Rix & Firth, and one of the first representatives of the auxiliary valve system. The Sergeant drill next made its appearance, brought out by H. P. Gregory & Co.

Then came the Cummings drill, a machine of local make, operated on the two-pipe system.

The Challenge drill, brought out from England, made only a passing stay on this coast.

The Rand drill was next brought out by H. D. Morris & Co., and with the Leyner, manufactured in Denver and brought out by E. P. Allis & Co., and the Sullivan, made in Chicago and brought out by Henshaw, Bulkley & Co., represent the latest types of imported drills on this market.

The Doble drill, the Firth, the two Giant tappet drills of the Rand type, one manufactured by the Compressed Air Machinery Co. and the other by the Rix Engineering & Supply Co., are all machines of local make, and close up the list at the date of this writing.

The machine rock drills, whose particulars have been furnished to the writer, and which will now be briefly described, are:

Eastern made machines: Ingersoll, Sergeant, Sullivan, Rand; Leyner, of Colorado.

California manufactured machines: Rix Giant, Compressed Air Co.'s Giant, Firth, Cummings.

All these machines are especially intended for underground work, quarrying on a large scale being only exceptional on this coast. The same machines, moreover, can be used for open air work, although certain types of Eastern manufacture are more particularly recommended in those cases.

A comparison between the various designs will be made more easy and more practical by a few remarks concerning the salient features of the operation of a rock drill.

Any machine whatever, designed for that purpose, reproduces the movements of the hand driller, namely:

First.—A sharp-edged steel drill or bit is projected against the rock, by the rapid reciprocation of a piston, to which it is firmly attached, and which moves into a cylinder. Compressed air is admitted into and exhausted from that cylinder by a valve which controls the reciprocating motion of the piston.

The first distinctive feature of a rock drill is therefore its valve motion.

In the early types of European machines built for the Mont Cenis and the St. Gothard tunnels a special motor was used to operate the valve; it was simply a double-acting piston engine, actuating a shaft upon which a cam was mounted, connected with the valve of the drill, which could, therefore, be operated independently of the piston, and, namely, if the bit became engaged in the hole. This system has long since been discarded and was never used in American machines, where the motion of the valve is always controlled by the reciprocation of the piston itself; and this control is effected in either one of three distinct ways, all of which can be found in existing and successful machines.

(a) In the tappet drills the valve is moved back and forth over the ports by an oscillating lever or tappet, whose position is reversed when the piston comes in contact with it at the ends of its stroke. This is the most positive connection that can be devised. It is characteristic of the Rand drill and of the two types of Giant drills previously mentioned.

(b) In this second variety the valve is cylindrical and self moving, when air is admitted or exhausted in proper time behind its ends, which act, therefore, as pistons moving in separate chambers at both ends of the valve chest. The admission and exhaust of air into and from these chambers takes place through posts or passages whose ends are alternately covered and uncovered by the piston of the drill. The best known representative of this system is the Ingersoll Eclipse, and among the above mentioned drills it is characteristic of the New Ingersoll, of the Cummings and of the Sullivan.

(c) Another device consists, as previously, in controlling the admission and exhaust of air on both ends of a cylindrical valve; but here the two ports used for that purpose are open to pressure or to exhaust by an additional or auxiliary valve, positively actuated by the main piston. This system partakes, therefore, of the two former ones.

Amongst the machines here considered, the Sergeant and the Firth are provided with this style of valve gear.

As to the relative value of the three systems, it would probably prove useless to draw well defined lines, besides stating that the Eclipse device (b) is possibly less subject to wear than the two others; all of them have been for a long time and are still applied in many thousands of successful and efficient machines. The last two are used simultaneously by a prominent Eastern firm, while other builders, after successfully making rock drills with auxiliary valves, have now adopted the tappet system. So that a selection between them seems to be a matter of custom or of individual preference more than anything else.

Second.—If the drill were always beating against the rock in the same position, it would soon become engaged and wedged into the pieces of broken stone detached from the bottom of the hole. It is, therefore, necessary to drill a round hole, and this is effected by turning the piston and the attached drill by a certain amount at each blow, so that the cutting edge of the drill never strikes the same spot twice in succession. This partial twist generally occurs on the back stroke, although in some cases it has been effected on the forward stroke. This motion also facilitates the cleaning of the hole of broken fragments, and in all of the above-mentioned machines it is invariably produced by a rifle bar, which engages a nut fastened at the back end of the hollow piston of the drill, and which is provided at its back end with a ratchet and pawl device, allowing the rifled bar to turn in one direction, but locking it in the opposite one.

The only variants in that rotating mechanism consist in that with some machines, namely, the Rix Giant, the Ingersoll and the Sergeant, the pawls are carried by the back head of the rifle bar, and the ratchet teeth are cut into the ratchet box or casing; whereas in the other machines the teeth are cut around the head of the rifle bar, and the pawls are inserted in the ratchet box. (Compressed Air Co.'s Giant, Cummings, Firth.) The rotary device of the Sullivan drill consists of rollers locking the rounded ratchet teeth when turning in one direction.

Third.—As the hole becomes deeper, it is necessary to move the cylinder forward, to prevent the piston from striking the front head.

In early machines for tunnel work, and in modern types more particularly designed for surface work, means were provided for producing this motion automatically. In homogeneous and hard ground, and when a number of drills are working together, this automatic feed is desirable and simplifies the attendance.

Experience has shown, however, that in most cases of practice, and, namely, for underground work, hand feed is preferable, and this is exclusively adopted in the machines presently considered. The only variant is found in the feed nut, which is single in all of them, except in the Rix Giant, where a double nut is used, permitting by a relative motion of the two nuts to take up the wear of the threads.

It appears, therefore, that in most cases a rock drill can be characterized in a few words, respecting its three essential functions, namely:

Valve Motion: Tappet, Eclipse or auxilliary valve.

Rotary Device: Stationary or revolving pawls or friction rollers.

Feed: Automatic or hand. Single or double nut.

The shell carrying the cylinder side guides and the feed nut is attached to a column, with or without arm, or to a tripod. Carriages are found only in tunnel work and not in ordinary mining.

Special features of the shells will be pointed out in describing each machine. So will the clamp, through which the shell is fastened to the column or to the tripod.

No reference will be made to columns or arms, which are of practically uniform design in all cases.

Tripods will not be represented either, as with very few exceptions they pertain to surface rather than to underground work, and their description would extend the scope of this paper without necessity.

(TO BE CONTINUED.)

By-Products of Coke Production.

Considerable inquiry has been received regarding the by-products of coke production. In addition to what has been published, the most practical statement noted of late is contained in an account received from the New England Gas & Coke Co. of Everett, Mass.:

"At Everett (a suburb of Boston) the New England Gas & Coke Co. sell their sulphate of ammonia at 2½ cents per pound, and get about thirty pounds from a ton of Cape Breton coal in the process of coking. Assuming that only twenty-eight pounds of sulphate of ammonia will be obtained at Sydney, and that the selling price will be only 1¾ cents instead of 2½ cents per pound, it will yield 49 cents per ton of coal. The by-product ovens at Everett also obtain from a ton of Cape Breton coal about twelve and one-half gallons of tar, which is sold at 2 cents per gallon, and about 5000 cubic feet of gas, which is sold at 20 cents per thousand. At Sydney the surplus gas will be used in the steel mill, and it is fair to estimate its value at the cost of natural gas in the most prolific natural gas districts of the United States, or 5 cents per 1000 feet. This will give the steel mill as cheap fuel as if it were located in a natural gas district. It is calculated that the quantity of gas produced at Sydney will be somewhat less than at Everett, as the coke will be treated somewhat differently to suit the blast furnaces, but it will not be less than 3000 feet, which at 5 cents per 1000 feet will be 15 cents per ton of coal. The quantity of tar obtained will be about ten gallons per ton of coal, which at 1 cent per gallon, half the price obtained in Boston, would give 10 cents per ton of coal. Thus the value of the ammonia, gas and tar obtained from each ton of coal will be not less than 74 cents, while the cost of manufacturing the coke and by-products will only be about 10 cents."

Electric Mine Hoists.

The use of electricity in mining has reached an advanced stage of development in Cripple Creek district, Colo., where the miner may eat a meal warmed by electricity, in a room lit by electricity, ride in an electric car to the mine, go down in a cage run by an electric motor, talk through an electric telephone between the stations, put in a blast by use of an electric drill and touch it off by electric device, and subsequently see some of the ore electrolytically reduced.

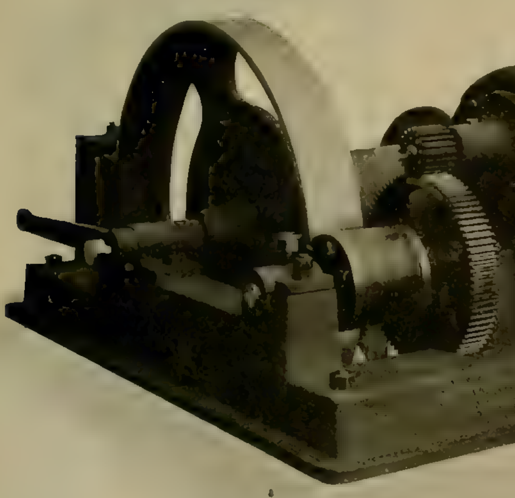


Fig. 1.—Electric Winze Hoist.

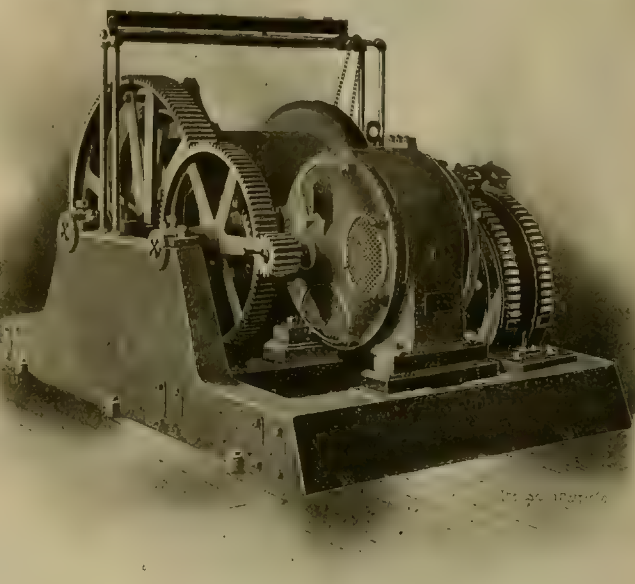


Fig. 3.—Electric Hoist "Cripple Creek Standard."

Not alone in Colorado but in other mining States is electricity in daily use in great variety of form, both for surface and underground work; but in the district specified conditions conduce to make it noticeable.

In the matter of electric hoists, especially, Cripple Creek affords example of progressive types. Figs. 1 and 2 depict a style of hoist considered to be well adapted for use in stopes and winzes. They are furnished by the Denver Engineering Works Co., Denver, Colo., in 1, 2 and 3 H. P. As will be noted, they may be operated by direct or alternating current motors. The drum is driven by a flat paper friction wheel and the hoisting, lowering and braking are controlled by one lever, which throws the drum either against the revolving friction wheel or against the stationary brake block, while the motor runs continuously. The hoist frame is cast in one solid piece. The drum is of cast iron with 6-inch flanges. All gears are machine-cut from the solid. The motor pinion is cut from vulcanized fiber, or rawhide. The hoists are furnished with sheet iron housing if desired; size of drum, 10″ diameter, 15″ long; size of steel rope, ¼″; shipping weight of hoist, without motor, 815 pounds. The capacity of 3 H. P. hoist with direct current motor is as follows: 1600 revolutions per minute; rope speed, 150 feet per minute; load, 600 pounds.

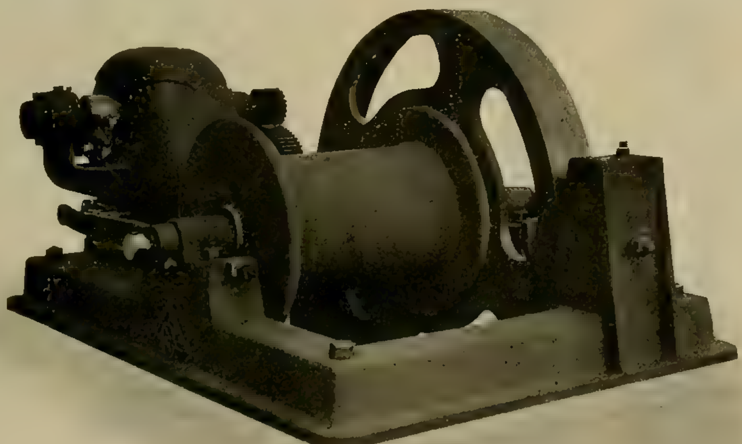


Fig. 2.—Electric Winze Hoist.

The same concern also make what they style the "Cripple Creek Standard," shown in Fig. 3. This hoist is not especially designed to be operated by an induction motor, but may be equipped with a railway motor. The brake is of the band type; the gears of close-grained cast iron, machine cut; the shafts are of steel, running in babbitted bearings; the drum has removable bronze bushings; the motor pinions are of vulcanized fiber, or rawhide. The motor is set on hard wood blocks, making complete insulation between the motor and hoist. The controller for varying the speed of the motor is of the street-car type, adapted to the alternating current. The reversing and speed control is effected by the one handle of the controller. In the 15 H. P. hoist the frame is cast in one piece; the 30 H. P. hoist is made with solid frame, or with frame made in sections and bolted together; the 50 and 75 H. P. hoists are made with sectional frames. The shipping weight of a 15 H. P. hoist of this type, without motor, is 2600 pounds; load, 2000 pounds; size of rope, ⅝-inch.

Deep Mining in California.

On the occasion of the August, 1900, meeting of the American Institute of Mining Engineers at Halifax, Nova Scotia, as reported in the Canadian Mining Review, in discussing a paper by G. W. Stuart of Truro, on gold mining in that province, R. W. Raymond said: The indications which Mr. Stuart has given of a revival of gold mining in this province and to a greater depth is parallel with what has been occurring in California, where, with energy and modern appliances, they are treating rock that was formerly thrown away. I remember a couple of years ago enquiring as to the cost of mining and milling in California, and I found they were able to extract ore from the hard quartz vein 2509 feet from the surface, and take it up to the surface and treat concentrates for about $2.60 per ton, of which $1.25 went for mining.

Following, Mr. Gilpin said: The gold mining industry of Nova Scotia has in the past consisted almost entirely of operations in the small gold-bearing veins. Many of these small veins were not suitable for small local syndicates, because it was found that after $150,000 or $200,000 had been taken out the pay streak ceased, but there have been veins of moderate size which have been worked very profitably by companies for a long time. I think the best results are to be looked for in the low-grade belts. They are undoubtedly the most certain, and it is along these lines, I think, that the greatest development is to be made. Our mining facilities are very good. Of course, we cannot prospect in winter, because the ground is frozen, but all our mining is carried on in winter as in the summer.

Mr. Raymond: Has the recent glacial denudation taken place before or after the completion of the veins?

Mr. Gilpin: After.

Mr. Raymond: Then in that case you began the work in this province for 1000 feet below the original surface when the range was formed?

Mr. Gilpin: Yes, but as a matter of fact, we have mines that have been opened on the entire thickness forming the gold-bearing horizon.

Mr. Raymond: How deep have your high exposures been worked? And what is the aggregate height above the sea that the gold veins are exposed?

Mr. Gilpin: Mount Uniacke is about 600 feet above the sea, and veins have been worked there to a depth of 350 feet.

Mr. Raymond: I only wish to bring out this point to emphasize what Vancotta said. It is absurd to talk about veins giving out when they were originally 5000 or 6000 feet higher than they are to-day. You start 5000 or 6000 feet below and then you wonder whether it is going to give out. Eor instance, in California, the mother lode runs with it, and it is crossed by innumerable canyons. We run across the vein on the top of the mountain, and then across the same vein 1000 feet farther down. The veins in the canyon were poor and on the high mountains rich, and that made prospectors feel that they gave out. It is only within the last few years that we have found bedrock at a depth of 1000 feet, and now they mine at a depth of 5000 feet.

Mr. Edwards: In California the experience of our miners had been that after going down 500 or 600 feet there did occur a barren zone and that continued 400 or 600 feet farther down, and when that barren zone was reached the men of the mine ceased work. But latterly they have tried it again and they have struck pay ore still farther down and that is what they are working on now, and as far I know they have not reached the bottom of that pay zone yet. They have reached down some 2000 feet, and they have 1200 feet of continuous pay ore in depth.

Mr. Raymond: In older times when they went to $5 a ton they could not work it at such a depth.

Mr. Edwards: They can take it out from $2 to $3 a ton.

Mr. Raymond: I suppose they take out $3 stuff rather than none.

Mr. Edwards: There was one man out our way who only got 69 cents for years and years and still they worked it.

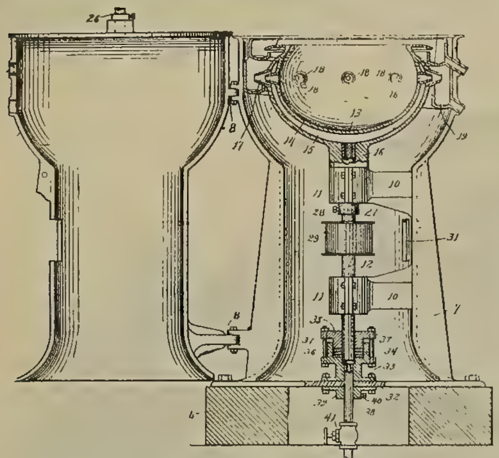
Jas. Douglas, the president of the American Institute, in the course of some further remarks at Waverly, said: Last year we visited the mother lode in California. There we saw the marvelous ore deposit which in the early days enriched California, and which had fallen into decadence, mines closed and everything gone to wreck and ruin, the mother lode supposed to have been exhausted. But better machinery, more skill and higher metallurgical science was brought to bear upon it, and the prosperity of the mother lode was never more assured than it is to-day.

Mining and Metallurgical Patents.

Patents Issued October 2, 1900.

Specially Reported for the MINING AND SCIENTIFIC PRESS.

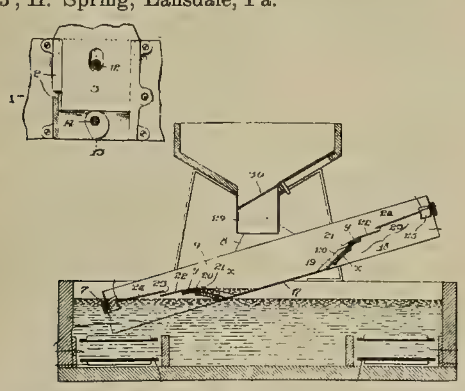
MECHANISM FOR SIZING AND SEGREGATING ORES OR DISINTEGRATED MATERIALS.—No. 658,807; C. E. Seymour, H. S. Morey, Placerville, Cal.



Mechanism for sizing and segregating ores of finely divided or disintegrated materials; combination, with revoluble treatment vessel adapted to act by centrifugal force on material contained therein, provided with discharging outlet, adapted to discharge to exterior of vessel, conduit having connection with external discharge of treatment vessel, adapted to serve as passage for opposing force conducted under continuous pressure through discharge into receptacle and simultaneously through discharge outwardly, by which construction energy under pressure exerts inward and outward pressure at point of external discharge, inwardly acting portion adapted to drive back lighter particles, while permitting heavier particles to be forced against and through it by centrifugal force to effect discharge of heavier particles at point of external discharge, facilitated by outwardly acting portion of agent, and external fluid forcing device connected to or communicating with conduit.

◆

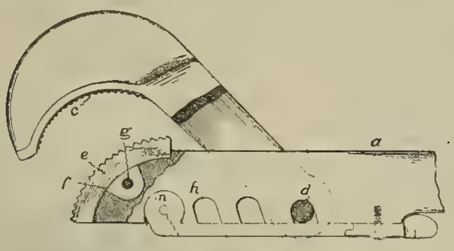
WASHER AND CONCENTRATOR FOR ORES.—No. 658,813; H. Spring, Lansdale, Pa.



Scoop or pan adapted to be suspended in or above body of water and dipped endwise thereinto, comprising side walls, bottom section, inclined end sections, latter provided with overflow openings and valved inlets, including each metallic portion, 19, blanket portion 20, with riffle 21, metallic portion 22, and dip 24; combination water tank, of cradle suspended therein, scoop in cradle provided with oppositely inclined ends having overflow openings and valved inlets, and means for oscillating cradle whereby inlets are dipped into and raised from water in tank in alternate succession.

◆

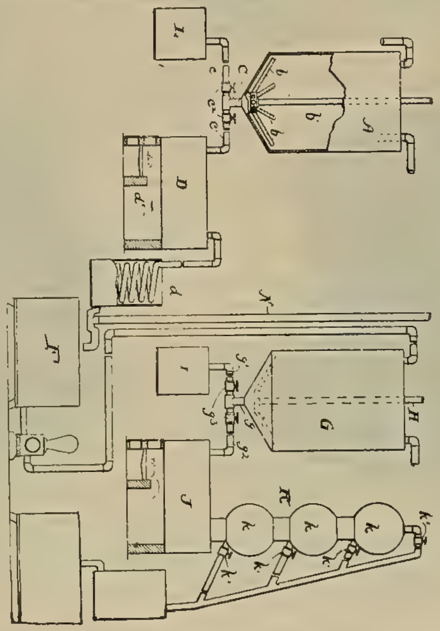
PIPE WRENCH.—No. 658,962; T. E. Ryan, San Francisco, Cal.



In a wrench of character described, combination with movable jaw, and solid shank having handle portion at one end gripping jaw at other end, quadrant-shaped face on jaw-bearing end, detachable jaw fitted thereto, having serrated outer face and smooth inner face of same curvature as face on end of shank and on which jaw has solid bearing for entire extent of surface, mortise in middle of bearing surface on end of shank, fixed tongue on curved inner face of jaw standing perpendicularly thereto and taking into mortise, crosspin inserted through shank and tongue and holding curved faces in positive contact, latch bar having ears of circular shape on one end standing perpendicularly from one side of bar, and recesses of corresponding shape in opposite sides of shank in which ears are let in flush with sides of shank fitted to turn, hinge pin inserted through ears, latch adapted to lock free end of bar, constructed for operation.

◆

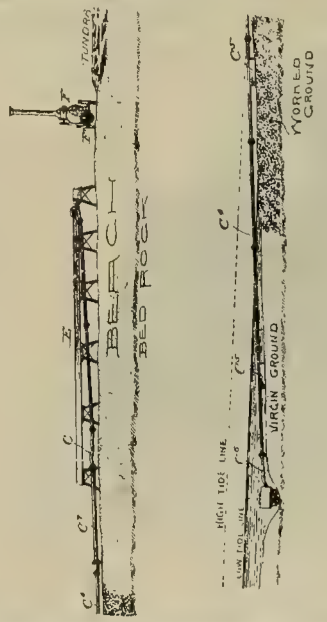
PROCESS OF DESULPHURIZING PETROLEUM OIL.—No. 658,857; J. McGowan, Cleveland, Ohio.



Process of desulphurizing sulphurized petroleum oil, which consists in distilling mixture of sulphuric acid with sulphurized oil which has not been previously treated so as to change chemical character of sulphur compounds therein, agitating sulphuric acid with oil; allowing mixture to settle; segregating oil from precipitated sludge and so much of acid as settles with it; finally distilling sulphurized oil with so much of acid as remains mixed with it.

◆

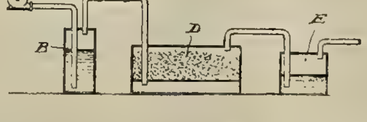
SUBMARINE DREDGER.—No. 658,922; G. A. Overstrom, Deer Lodge, Mont.



Submarine dredger, combination of float device formed with airtight compartment having water inlet and outlet valves, compressed air supplier communicating with compartment operating to let water in or force it out of compartment, to increase or diminish displacement of float, suction and force pump and operating motor therefor on float device, and delivery pipe extending from pump to shore.

◆

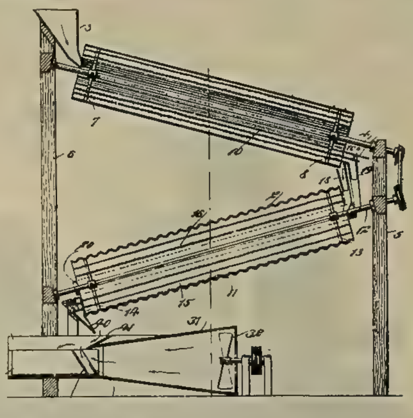
PROCESS OF EXTRACTING GOLD AND SILVER FROM ORES.—No. 658,938; J. B. De Alzugaray, London, England.



Process for extracting precious metals from their ores, consisting in moistening crushed ore to such an extent that it will "ball" in the hand, with concentrated solution of cyanide, placing moistened ore in gastight vessel, subjecting same to action of gaseous mixture of bromine and oxygen, whereby precious metals are converted into soluble salts of same, obtaining precious metals in solution by washing ore, and finally recovering metals from solution in any suitable manner.

◆

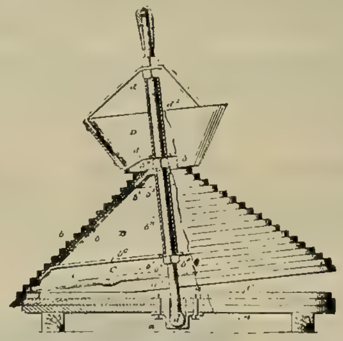
GOLD SEPARATOR.—No. 659,148; Hopkins & Manzke, Spirit Lake, Iowa.



Gold separator, comprising two rotary cylinders inclined in opposite directions one above the other, upper cylinder having two cylindrical screens spaced apart of different mesh, having gravel screen consisting of longitudinally placed bars, two cylindrical screens in lower cylinder spaced apart, different mesh, chute for feeding material from upper cylinder to interior screen of lower cylinder, rotary pipe arranged at one side of lower cylinder, chute for discharging material from screen in upper cylinder into pipe receptacle for receiving material discharged from lower cylinder and from pipe, an air-blast device for operating material passing into receptacle.

◆

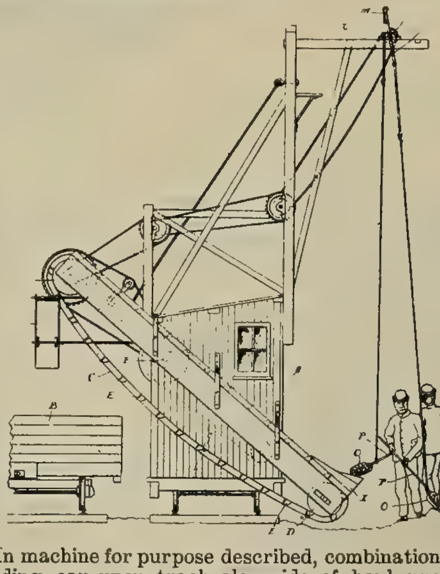
ORE SEPARATOR.—No. 658,947; W. J. Goyne, Barton Heights, Va.



Ore separator comprising base or platform, annular track secured thereto, threaded shaft having lower enlarged portion loosely mounted in base or platform, cone-shaped separator body mounted on shaft, nuts working on shaft and engaging separator body, hopper also mounted on shaft, nuts working on shaft and engaging hopper, series of concentric annular rings or flanges secured to upper face of separator body, annular ring secured to lower face arranged to contact with track ring having series of undulations or corrugations.

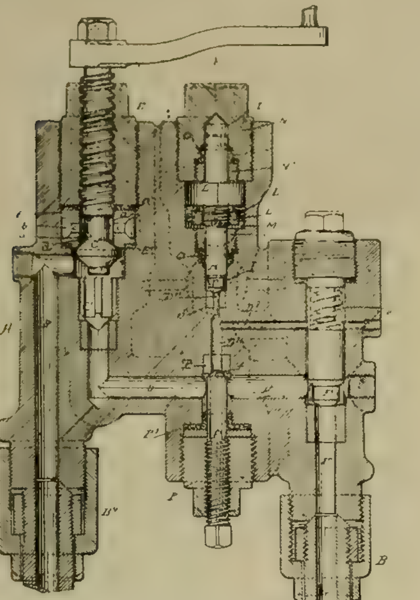
◆

MACHINE FOR EXCAVATING, CONVEYING AND LOADING BALLAST UPON RAILWAY CARS.—No. 659,008; A. Torrey, Detroit, Mich.



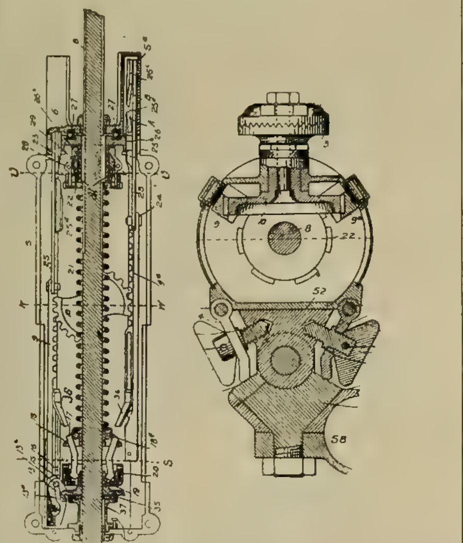
In machine for purpose described, combination with loading car upon track alongside of bank provided with two inclined conveyers operated from source of power on car, adapted to receive material from hoppers on side of car adjacent to bank near ground, to convey it directly into ballast car standing on other side of loading car, crank shaft having oppositely extending cranks at each end, cranks at one end placed at right angles to cranks at other end, overhead frame supporting shaft on loading car at distance above hoppers and overhanging same, length of cranks, actuating connection with source of power for imparting continuous rotary motion to crank shaft, suspension devices from crank shaft and track shovels, connected at handles to suspension devices adapted to be manually operated with mechanical assistance of power derived from motion of crank shaft.

HYDRAULIC VALVE.—No. 659,031; H. W. Kimes, Dayton, Ohio; assignor to the Stilwell-Bierce & Smith-Vaile Company, same place.



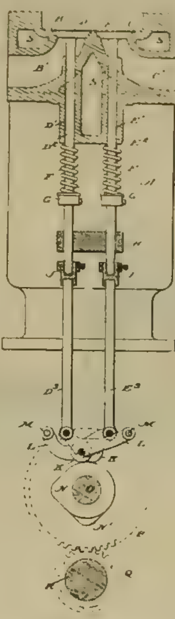
In valve mechanism for hydraulic rams, combination with low and high-pressure valves, of main passage communicated with by both valves, check valve interposed between main passage and passage leading to press cylinder, communication between press cylinder and high-pressure valve, whereby high-pressure valve is opened when pressure in press cylinder attains predetermined stage, passage D″ forming direct communication between high-pressure valve and main passage, passage forming direct communication between passage D″ and low-pressure valve, and throttling device interposed in main passage between passage D″ and low-pressure valve, whereby accumulation of high pressure between low-pressure valve and throttling device is prevented, high pressure is enabled to act upon low-pressure valve instantaneously with pressure from high-pressure valve to passage D″.

ROCK DRILL.—No. 659,185; A. M. Southard, Denver, Colo.



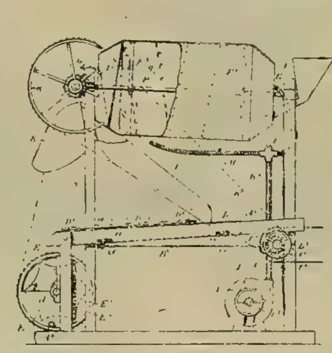
Rock drill, combination with reciprocating shaft and power spring surrounding shaft, of collar surrounding shaft, shoes located in collar engaging shaft, gripping levers engaging shoes, another collar engaging levers against which power spring presses, normally causing levers to grip shoes, clamp releasing mechanism comprising two connected jaws one being pivoted on casing, other adapted to slide on pivoted jaw, lever having arm passing through slots formed in two jaws, one slot having angular and straight portion, other slot being shorter, whereby lever arm moves through angular portion of one slot, two jaws are forced inwardly to engage two collars, after which lever arm forces jaw containing short slot rearwardly thrusting collar against spring, thereby releasing shaft from action of gripping levers.

GAS ENGINE.—No. 658,858; L. H. Nash, South Norwalk, Conn.



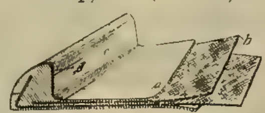
A plurality of poppet valves having parallel stems, rocking arms respectively pivoted to stems at one end and to fixed bearings at other, rocking arms overlapping one another, and cams by means of which said rocking arms and valve stems are operated.

ORE SEPARATOR.—No. 658,921; J. B. Moore, Oakland, Cal.



Combination of rotary separator which eliminates coarse impurities, chute or runway leading finer pulp from discharge end of separator, concentrating table receiving fine pulp from chute, series of transversely moving agitators working across upper surface of concentrator, maintaining suspension of finer material while permitting grain gold to settle, trough arranged below concentrating table, drum working therein, series of amalgamating plates secured to drum operating to intercept float gold escaping from concentrating table.

BELT FOR ORE CONCENTRATORS.—No. 11,860; W. J. Loring, Angel's Camp, Cal. (Reissue).



Concentrator belt consisting of body portion having yieldable edge flanges, reinforced by textile material cut on bias, of alternating layers of rubber and textile material having solid rubber edge flange, one layer of textile material extended sidewise and embedded in flange.

PROFESSOR F. W. PUTNAM of Harvard University, a leading American anthropologist, is traveling through California, and says there are better hopes of solving the antiquity of man in California than anywhere else in this country. The California gold-bearing gravels in which the Calaveras skull, the Table Mountain bones and a number of stone implements are said to have been found, date from an antiquity far more remote than any other known formation which contains relics of men. An accurate scientific demonstration that human bones or implements really occur in the auriferous gravels will immensely increase the known antiquity of man. Any miner or excavator who can show to a scientist, in place in the auriferous gravel, such remains, will make a discovery of high importance. In the California University museum are a number of stone implements whose finders have made affidavit that they actually came from the auriferous gravels, deep under lava flows, and among the bones of extinct animals. Of fifty-eight distinct Indian languages known in the United States, thirty are native to California, which makes this State an unrivaled place for investigation in aboriginal linguistics. Meanwhile, this paper long since showed that the Calaveras "prehistoric" skull was a myth.

Source and Origin of Values.

Increase of ore values with depth is always a mooted question among miners. That ore bodies increase both in size and value with depth is a dictum held by many mining engineers, among whom are Wm. A. Farish. In a report on a Cripple Creek, Colo., property he gives his reasons for such belief and among other things, says:

"The values came from great depth in hot water solution under great pressure, the heat being generated by the dikes, and as the waters cooled off the values were precipitated in the rocks and crevices. These waters carried sulphuric acid which acted upon and destroyed the feldspar and mica, replacing them by silica, thus changing a pure granite into what is locally called 'granite quartz,' carrying values.

"Where the formation is solid and has not been disturbed, continuous ore bodies are generally found of varying lengths and widths in the veins, the ore-bearing gangue being granite quartz and pure quartz.

"Where the formation has been disturbed, the waters not being confined to a regular crevice or conduit have dissipated their weath in the surrounding formation.

"This whole district was at one time—prior to the dike era—covered by overflow porphyry, and at present that portion of the district lying north for a distance of about 2½ miles and an equal distance of east and west of the center of the north and south line is in porphyry bounded on all sides by granite walls, showing that there is a basin in the granite filled by porphyry cut by the dikes of the district, as above referred to. It is my opinion that some point within the porphyry area an extinct volcanic crater will yet be discovered. All the overflow porphyry in the district, except in the basin referred to, was scoured off by glacial action, and the granite rocks from the surface down to several hundred feet in depth were more or less moved and disturbed, which is the reason that no great bodies of continuous ore (except in rare instances) have been found above 300 to 500 feet in depth, the wealth carried in the water being dissipated in the loose and broken formation.

"By the above I do not mean to infer that no valuable ore was found above the depth indicated, for there was a great deal of money taken out of the veins which have been developed above 300 feet; but the ore bodies, as a rule, were narrow and short, and oftentimes did not continue in depth, while below that depth the ore bodies have been more continuous, longer, and as a rule of greater width and of more uniform value.

"Reasoning from the above-known facts, it is my opinion that as depth is attained, the quality of ore will increase, and at the same time maintain its present average values. By this I do not mean to say that at different depths in any mine values will not fluctuate, but I do mean to say the general average quantity of ore will increase and values will be maintained until great depth is attained.

"It is therefore my opinion that the veins will carry values as long as the formation is cool enough to permit of the waters precipitating their values."

Big Railroad Tunnel.

The Great Northern Railway tunnel, in the heart of the Cascade mountains, is through. By Dec. 1 track will be laid and trains running. Work began in January, 1897. It is 13,253 feet long and cost about $4,000,000. It is 53 feet over 2½ miles in length. There were approximately 800 men employed for nearly three years. They cut the tunnel from both ends at once; the progress through the solid rock averaged about 8 feet for every working day for each gang of workmen. It therefore required fifty men one working day to cut 1 foot of the tunnel. It is 23 feet high, 16 feet wide; the entire interior is lined with cement. The rocks that were blasted were ground into powder and mixed with the cement. The steam locomotives will not pass through the bore; an electric engine will pull the trains from one end to the other. This is made necessary on account of the coal smoke from the locomotive. The tunnel was designed and built under the supervision of J. F. Stevens. The difference in alignment was about one-fourth of an inch; the error in the grade was 2½ inches.

THE greatest quantity of iron ore mined in any country in one year, up to 1899, was 19.4 million long tons, the output of the United States in 1898. This figure, however, has been eclipsed by the record of 1899, made up and announced by the Geological Survey. In 1899, according to that authority, our production of iron ore reached the total of 24,683,173 long tons—an increase of 27% over the record mark of the previous year. The total value at the mines of the ore was $35,000,000, or $1.42 per long ton. The average value in 1898 was $1.14.

Working an Asbestos Mine.

At Thetford, near Sherbrooke, Ontario, Canada, are the largest producing mines of high grade asbestos in the world.

The mining is carried on in open quarries, what is known as "the big pit" at Bell's mine being several acres in area and about 150 feet deep. The serpentine is drilled and blasted and is conveyed to the surface by cableways and derricks. The first task is the separation of the asbestos-bearing rock from the barren rock, and this is done by hand picking. The portions containing asbestos are then conveyed to the cobbing house, where old men and boys knock off the long-fibered asbestos from the serpentine. Generally, cobbing is limited to veins from ⅜-inch thick upward, the separation of the asbestos carried by the thinner veins being done mechanically.

The mechanical separating process is a simple one. From the cobbing room the rock is deposited in chutes leading to a battery of rock breakers below. At Bell's mines gyratory breakers of the Gates type are employed, and from them the coarser fragments pass to a set of crushing rolls. From these rolls the crushed rock passes on to traveling belt picking tables, where boys standing alongside pick the fragments of barren rock off the belt and throw them to one side. The mineral bearing fragments pass from the picking tables to cyclone pulverizers in which the final crushing is performed and where a current of air separates the light asbestos fiber from the heavier rock dust. At various points between these crushing and picking operations the material is screened, and finally the abestos fiber is screened from the fine dust and finely broken fiber. The operation is a continuous one, the rock passing from the top floor downward through the various processes until the final product—commercial asbestos—is turned out at the ground floor. Except for the work of the boys at the picking tables the operation is a mechanical one throughout.

The separated asbestos is divided into three grades for the market. The first grade comprises the long-fibered material which is separated by cobbing. The two other grades are similarly determined according to length of fiber, color and freedom from foreign matter. The material not good enough to be included in any of the three commercial grades, but which contains fiber, is called "waste" and really constitutes a fourth grade. The sorted asbestos is packed in bags of 100 pounds capacity for the market. At the Thetford mines about two tons of commercial asbestos is obtained from every 100 tons of rock which is crushed. Altogether about 600 men are employed in the mining operations of three companies working the deposits at Thetford.

Progress at the Anaconda.

At the property of the Anaconda Copper M. Co., Montana, each mine has machinery for handling ore from a depth of 3000 feet. The old style hoisting ore with cars is abandoned; ten-ton self-dumping skips have replaced them. The skips are either hung above a double-deck cage or below, to suit the arrangements of the skip bins at the surface. By having cages in connection with these skips, every time the skip makes a trip a load of ore can be hoisted, besides two cars of waste or deck loads of men, and, in consequence, no men need wait for a cage for any length of time. The skips are loaded at the different stations, from fifty-ton ore bins, in a few seconds. The gates are operated by compressed air. The old way of using cars was dangerous for the station tender, in pulling the empty cars off and pushing the loaded ones on the cage, besides being hard work. Now he pulls a lever and the skip is loaded. The sinking of the shaft is done by direct hoisting engines, capable of sinking 1000 feet from one place. The old wooden gallows-frames have been replaced with steel structures from 60 to 100 feet in height. An important consideration in the building of steel gallows-frames, engine houses, etc., was to guard against fire. The steel frames are incombustible and there is no lumber above the shaft.

The company has in most places high-pressure marine boilers. The boiler houses are of steel. All the machinery underground is run by air. All the large underground pumps are furnished with air instead of steam, keeping the mines cool and comfortable. No vacuum pumps are now needed; these were formerly a great expense, on account of the acid water. Most of the pumps are of the Corliss type. The column pipes are wood and lead-lined.

* * *

H. B. **Depoy** of Indianapolis, Ind., has made some experiments with a process on which he has been working for thirty-two years on the manufacture of steel. With the new process, he says, any piece of steel may have its tensile strength increased from 40% to 75%. "It can be made so hard that no tool will scratch it, and only a diamond can be used to cut it. Yet it can not be cracked or broken by impact. The harder the steel is made the greater and more dense its tensile strength becomes." Railroad men say that, if so, Depoy has discovered the very thing that railroads have been searching for in vain for years—a process by which steel rails can be hardened to resist the wear and tear of heavy trains without becoming so brittle as to crack easily.

Of Increasing Use.

The automobile or "locomobile," as it is sometimes styled, is becoming a familiar object in the streets of many principal cities. Like the bicycle, it is evolutionary, and there are constant improvements. Among those noted are the styles furnished by the Locomobile Co., a self-propelling steam-motor vehicle, with little noise and no odor or vibration. The body contains the boiler, engine, gasoline and water tanks. The gasoline is carried in a copper tank under the footboard; it is forced by compressed air through the boiler, where it is vaporized, and thence to the burner, where it is ignited. The steam is generated in an upright copper boiler; water is supplied by a direct-action pump connected to one of the crossheads of the engine. This pump works continuously when the vehicle is in motion. The running gear consists of two steel-trussed ball-bearing axles, connected by a double reach; the front wheels connected to their axles by several joints; the rear axle composed of two parts passing through the rear tubing. Fig. 1 illustrates the "Runabout," Stanhope model; Fig. 2 a different make with buggy-top; Fig. 3 a "Locosurrey."

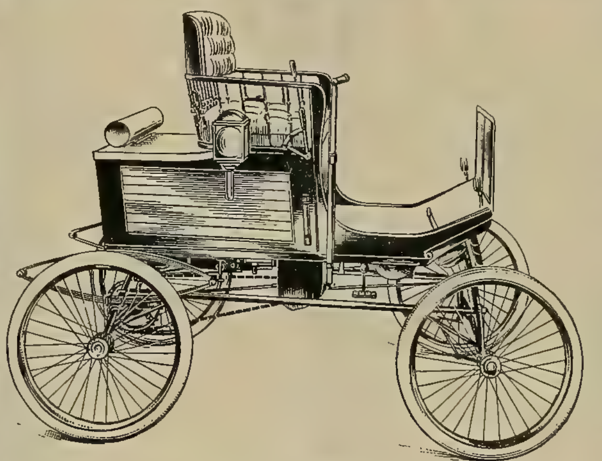


Fig. 1.—Style 2, "Runabout."

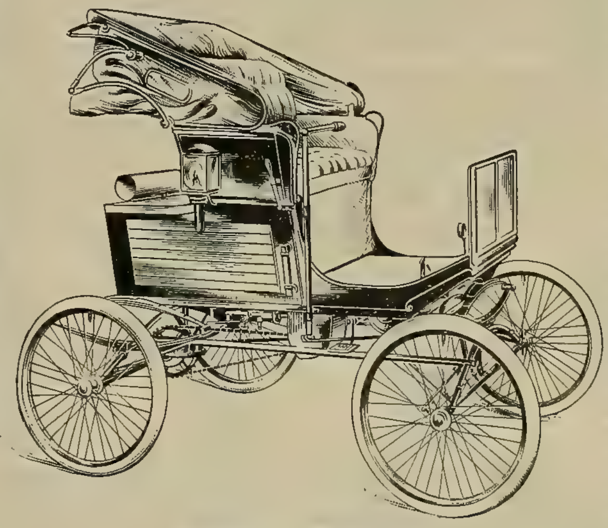


Fig. 2.—Style 3, Victoria Top.

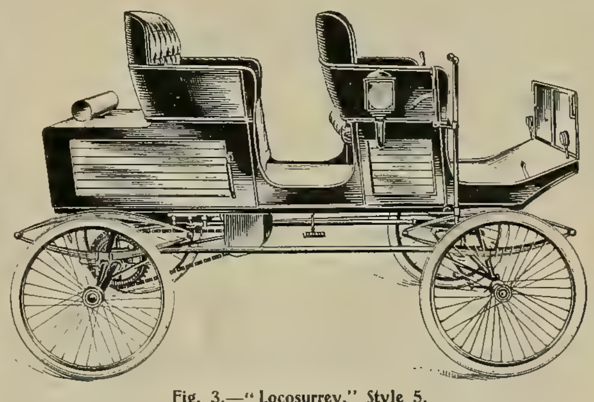


Fig. 3.—"Locosurrey," Style 5.

Explosives—Constant Care Necessary.

In spite of the quantity of explosives used in mining, in spite of the special instructions issued with every packet, in spite of the lessons taught by former accidents, it is a sad truth that injuries from dynamite and its kindred explosives continue to furnish about one-third of the total number of accidents for the year.

Nitro-glycerine and other high explosives are not dangerous so much by themselves and under normal conditions, as from the fact that they have to be exploded by percussion, by means of a detonator containing fulminate of mercury, which is a very sensitive medium. We have, therefore, these rules:

Never keep dynamite in the same box as the detonators.

Never clean a detonator with a hard substance, such as a pin, or even a straw, merely shake the sawdust out.

Never bite the cap on to the fuse, but use a pair of pliers.

When using powder, it is necessary to tamp very tightly, hence copper bars are allowed; iron bars being prohibited, as they emit sparks when struck on the side of the holes. Many miners still cling to the superstition that dynamite must be tamped like powder and, therefore, use a copper bar. This should be prohibited, it is not necessary, and is very dangerous, for if the bar slipped out of the man's hand when pushing the primer home, its falling weight is quite sufficient to explode the detonator. Hardwood sticks are all that are required and all that are permissible.

In all large mines the dynamite stored underground should be placed in a specially constructed magazine, under the charge of one man. The detonators being in separate boxes well apart; and a locked and cased lamp kept constantly burning; any one taking a naked lamp into the magazine should be dismissed, for if dynamite catches fire and burns away instead of exploding, it generates excessive quantities of carbonic acid and carbon monoxide—the one asphyxiates, the other is a deadly blood poison; and it may destroy every man in the level.

Proper cases should be supplied for carrying the dynamite from the magazine to the working places, and contractors' boxes should have a separate compartment for the explosive, the detonators and the fuse, and be provided with a strong hinged lid.

In charging holes underground explosives should never be mixed; it is absolutely useless since the quicker explosive will do the work, and it may be dangerous by setting up chemical reactions and generating deadly gases, which would not be formed in excessive quantities by the one explosive. Never drill out missed holes, never go back to missed charges until some time has elapsed and never drill into old sockets, as a plug may only partially explode, or may coat the hole with a layer of active explosive. Neglect of these simple and obvious rules has erected a city of tombstones over the bodies of the hapless and foolish victims.

When firing holes all approaches to the place should be carefully guarded to prevent any one from inadvertently approaching.

When firing charges there are three methods adopted—by snuffs, by matches, and by spitting the fuse. The most common and most dangerous is to spit the fuse; even the best fuses may have a bad coil; occasionally where the powder is unevenly laid, the fuse will then "run" and explode the charge prematurely. The usual speed of a fuse is 2 feet a minute, but the writer has known an individual coil, by one of the most reliable makers, run through 5 feet in twenty-five seconds; hence spitting is dangerous, as a man has no time to escape should the fuse begin to crackle, a sure sign that it is running.

It is becoming very common to spit a fuse with dynamite. The end of the fuse is split with a knife, and a piece of dynamite the size of a pea placed in this slit; the dynamite is then lighted and ignites the fuse. Some day the dynamite will explode, temporarily or permanently blind the man, and while he is groping about to find his way out the charg will explode and he will pay the full penalty for his temerity.

Firing with a match is done by splitting the end of the fuse, inserting the head of the match and lighting the other end; this gives nearly three-quarters of a minute extra time.

The best plan is to use a candle snuff; each fuse has a snuff placed under it, the miner lights them and can retire to some safe place and wait until the fuse burns through and spits. As soon as he sees they have all spitted he can go away and there is no danger; yet in spite of all this, and for the sake of saving two or three seconds, men will frequently juggle with their lives.

In firing in shafts it should be compulsory to fire with electric discharge. A man never knows what may go wrong with the engine, windlass or ladders—if he lights his fuses and anything should go wrong he is like a rat in a trap, with no escape. In firing by electricity the battery is never connected until all the men are out of the shaft, and there can be no danger; it is also far more efficient.—T. R. Godfrey.

Characteristics of California Petroleum.

By A. S. COOPER, Cal. State Mineralogist.

Petroleum oils from the different oil fields of California differ widely in physical characteristics and chemical composition. They may contain, chemically combined, one, two or three of the following elements, sulphur, oxygen and nitrogen, and in widely varying amounts, while in some rare instances these elements may be absent. Oils in the same stratum and a short distance apart may vary greatly. Frequently a well when it first yields will give an oil of a lighter gravity than that which it will yield when it has been pumped for some time.

We may, therefore, look upon California petroleum oil as containing the following substances in an unknown state or states of combination: Carbon, hydrogen, sulphur, oxygen, nitrogen and other substances in minute quantities; these combinations being very great in number and extremely complex.

The boiling point and melting points of the bitumens are altered very considerably by the presence or even by the traces of sulphur, oxygen and nitrogen. The presence of a greater or less amount of these substances during distillation has an influence on the distillate. Generally the larger the amount of carbon, sulphur, oxygen or nitrogen an oil contains, the greater its specific gravity, boiling and melting points.

California petroleum is a mixture of a large number of hydrocarbons and a large number of compounds containing hydrocarbons, combined with sulphur, oxygen, nitrogen and other elements.

The sulphur compounds usually predominate, followed by oxygen, then nitrogen, and, last, the other elements in smaller quantities. These sulphur, oxygen and nitrogen compounds were formed at the time that the oil was distilled from carbonaceous rocks by the heat of metamorphism, or are substitution compounds formed subsequent to such distillation by the hydrocarbons coming in contact with these substances under different conditions. Oil when exposed to the air absorbs oxygen. When heated with the peroxides the peroxides are reduced to a lower state of oxidation. Petroleum when exposed to sulphur vapors absorbs them; when heated with the persulphides the persulphides are reduced to a lower state of sulphuration. From the above it can be seen that California petroleum is of a highly complex character, containing a large number of hydrocarbons and hydrocarbon derivatives. When the sulphur, oxygen, nitrogen and other elements are removed a number of the remaining hydrocarbons must be unsaturated, and unless these substances be removed from the crude oil before distillation, fractional distillation does not give a true index to the composition of the oil. Ultimate analysis is worthless to show the character of the oil.

All the hydrocarbons and their compounds with other elements in California crude petroleum are volatile. Some, such as benzine, are extremely volatile, whereas asphaltum volatilizes with great slowness. Natural gas is a volatile part of petroleum. Like coal, the bitumens, oil and asphaltum, through decomposition, are constantly giving off carburetted hydrogen.

This decomposition is probably effected by acids, alkalies and other oxidizing agents forming oxygen compounds with the bitumens and liberating carburetted hydrogen.

Decomposition may also be effected by sulphurizing agents forming sulphur compounds with the bitumens and liberating carburetted and sulphuretted hydrogen. These oxidizing and sulphurizing agents are formed by metamorphism and other chemical reaction within the earth, and which came in contact with the bitumens. Carburetted hydrogen may also be generated from oil by heat. This gas is often found issuing from vents in the ground in California, having a temperature higher than the surrounding ground, sometimes as high as 90° F.

One of the reasons that California petroleum oil has such a high gravity is owing to the fact that the formation in which the oils occur is tilted and broken, permitting the escape of the gases. When California petroleum is evaporated by atmospheric influences, the sulphur, oxygen and nitrogen compounds remain and are concentrated, and, if the process is continued long enough, solid asphaltum is formed. After asphaltum is formed evaporation proceeds with exceeding slowness. Heat accelerates evaporation. The evaporation from an oil tank built underground and kept at a temperature of 50° F. is far less than from a tank built above the ground and exposed to the sun's rays, which may often reach a temperature of 130° F.

If a petroleum oil having a specific gravity of 40° B. be exposed to the heat of the sun in a shallow pan it will decrease 20% in volume in a short time; the portion of oil evaporated being better for the manufacture of gas than the part remaining in the pan. This experiment is easily tried and very convincing. Notwithstanding this loss by evaporation caused by high atmospheric temperature, the oil producer stores his oil in dark colored tanks which are exposed to the blistering heat of the sun, and it is to be regretted his example in many instances is followed by the gas manufacturer. If the oil tank cannot be placed underground where the temperature is low and fairly constant, it should at least be shaded from the sun and whitewashed to decrease absorption of heat.

When a fresh supply of oil is emptied into a tank which contains oil which has been stored for some time, it should be introduced into the bottom of the tank. The fresh oil, being lighter than the oil already in the tank, has a tendency to ascend, and in doing so it dissolves the heavy oil and will not evaporate as rapidly as it would if placed on the surface of the heavy oil.

Advantage is taken of the fact that asphaltum is nearly an unalterable gum to make many constructions in which a plastic and unalterable cement is required. Usually California asphaltum contains from 5% to 9% of sulphur.

Some wells in California produce oils containing paraffine, but they are so valuable for producing illuminating oil that their use for gas making is prohibitive.

At Baku, in Russia, a tract of land less than twenty acres in area has produced in twelve years 35,000,000 barrels of oil, and is still producing about 12,000 barrels per day.

On the Laguna extension, or Zaca rancho, in Santa Barbara county, California, there are large deposits of bituminized sand exposed upon the surface. On any one of several twenty-acre tracts at this place the dimensions of the exposures of the bituminized sand would show that it contains 8,000,000 barrels of heavy petroleum of the consistency of molasses.

To make one barrel of that material must have taken eight barrels of ordinary petroleum before evaporation, so that on each twenty-acre tract is now the remains of 64,000,000 barrels of petroleum oil. The astonishing part of this is that it is seen upon the surface and is not hidden beneath. Therefore, in California as well as in Russia, there are probabilities of a very small territory producing immense quantities of petroleum oils. The case cited shows one at least of such places; and there may be, and doubtless are, many others of similar character where the oils are still hidden.

Unaltered rocks of California cover an area of over 40,000 square miles. Bitumens occur in all geological formations, from the plutonic, metamorphic or igneous rocks up to and including the quaternary. It is found saturating strata of sand and seamed shale and as many as ten beds of shale can be seen on the eroded sides of some of the anticlinal ridges of the Coast Range. These sand beds are very irregular as regards their thickness and the distance intervening between them. Some are a few feet in thickness, while others exceed 400 feet, and the shales are from a few feet to over 500 feet in thickness.

When several sands are to be seen on the side of a mountain, or when they can be traced upon the surface of the earth by their outcrop, if bitumenized at all, the bitumen will generally be in the geologically lower beds; and when a sand contains bitumen, the underlying sand beds are also liable to contain bitumen. At the present time nearly all the wells that are being bored are in the vicinity of surface indications—to wit, oil seepages, outcrops of bituminous rock and gas blows, all of which are signs that the reservoirs of petroleum are leaking, owing to insufficient cover. At present the wells are generally shallow, but they will increase in depth in time, as they have done in other oil fields.

The day is not far distant when oil territory will be selected by geologists on account of favorable structure and position, irrespective of surface bitumens. The wells in this territory will have to be drilled to greater depths, but, when productive, will yield light oil. Owing to the large area, and the thickness of the unaltered rocks, the great thickness and the number of the oil sands in California, the yield of oil in California in future years will be enormous.

A comparison of the consumption of fuel oil with that of coal shows 3.33 barrels of fuel oil to be equivalent to one ton of good imported coal. Figuring oil at $1.40 per barrel, and coal at $7.50 per ton in San Francisco, it shows the cost of oil to be $4.66 as against $7.50 for its equivalent in coal. Moreover, the labor required to operate with coal is far greater than with oil, in most instances being nearly double.

The perfect cleanliness of fuel oil and the ease and simplicity of supply and regulation, make it a most desirable substitute for coal. As long as coal remains at $7.50 per ton in California it cannot be expected that oil will fall below its present price, not at least for some time to come.

In the year 1899 there were 1,740,027 tons of coal imported into the State of California; to supplant this 6,794,278 barrels of oil will be required. As the supply becomes more permanent the uses of fuel oil will multiply.

The removal of the gasoline, benzine and illuminating oil leaves an oil with a high flashing point, which would be less dangerous to use in a locomotive and otherwise than a fuel oil of low flashing point. The removal of the water also improves the oil for fuel purposes, as it does not have to be evaporated by the fire.

The asphalts in the crude oil are objectionable for the manufacture of gas. When the asphalts are subjected to the temperature necessary to gasify the oil, sulphurous gases are formed (principally sulphuretted hydrogen), and as the asphalts contain a large percentage of sulphur, these gases are formed in quantity and require a large amount of a purifier for their removal. The presence of asphaltum also fouls the checkerbricks in the superheater and carburetor in making water gas, and the retorts in making oil gas.

At present the market value of asphaltum is too high for it to be economically used for either the manufacture of gas or for fuel purposes. The large percentage of sulphur in natural asphaltums or in those obtained as a residue in the distillation of crude petroleum make them an undesirable fuel. During combustion with oxygen the sulphur combines with the oxygen to form sulphur dioxide. Sulphur dioxide in absorbing water or the vapor of water, changes to sulphurous acid. By oxidation, the sulphurous acid is changed to sulphuric acid, which may lodge on the surface of the boiler and attack the iron, forming sulphate of iron. Through this action the sulphur contained in the asphalt is a cause of corrosion in boilers. Owing to the presence of sulphur, the fuel value of asphaltum is small when compared with the other hydrocarbons contained in crude oils.

The time is not very far distant when crude California oil will not be used for the manufacture of gas. Distillates will be substituted for crude oil for the reasons given in this article. Therefore, it will be of interest to know what action distillation will have upon the crude California oils.

In Pennsylvania the upper half of the still is left exposed to the air to facilitate decomposition. During the first distillation of crude California petroleum oil, decomposition of any part of the oil should be avoided. Consequently, the stills should be completely bricked in so that the vapors will be kept fully heated until they escape to the condenser. In the manner of cracking, as practiced in Pennsylvania, there must be a great loss of heat from the exposed surface of the still.

The laboratory and practice show that the distilling, manipulating and purifying of crude California oil must be totally dissimilar and different from the methods in use in Pennsylvania, Canada and elsewhere. Most of the crude California oils should be distilled twice. From experiments made it would appear that the vapors of the lower hydrocarbons during distillation are contaminated by the decomposition of the sulphur compounds contained in the higher hydrocarbons, such decompositions being caused by heat. Usually the higher the boiling point of a distillate obtained during any one run of a still, the greater the amount of sulphur compounds contained in the same. In distilling oils containing sulphur, the main bodies of the sulphur compounds remain in the higher hydrocarbons. Owing to this action, by repeated distillation, the sulphur compounds are generally eliminated to a great extent, but hardly ever completely, from the oil.

A distillate having a certain specific gravity, when distilled under atmospheric pressure from crude petroleum, may contain sulphur in notable quantity, whereas a distillate of the same specific gravity when distilled from the same crude petroleum oil in vacuo may be comparatively free from sulphur. This is probably owing to the fact that a greater temperature is required to vaporize the oil when under atmospheric pressure than in a vacuo, this additional heat decomposing the sulphur compounds. At ordinary temperatures petroleum oil does not absorb sulphuretted hydrogen when collected on the surface of the oil.

If hydrogen at a high temperature, or in a nascent condition, is introduced into the vapors of the light hydrocarbons during distillation, the sulphur vapors which are formed by the decomposition of the sulphur compounds contained in the lighter hydrocarbons combine with the hydrogen and can be carried from the still; but if the hydrogen is omitted, the sulphur from the decomposition of the sulphur compounds combines with the hydrocarbons to form complex sulphur compounds which are removed with difficulty. It is supposed that, when in a crude state and not distilled, the lower hydrocarbons in the California petroleum do not contain sulphur compounds to any marked extent, but are sulphurized during distillation by the decomposition of the sulphur compounds contained in the higher compounds.

The asphalts obtained by the distillation of California petroleum contain from 4% to 7% of sulphur. Vapors of sulphur have a greater affinity for heated hydrogen, forming sulphuretted hydrogen, than for heated hydrocarbon vapors to form sulphur compounds. When hydrogen is in a nascent condition it will replace sulphur in the liquid compounds of sulphur and hydrocarbon by inverse substitution. The activity of this action is increased by heat. At 60° F. the action is very feeble, but at 200° F. the action is rapid, and at higher heats the action is still more rapid.

As has been stated above, California crude petroleum is composed of a number of hydrocarbons and hydrocarbon compounds, mutually dissolved one within the other, and having different boiling points. Owing to this they can be fractionally distilled so as to separate them into fractions having the following commercial names and physical characteristics:

Crude California Oil, 20° B. Distillates, Commerc'l Name.	Gravity			Per cent Obta'd, Approx.
	Approx. Baume.	Specific Gravity.	Weight of 1 gal. in lbs.	
Gasoline	75	0.6820	5.69	3
Benzine	63	0.7253	6.04	4
Illuminating	45	0.8000	6.66	13
Mineral sperm	38	0.8333	6.94	8
Gas distillate	28	0.8860	7.38	21
Light lubricating	26	0.8974	7.48	8
Neutral	23	0.9150	7.62	10
Heavy lubricating	15	0.9271	7.72	5
Valve lubricating	14	0.9655	8.04	4
Asphalt	..	......	....	11
Loss	..	......	....	13
				100

The following are the percentages of the distillates obtained by the first distillation from many crude California oils:

	Per cent.	
Naphtha	traces	to 15
Illuminating	6	to 27
Gas distillate	16	to 30
Lubricating	20	to 52
Asphalt and loss	7	to 25

In the first distillation the following are the temperatures at which the following distillates are distilled:

Crude naphtha	——	to 150° C.
Illuminating distillate	150°	to 300° C.
Gas distillate	300°	to 350° C.
Lubricating	150°	——

Owing to the highly complex composition and great diversity of California oils the above figures are to be considered only suggestive.

The Theory of Distillation by Steam.—Very many substances which distill only slowly or with decomposition can be quickly distilled and the decomposition averted if a current of steam is passed into the space above the boiling liquid or into the liquid itself. The latter is the better, for it gives a longer surface from which the vapor may come off, and also agitates the liquid so that in case there is any sediment it will not burn fast to the bottom of the still. Crude petroleum may be cited as a substance volatile with steam.

The reason why steam helps distillation may be explained by Dalton's law (the pressure, and consequently the quantity of vapor which saturates a given space, are the same for the same temperature, whether this space contains a gas or vacuum).

Now, as steam carries out from the still the vapor of the boiling petroleum, and allows more vapor to take its place, this explains the increased speed of the distillation by steam.

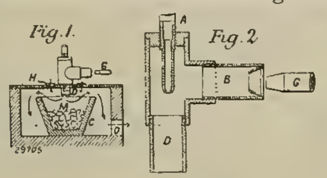
The vapor of the petroleum being removed, the liquid is as free to evaporate as if no steam were present—i. e., as if a vacuum was maintained; but it cannot be said that distillation with steam is the same as distillation in a partial vacuum. It only gives the same result as the latter. The decreased amount of decomposition may be explained by the vapor being quickly removed from contact with the superheated liquid and the sides of the still.

Why would not carbonic acid, hydrogen and other gases do as well as steam? When any of the gases, or their component parts, affect the petroleum it is manifestly inadmissible. For instance, sulphuretted hydrogen would sulphurize the petroleum, and the oxygen of air would oxidize the petroleum. Many gases could be used if they were practically condensible.

The volume of steam used is immense and condenses to water, which occupies $\frac{1}{1698}$ of the volume of the steam. Thus steam may be used to aid in the distillation of the petroleum, which is not soluble in or decomposed by water.

Crucible Furnace.

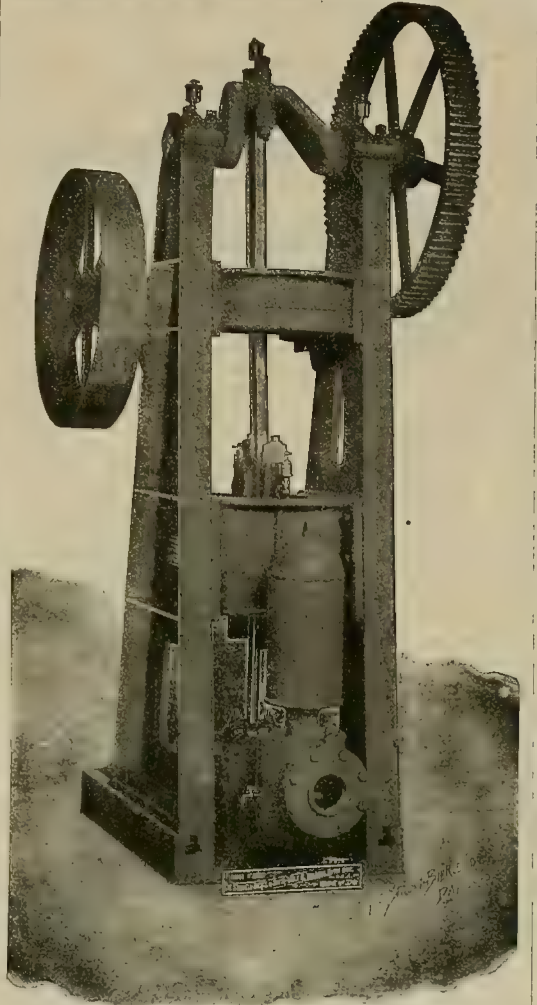
This invention relates to means of fusing, or otherwise treating by heat, metals or other bodies in crucibles by direct impact of a blow-pipe flame upon them. For this purpose an arrangement such as is shown in the accompanying figures is employed. The crucible C with its metallic or other contents M is placed within a furnace chamber having near the bottom an outlet O leading to a chimney. Through the top of the chamber centrally over the crucible there is a vertical duct D, into which is led laterally by a branch B a mixture of air with gas or combustible vapor supplied by a pipe G acting as an injector nozzle, so as to draw in air. In the center of the duct D a jet of air is directed downwards from a pipe A. A flame of intense heat is thus caused to issue from the duct D and to impinge directly on the material M in the crucible, the products of combustion ascending along the interior of the crucible wall, passing over its upper edge, and then descending outside the crucible to the chimney outlet at the bottom of the chamber, as indicated by the arrows. Through the cover of the chamber there may be a number of holes H controlled by a turning valve, for admission of air, so that a flame is produced surrounding the crucible and so accelerating the fusion of its contents.



Bickford Crucible Furnace.

Deep Well Working Head.

Herewith is illustrated the latest design of the Smith–Vaile deep well working head of the differential type, considered by the manufacturers suitable for both open and drilled wells. The stroke is 24 inches in length, the machine being designed for adaptation to size of working barrel, depending somewhat, however, upon the maximum lift. It has been installed in some of the larger office buildings, elevating water 375 feet in the new Montgomery–Ward building in Chicago. The crank is of steel; crank bearings of liberal area. The gears are of charcoal iron, machine cut. The pinion shaft operates in ring oiling bearings. The connecting rod is of steel, provided with bronze boxes at crankshaft connection, and also with adjustment device at crosshead connection. The crosshead operates in an adjustable shoe. A water box is also provided, and there is located beneath the air chamber a check valve. Further particulars may be obtained by addressing the manufacturers, The Stilwell–Bierce & Smith–Vaile Co., 276 Lohman street, Dayton, Ohio, U. S. A.



Smith--Vaile Deep Well Power Pump.

THE Manufacturer says: "For good or evil to our manufacturers American coal is going to Europe in rapidly increasing quantities. The immediate cause is found in the Chinese and South African wars. Markets held hitherto exclusively by English coal have been opened to us. The superiority of our coal for steam purposes has finally been forced home to possible buyers. Had we been wise enough to build and aid ships ten or twelve years ago we would be in the Mediterranean with coal, ton for ton as cheap as England. We have been too careless. There are those who think and say we should husband our resources in coal; that a time will come when we will want what we are now exporting, but that time is many generations distant."

Boulders in Mines.

The finding of water-worn boulders at great depths in mines has been a source of wonder to miners, and has been the cause of some theorizing as to how the boulders got there. A few such occurrences have been noted by the journals, but doubtless many such finds never found their way into the columns of a paper.

Some twenty years ago an extensive bed of sand and rounded, water-worn boulders was found in the California mine at Central City at a depth of 500 feet.

Some time in the 80s a nest of boulders was found in the Virgin lode on Republican mountain. The boulders were firmly cemented in the gangue rock and some 60 feet from the surface.

At a depth of 230 feet a large number of water-worn boulders were taken out of the Brannigan lode on Leavenworth mountain.

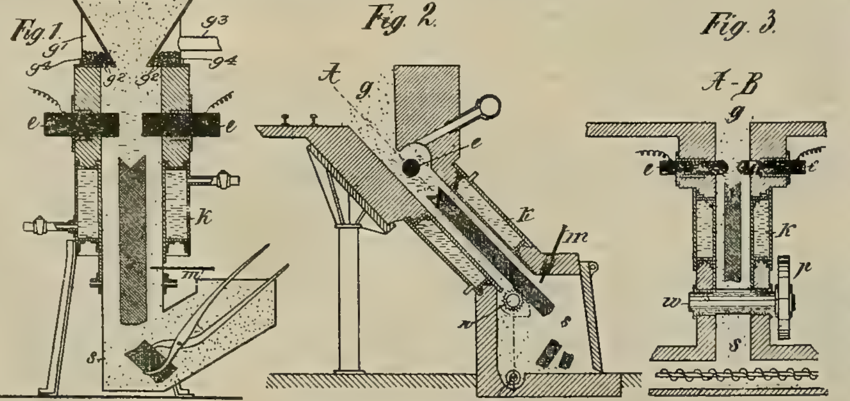
In 1880, while driving a level on the Shively mine, a large number of rounded boulders were found, varying in size from pebbles to those measuring 8 or 10 inches in diameter. They were found at a depth of about 400 feet from the surface and were all granite.

Boulders of galena were quite common at a depth of about 125 feet in the Last Chance mine at Creede, and boulders of eruptive rock, coated with a thin scale of mineral, are common in the Bassick mine, Silver Cliff.

Their occurrence is an interesting study for the geologist. The only tenable theory advanced by the miners is that they fell into the crevices before the process of filling was completed. — Georgetown, Colo., Courier.

New Electric Furnace.

The newest thing in electrical furnaces is illustrated herewith, as noted in the N. Y. Electrical Review. In the manufacture of calcium carbide and other products in an electric furnace requiring high temperatures the following difficulties have been met with: The mixture to be heated partly escapes decomposition when passing the region of the electric current, while another part is whirled out of the furnace with the gases arising during the electro-chemical and thermo-chemical reactions. That part of the furnace charge which passes the electric heating region undecomposed, together with a part of the manufactured product, will in many cases suffer damage by combustion, because it can not be prevented from leaving the furnace in too hot a condition. By this invention it is not intended to avoid a moderate part of the furnace charge passing the electric heating region undecomposed, because by allowing a part of the furnace charge to pass the furnace undecomposed this part will not only help to protect the furnace walls against the action of the electrically heated products, but it will also greatly help in keeping up the necessary isolations; yet all other difficulties enumerated above will be done away with. In carrying out the idea the usual electric furnace is provided with a feeding hopper and electrodes. The lower portion of the furnace, however, is surrounded by a water jacket through which cold water is continuously passed. This jacket cools the products of the furnace as well as the undecomposed portion of the charge, and prevents such losses as are unavoidable when the products of the electric furnace leave the furnace hot as they are and come into contact with air. This is not only important for the ready product, but especially for the undecomposed part of the furnace charge, which in most cases consists of oxides and carbon. Coming out too hot, the carbon will catch fire and burn away from the mixture, which, in order to be used again, will have to be mixed with a fresh portion of carbon before being returned to the furnace. As the undecomposed part of the furnace charge comes out cool, it can immediately be returned to the furnace, together with fresh charges. The chief product itself will not suffer deterioration if after completion of the originating reaction it is sufficiently cooled inside the furnace.



Improved Electrical Furnace.

MINING SUMMARY.

ALASKA.

In his report to the Director of the Mint from the Nome district, special agent Cabell Whitehead says:

"Of the new discoveries since last season, Topkuk, located on the beach 60 miles east of here, easily takes the lead. From a space not over 500 feet in length along the beach to the tundra there was taken out this spring between $500,000 and $600,000, all with rockers.

"The latest strike, and one which is at present attracting much attention, is on the Bluestone river, in the Port Clarence mining district, something less than 100 miles from Nome. One of the tributaries of this river—Gold Run—is said to exceed in richness anything known heretofore, it being no uncommon thing to get from $10 to $20 in a single pan. The creek is entirely taken up.

"A source of gold which is attracting much attention at the present time is the ancient river beds along the head of Dexter and Anvil creeks. Some of these deposits are fabulously rich, nothing richer having been found in the Klondike, I am told, than some of the claims along Nickkala gulch. The extent of the deposits, however, has not yet been proven and another season will be necessary to demonstrate their value.

"I incline to the opinion that these ancient channels are the source of the gold found in all the countries in this district, as well as the gold taken from the beach, and, if I am right in this opinion, they should be very extensive, and may add millions to the world's production. I see no reason to doubt that during the coming winter, when prospecting can be done with the aid of thawing machines, these channels will be located, and next season will see a very largely increased production.

"In my opinion, the future of this district remains to be proven, with the chances largely in favor of its becoming in the next two years a very great producer.

"My estimate of the production up to this time is $1,500,000, with the chance of increasing this production before the end of the season to $2,000,000."

The Alaska-Treadwell M. Co. in September worked 40,658 tons ore, valued at $47,483, and 671 tons sulphurets, value $20,835; total output, $73,495. The ore averaged $1.81; working expenses for month, $20,500.

ARIZONA.

SANTA CRUZ COUNTY.

The new concentrating plant at the Mowry mine is in operation. Its capacity is thirty-five tons per day.

YAVAPAI COUNTY.

W. C. Brandon, Supt. Middleton mine, near Prescott, says the shaft, present depth 375 feet, will be sunk to a depth of 700 feet.

At an adjourned meeting of the stockholders of the Crowned King M. Co. at Taylorville, Ill., Oct. 8, it was decided to continue operations.

President Bosworth of the Verde Queen smelter, Jerome, says it will be started up again this month.

The Jerome News says that the new cyanide plant put in by the Copper Chief M. Co. on Equator hill is such a success that the plant will be enlarged.

CALIFORNIA.

AMADOR COUNTY.

The Democrat says the property of the Wildman G. M. Co. has been turned over to Chas. Bishop of San Francisco, who will operate it under an option to purchase. The mine has paid off its employes.

I. N. Holman of Ione has sold to San Francisco men for $9000 a promising gravel proposition near Wallace.

W. R. Bacon, Supt. of the N. Clark & Co. claybanks at Dashville, is taking out clay; is used by N. Clark & Co. of Alameda in the manufacture of terra cotta goods.

The Mutual mine, after cutting through 4 feet of ribbon rock, has opened a body of ore on the east drift of the 400 level.

The Plymouth Development Co. is organized. Directors—J. Cook, E. B. Cutter, J. Dolberg, E. W. Ferguson, T. J. Parsons, E. W. Taggard, G. D. Gray, W. W. Douglas, S. K. Thornton; capital stock, $360,000; subscribed, $900.

Ledger: At Jackson, forty stamps at the Kennedy mine and forty at the Zeile are in operation, mines producing as usual. ——A few men are at work at the Argonaut.——In the Bunker Hill the old shaft has been retimbered to a depth of 655 feet, at which point the old timbers were found intact.——By November 1st the shaft of the Peerless mine will be down 500 feet. ——At the Lincoln mine, Sutter Creek, at the 1200 level, drifting north and south is to be done.

CALAVERAS COUNTY.

At the Melones Company dam, near Robinson's Ferry, 110 men were at work before the recent rains. Two centrifugal pumps, capacity 240 and 180 inches, respectively, kept the pit free from water; three steam derricks removed the gravel and stone. The pit is 110 feet long, 50 feet wide; height of dam when completed, 20 feet above low water mark. The water is to be taken out through a flume 4x9 feet, which, with a tunnel ⅛ mile long, will make a distance of 3 miles from the dam to the turbine.

The Oriole M. & M. Co. thinks of sinking its 400-foot shaft 400 feet deeper, at a cost of $8000.

EL DORADO COUNTY.

M. L. Smith, at the Rosebud mine, near Fairplay, will build a 5-stamp mill.

The Placerville Nugget says that the river bed mine at Salmon Falls, which was being developed by Messrs. Drew, Cohn & Donnelly, has been abandoned. After spending a sum of money they found they were developing a worked-out claim. The bed of the river was covered with several feet of debris and there was no indication on the surface that the river bed at that point had ever been worked, but when bedrock was reached various mining implements were found instead of gold.

LOS ANGELES COUNTY.

At Newhall the Pioneer White Oil Co., drilling in Placerita canyon, is down 650 feet and has finished putting in 9⅝-inch casing.

In East Los Angeles the Standard Union Oil Co. is down 600 feet in 7⅝-inch casing. Considerable water has been found.

MADERA COUNTY.

At the works of the California Copper Co. Manager Langford will continue sinking the shaft at the north end of the mine to a depth of 500 feet; thirty men are at work.

MARIPOSA COUNTY.

The Mary Harrison shaft, near Coulterville, will be sunk to a depth of 700 feet, when crosscutting and drifting will begin.

MONO COUNTY.

The Mono Marble Co. of Oakland will work at Antelope valley.

NEVADA COUNTY.

The Reward mine shaft is now unwatered. It is now equipped with a new electric power plant. When sinking is resumed additional men will be put to work.

The Herald says that the Delhi mine is turning out fine ore.

The Union learns that the idle 30-stamp mill at the Champion mine, near Nevada City, will be renovated. At present the company is running its 40-stamp mill.

PLACER COUNTY.

A. Bordeaux is manager of the Ralston Divide G. M. Co.'s property, a drift mine in a territory described and illustrated at considerable length in the issue of July 30, 1898. His nearest postoffice is Georgetown, 30 miles away; his supplies are received at Summit station. A system of ditches, when completed, will furnish water the coming winter to carry on hydraulic operations that are expected to reimburse the company for its considerable outlay. Felix Chappellet is president of the company, which has acquired possession of considerable valuable property which will be thoroughly developed. Mr. Chappellet has already shown considerable nerve in such enterprises. When at the Mayflower he determined that by adopting a certain course the ancient channel could be found, and for this purpose a tunnel 5585 feet long was driven through hard slate at a cost of $150,000, with entire success. That section has yielded about $30,000,000, which is considered to be but an index of the amount yet to be extracted therefrom.

Sentinel: At the Occidental gravel mine at Grizzly Flat, near Iowa Hill, the main tunnel has followed the channel 350 feet. Crosscuts show a width of about 400 feet.——At the Herman quartz mine, near Westville, the new tunnel taps the ledge at 1400 feet and has been extended 300 feet on the ledge. Thirty-five men are employed.

PLUMAS COUNTY.

Konradi & McElroy have leased the Duncan gravel mine, on the East Branch, and will work it by hydraulic elevator.

RIVERSIDE COUNTY.

Studenraugh & Barta, 12 miles northeast of Capistrano, have spent the summer running a tunnel 65 feet with a 7-foot dike of what they think is tin ore in the face. The local paper says assays indicate that this ore runs from 3% to 6% tin. It carries iron and traces of silver. This property is about 20 miles from the Temescal mine.

SAN JOAQUIN COUNTY.

At Stockton a briquette factory will be built with daily capacity 500 tons. The briquettes will be made from coal dust, screenings and petroleum.

SANTA CLARA COUNTY.

The Hood M. Co. has incorporated at San Jose; capital, $100,000; $62,000 subscribed: J. H. Burkhart, C. D. Hayward, T. J. Gillespie, P. Long.

SHASTA COUNTY.

The Mountain Copper Co. has declared an interim dividend of 9s per share, payable at the London office October 10th; 99,948 tons of ore were smelted at Keswick during the six months ended June 30th. The copper produced was sent to the company's works at New Jersey to be refined, where the output of fine copper during the six months was 5038 tons; sales of finished copper for delivery during the six months aggregated 4962 tons.

C. F. Dougherty has chrome ore in his mine on Shotgun creek near Chromite. Former owners shipped 3000 tons of chrome in one season to the East for paint manufacturing. The ore is now being used extensively for linings for smelting furnaces. He has taken out and shipped 400 tons this season.

SIERRA COUNTY.

At the Sierra mine, Supt. Finney has built a flume 2600 feet long, a pipe line 800 feet long, and put a jet pump and hoisting works in place.

The Thistle shaft on the Gibsonville ridge is started. Thirty men are at work.

SISKIYOU COUNTY.

The Cherry Hill quartz mill, Cherry creek, is in operation under management of E. D. Baker.

SONOMA COUNTY.

C. Bell of the Socrates quicksilver mine at Pineflat has had six retorts constructed upon plans of his own whereby he figures that 98% of the mercury in the ore treated will be saved. The metal easily vaporizes when distilled, and with this vapor go the profits. Each of the six retorts is capable of treating 2700 tons of ore in twenty-four hours if run at its full capacity. A new crosscut to the vein from the main tunnel has discovered 5% black oxide and quicksilver. Mr. Bell says the ore newly exposed contains $1.75 gold and three ounces silver to the ton.

TRINITY COUNTY.

Whitmore & Young's gravel claims on Oregon mountain, at the head of Democrat gulch, are sold to San Francisco men. A 25-mile ditch will be in charge of O. C. Loveridge. Water will be taken from Canyon Creek falls, 6 miles above Dedrick.

A strike of rich ore is reported in the lower tunnel of the Brown Bear mine, Deadwood.

At Harrison gulch ten men are doing preliminary work at the W. R. Hall mines.

C. D. Galvin has 140,000 pounds machinery for a dredger to be operated near Weaverville to be in operation by Dec. 1st.

Geo. L. Carr, owner of the Yellow Rose of Texas, on Union creek, expects to reopen the mill.

TUOLUMNE COUNTY.

The Genevieve M. Co. has incorporated; W. P. Scott, A. J. McGovern, M. B. Woodworth, T. M. Carrol, A. H. Warren; capital stock, $250,000.

One thousand feet of steel rail will be used in the tunnel of the Golden West M. Co., near Sonora. The company will build a mill next spring.

S. S. Petrovitch is superintending development of the Comstock Ranch property for the Golden West M. & M. Co.

COLORADO.

BOULDER COUNTY.

The Bailey chlorination mill at Eldora has resumed.

At Sunnyside the Welcome G. M. Co. is operating the Silent Friend group of claims. G. L. Spence is manager and J. Murphy underground foreman.

At Salina the Valley Forge mine is sold to Cripple Creek men for $50,000. The property is under the management of Mr. Mathiews.

The Golden Eagle mine, owned by the Golden Eagle Exploration Co., has fifteen men at work under the management of Mr. Ellis.

At the Ingram mine six machine drills are running.

A strike is reported in the Melvina mine. At a depth of 600 feet a streak of tellurium ore, 3 inches in width, running 200 ounces gold per ton, was encountered.

Miner: On some of the wolframite ore from Burnt mountain, in Denver, values running $200 to $300 per ton were obtained. J. H. Knight was the first to discover wolframite in that district, and in his lead can be found wolframite ore carrying 60% tungstic acid.——At the B. & M. mine Supt. Bossen has in the 700 west level solid smelting ore 3 feet wide.

CHAFFEE COUNTY.

Near Buena Vista the Boston M. & D. Co. has two mines, the Lone Star and the Edith, and are putting in machinery. Manager C. A. Smith is unable to hire the men he wants, none being available in that county, and that is holding them back. A 9x5 shaft that develops the two mines is down 96 feet, timbered with California square-cut redwood; the shaft is an incline.

EL PASO COUNTY.

At Colorado City the Portland's new chlorination plant will cost $300,000; the structure will be of steel.

GILPIN COUNTY.

Shipments of smelting and crude ores concentrates and tailings from Blackhawk to outside smelters and other points of treatment for the last week of September were eighty-one cars. The entire month's shipments were 304 cars—5624 tons.

Register-Call: During September there were shipped from the Black Hawk depot of the Colorado & Southern railroad 304 cars of ore, 5624 tons, representing the shipments of smelting ore, tailings and concentrates, to Denver and other smelters, and shipments of crude ore to outside points for treatment.——Manager J. W. Bostwick, at the Clark-Gardner mine on Quartz hill, at a depth of 825 feet, has a good vein exposed. The property is operated by the Rome-Gardner M. Co.

HUERFANO COUNTY.

Walsenburg reports the Slone-Ripley-Sefton mine, on the west slope of Greyback mountain, in the Greyback district, 40 miles west of there, sold for $60,000 to N. Meade of Colorado Springs, N. Gandy and C. E. Barney of Springfield, Ill. Thirty miners are working ten cars of hematite iron that will be shipped, assay-$100 per ton. As soon as the new owners take full charge more men will be put to work.

LAKE COUNTY.

The Leadville ore output at present is about 2000 tons a day, and the advance in silver is encouraging to mining men. An advance of 5 cents an ounce would mean an increase of $1000 a day.

Carbonate Chronicle: Leadville has abundance of manganese ore, but competition is so keen that profits on shipments to Chicago are very low. The demand for all manganese ore is very great in the East. The mines of Virginia, Arkansas and other points can not supply it, and the big iron and steel works must necessarily go outside for their supply, and shiploads are brought in from Peru, Russia and Cuba. In the smelting of manganese, the separation from the iron is not complete, two products being made—speigeleisen, where the iron is more than the manganese, and ferro-manganese, where manganese is in lesser quantity than iron. The main trouble about mining the Leadville manganese is the question of freight. Unless the ore is up to a certain standard it will not pay to ship. If a furnace could be erected at Leadville to reduce the manganiferous iron to a ferro-manganese, about 40% of the weight would be eliminated, and the product could then be shipped with profit.

OURAY COUNTY.

The British option on the Camp Bird properties at Ouray has been extended sixty days for further investigation. The price is $13,000,000 in London; $6,500,000 in Colorado. Twenty stamps are being added to the mill. The new cyanide mill —100 tons daily capacity—will be in operation Nov. 10.

J. S. Loder has bought the Badger mill, near Ouray, and will convert it into a pyritic smelter.

PITKIN COUNTY.

Aspen reports a strike in the Last Dollar mine, Bull hill, impregnated with sylvanite.

The Lexington Co. has sent a shipment of 100 tons of $30 mill ore and forty tons smelting grade, which goes about $75.

SAN MIGUEL COUNTY.

The Butterfly-Terrible Co. of Ophir produced in September $8000. Since starting the mill April 20, $28,000 has been produced.

The Tom Boy M. Co. mill during twenty-eight days crushed 4300 tons ore; estimated value, $46,000. Concentrates shipped, 265 tons, valued at $4000. Expenses of month, $35,000; of the expenses $3800 was for the purchase and installation of a new hoisting engine.

TELLER COUNTY.

Lowery, Sheidler, Whiteside & Co. of the Christmas, above Goldfield, have a 2-inch streak of talc that assays twelve ounces.

Near Victor operations on the Bertha B. have resumed. J. S. Fitting has a bond and lease for two years at $25,000.

The Stratton Cripple Creek M. & D. Co. has started work in the Chicago-Cripple Creek tunnel. A double compound compressor, to operate eight drills, will be installed over the deep shaft of the John A. Logan. Machinery will be put in over the shaft capable of operating the mine to a depth of 3000 feet. The shaft is now down 1400 feet. The Gold hill and

Bull hill groups will be worked simultaneously.

During September the Vindicator mine produced 2500 tons of ore, 60% milling grade and the balance smelting grade ore.

The El Paso M. & M. Co. has the shaft down 500 feet and will sink 200 feet deeper by Jan. 1st.

IDAHO.

ADA COUNTY.

A Boise case involving the right to cut timber from mineral land is before the U. S. Commissioner. Ridenbaugh & Rossi were arrested on the charge of illegally cutting timber from the public domain. They admitted that the timber had been cut, but under the circumstances claimed it was not a violation of the law, which permits the cutting of timber from such portions of the public domain as is known to be mineral in character and subject to entry as mineral land only. The complainant, E. T. Staples, claimed the mining property from which the timber was cut. As he desired the timber for his own use he caused the arrest. The land being mineral in character, the U. S. District Attorney caused the complaint to be dismissed. It has been supposed that the holder of a mining claim was entitled to the timber thereon. If the construction that he is not be correct, the miner is afforded no protection whatever with respect to the timber. He furnishes the proof that the land is mineral bearing and any one can take advantage of it and cut the timber off. It is likely a test case will be brought soon with the view to having the question definitely settled. Officials at the land office are under the impression that the mine owner could prevent the cutting of timber from his claim. As there is nothing in the law preventing the cutting of timber from a mining claim, however, the miner cannot secure protection through the criminal courts. His remedy, if he has any, lies in a civil proceeding. Receiver Garrett of the Boise Land Office says: "While the law permits the cutting of timber from mineral land, still the man who appropriates the timber therefrom is not the sole judge as to the character of the land. The government can at any time require him to furnish proof that the land is mineral, failure to do which would be followed by proceedings in the federal court."

ELMORE COUNTY.

At Rocky Bar the Sawtooth Co. has reduced wages from $3.50 to $3 a day.

SHOSHONE COUNTY.

The Crescent mine, near Pierce, has its mill in operation.

MICHIGAN.

HOUGHTON COUNTY.

At Houghton, shafts Nos. 1, 2 and 3 of the Tamarack are sending out 55,000 tons of rock per month. The new No. 5 shaft is down 4486 feet. It was begun in August, 1895; it will be a full mile deep when completed in January, 1901, exceeding the Red Jacket shaft of the Calumet & Hecla, and becoming the deepest mining shaft in the world.

The shaft on the Mesnard portion of the Quincy is progressing. This shaft, at a depth of 4000 feet, will make connection by a long drift with the northernmost shaft of the North Quincy, once the Pewabic, passing under the Franklin workings.

MINNESOTA.

ST. LOUIS COUNTY.

On the 7th at Eveleth 7500 pounds dynamite in the powder magazine at the Spruce mine, ½ mile from town, blew up. A hole 100 feet square and 25 feet deep marks the spot where the magazine stood. The mine laboratory and warehouses were totally wrecked. Two hundred people were slightly hurt from being thrown down by the shock or hit by shattered glass.

MONTANA.

DEER LODGE COUNTY.

The Nipper is being worked under the receivership of T. McLaughlin. A new gallows-frame over the new shaft is 90 feet high; the skips carry five tons.

LEWIS AND CLARKE COUNTY.

The Bell Boy at Empire, under lease to Z. Vinson, is producing ore averaging $20 gold, two ounces silver, 8% lead.

MADISON COUNTY.

The Watseka Co. employ sixty men and have the Clark mill under lease.

MEAGHER COUNTY.

At Copperopolis Reynolds & McDowell are working the North Pacific, the Darling Fraction and the Copper. A shaft is being sunk on each. That on the North Pacific is down 500 feet; on the Darling, 125 feet; on the Copper, 250 feet. One hundred men are on the payroll. A townsite is being laid off.

SILVER BOW COUNTY.

On the 3d at Butte the engineers of the Gagnon mine struck for $5 per day instead of $4 they have been receiving. The management refused the demand and the engineers walked out.

NEVADA.

CHURCHILL COUNTY.

Barbee, McDonald & White of Colorado Springs, Colo., have bought out the Bell Mare C. M. & S. Co. for $100,000. There are two ledges of 6% copper.

ESMERALDA COUNTY.

H. T. Benson of Denver has bonded the Homestake, Summit, Sapphire, Savage, April and Poor mines, near Silver Peak, for $13,500; $1000 is to be paid before Nov. 1, 1900, $12,500 before Aug. 1, 1901. He has also bonded the Great Gulch and May mines near Silver Peak for $15,000—one-half to be paid by Dec. 1, 1901, the balance by June 1, 1902.

LINCOLN COUNTY.

(Special Correspondence).—Yellow Pine mining district, in the southern part of Lincoln county, southern Nevada, is very slow in developing on account of lack of facilities of transportation, lack of fuel and water. One man, Allen G. Campbell, has twenty-four patented claims in the heart of the district. No work is being done on any of them.

Mr. Newby, Deputy United States Mineral Surveyor, is surveying four claims for patent for Mr. Ritchie of Pueblo, Colo.

The Keystone mine, in the past a noted producer of the yellow metal, was under examination during the past week by Captain Hutton of Los Angeles, assisted by C. A. Beck of Goodspring. On the final report will depend the reopening of the mine.

C. M. Over, owner of the January copper mine, on the eastern slope of Potosi mountain, is pushing work in developing the claim, crosscutting the vein and running a tunnel, at the same time extracting copper ore averaging about 25%. This mine has paid all developing expense, besides standing an expense of $28 per ton shipping and smelting charges, and making for its owner a handsome net profit on each shipment.

A. E. Thomas is making another shipment of copper ore.

Bowen & Green, who have under bond the Azurite copper claim for $5000, are pushing work with three shifts, extracting and shipping copper ores. Between the copper vein and footwall, vein material several inches in thickness, assaying three ounces in gold per ton, occurs. Of course, this is carefully saved.

The Green Monster, under bond to the Hearst estate, Supt. Wilkinson, is showing up fine, the ore assaying an average of gold $5, silver ten ounces, copper 8%. Work is being prosecuted with vigor. Three shifts are employed, sinking and drifting.

Goodspring, Oct. 7.

STOREY COUNTY.

The official telegram of the drainage work at the C. & C. shaft of the 11th inst. says:

At 6:30 this morning the water was 193 feet 4 inches below the 1950-foot level station. No 1 elevator has been running continuously.

The Confidence, Challenge Con. and Con. Imperial mines report the west crosscut from the surface tunnel is now out 2745 feet, having been advanced 30 feet during the week. The face is again in hard porphyry. General repairs to this crosscut are still going on.

The Belcher says: On the 100-foot level the north drift from the west crosscut has been cleaned out and retimbered 11 feet during the week, its total length now in good repairs, 36 feet. The south drift from the west crosscut on the same level is now out 24 feet, having been advanced 8 feet during the week. The face of this drift is in ore giving an assay value of $15.61 per ton. On the 1100-foot level the Belcher, Crown Point and Yellow Jacket joint drift is being repaired.

The Justice says: At a point in the upraise from the south drift, 100 feet above the drain tunnel, have started a south drift following the ledge and advanced it 10 feet; face in porphyry quartz giving low assays.

WHITE PINE COUNTY.

(Special Correspondence).—A new mill has been built at the old Star mine, at Cherry Creek, which is equipped with crushers, rolls and concentrators. It is not now operating, having closed by reason of a shortage of water. This is 75 miles west of Ibapah, Utah.

Cherry Creek, Oct. 8.

C. H. Scheu, at Muncy, is sinking on a ledge in which 4 feet of ore shows 50% lead, ten ounces silver and $1 gold.

NEW MEXICO.

BERNALILLO COUNTY.

W. C. Wynkoop of the Cochiti Reduction & Improvement Co. has purchased for his company the Good Hope mine. The ore assays $12 gold and silver.

The Albemarle at Bland has its shaft 700 feet deep. It will be sunk 300 feet deeper.

COLFAX COUNTY.

Near Elizabethtown the Moreno placers which have been acquired by a Buffalo syndicate will be worked 2½ miles along the Moreno creek, a width of 1500 feet.

The Cleveland Co., operating the Cleveland group at Elizabethtown, has a body of ore 20 feet wide averaging $12 gold to the ton.

LINCOLN COUNTY.

Record: The American Placer Co. at Jicarilla is working a large force of men. ——Old Abe coal is freighted from White Oaks to Roswell and sold at $12 a ton.—— A 125-stamp mill has been recommended to be built by the Boston Boy M. Co. at White Oaks by Supt. Preswick.——A strike of ore is reported at the Compromise mine at White Oaks.

RIO ARRIBA COUNTY.

The Admiral G. & C. Co. has incorporated at Hopewell; agent, Thos. Smith.

SAN MIGUEL COUNTY.

The Deming M. & M. Co. is incorporated; N. G. Noel, H. E. Runkle, D. Bauman, A. R. Graham, S. Field; capital stock, $30,000. The company intends to erect a smelter at Las Vegas.

TAOS COUNTY.

The Red River copper district is attracting attention. It is in the Keystone mining region, in the vicinity of Elizabethtown and Amizette. H. J. Reiling & Co. are arranging for a dredger near Elizabethtown.

The Rio Grande Co. has nine claims 4 miles from Red River City and has started a tunnel to cut the main veins.

On the Copper King, opposite Red River, an Eastern company is sinking a shaft 300 feet.

The Memphis & Edison Co. has a developed property, R. Pooler, manager. Two carloads of ore shipped to Pueblo gave $33.50 per ton. Men are sinking on the main lead.

OREGON.

BAKER COUNTY.

The California Con. G. M. & M. Co. has incorporated at Sumpter; capital stock, $1,000,000; E. T. Warren, W. H. Jackson, S. H. Bell.

Near Baker City, nine Cincinnati men, who recently bought the Baby McKee mine, have placed J. T. Grayson in charge of the development work. The old tunnel is in 616 feet; the new 5000-foot tunnel 414 feet lower than the mouth of the old tunnel. The new tunnel, when in to a point immediately under the apex, will give a depth of 2260 feet.

A dispatch from London states that the Red Boy mine, near Baker City, has been sold to an English company for $2,000,000.

SOUTH DAKOTA.

At Lead the Homestake Co. is repairing the old Father DeSmet stamp mill. They will sink 2000 feet. The old Caledonia stamp mill is also being repaired. The repairing of these old mills, with the Deadwood Terra, will give a total of 340 stamps. About 1500 tons of ore per day will be treated by the three mills.

UTAH.

BEAVER COUNTY.

(Special Correspondence).—The Imperial M. Co. is obtaining good results in developing the Imperial mine, which adjoins the Horn Silver. The 300-foot tunnel goes in on the strike of the vein, the ores encountered being copper-iron sulphide. A recent shipment of thirty-four tons ran 16% copper, $5 gold and six to eight ounces of silver. T. R. Jones of Salt Lake and Eastern parties are chiefly interested, A. B. Lewis being manager.

Frisco, Oct. 6.

BOX ELDER COUNTY.

(Special Correspondence).—The Vipont mine, operated by the Salt Lake Mining & Improvement Association, ships an occasional car or ore, the last shipment of twenty-three tons netting the Association $2000, the product being silver in form of native wire silver and chloride of silver, with some sulphides. It is claimed the property has a vein 7 feet in width. The property includes a small concentration mill which may be enlarged.

The Sierra Madre mining district, encompassing the section around Maguire's peak, 10 miles north of Ogden, is attracting special attention by reason of recent developments there. A company of Michigan men are developing the Uwanta group and the adjacent El Dorado group is being developed by a company of Californians. The altitude of Maguire's peak is 9125 feet, that of the Uwanta and El Dorado groups about 8800 feet. Each group is being developed by a tunnel which cuts into the same ore zone. The tunnels are about ¾ of a mile apart, both trending eastward. The Uwanta is being driven on a 20% incline, is in 200 feet, all of the distance in ore, with drifts in ore at 75 and 150-foot stations. The ore zone is claimed to be a sedimentary deposit, in contact form, lying between dolomite lime below and blue lime above. The ores comprise a steel galena, associated with iron sulphides and lead carbonates, the gangue being a siliceous material. The values are said to run from 20% to 80% lead, 4 to 12 ounces silver and 50 cents to $2 gold to the ton.

Ogden, Oct. 3.

IRON COUNTY.

(Special Correspondence).—The Ophir mine management has straightened and retimbered the old shaft and sunk it to 300 feet depth. A 50 H. P. gasoline engine operates the hoist and a belt-driven compressor. At present depth the ore is more of a sulphide than that obtained nearer the surface. The main object now is development, and the only ore shipped is the high grade, which is sacked.

The Johnny mill is operating on ore from the Johnny mine, and considerable development work is in progress in the Stateline district.

Stateline, Oct. 3.

JUAB COUNTY.

(Special Correspondence). — Manager McIntyre of the Mammoth mine states that the large ore chute, well opened on the 800 level, will doubtless soon be tapped on the 900 level. A connection has been made on the 1700 level with the winze from the 1600-foot level, the winze being on the ore chute.

The May Day is developed by a tunnel which crosscuts 700 feet to the ore body. From the point where the ledge is intersected, various drifts have been run which exploit the ore on that level; at the breast of the tunnel is a hoisting engine and a 200-foot shaft which sinks vertically on the zone, there being drifts from the shaft also at the 100-foot station. The station at 200 feet depth in the shaft was recently cut. The shaft cuts the ledge on the latter's dip between the 100 and 200-foot stations. The ores average about $5 to $50 gold, 30% to 53% lead, 10 to 22 ounces silver, the shipments of this grade running from 300 to 500 tons per month. It is estimated that there are about 10,000 tons of milling ore on dump and in mine which will, according to samples tested, average 13% lead, 9½ ounces silver and $5 gold to the ton. The building of a concentrator to handle ores of this grade is to be considered. The May Day seems to be on the same mineral zone as that on which the Godiva, Uncle Sam, Humbug, Yankee and La Reine are located.

The Yankee is opened by a 1300-foot tunnel which crosscuts the formation, a 40-foot upraise from which taps the ore body at 600 feet below the surface. Capt. T. Egan, manager of the property, states that a recent car of ore shipped ran 50.5% lead and 47.5 ounces silver, and that a still later shipment of two cars will average about the same. The Yankee is owned by Salt Lake and Eureka parties.

The directors of the Lower Mammoth M. Co. have levied an assessment of 5 cents per share on its stock issue to raise $7500 for the purpose of liquidating indebtedness and to open up some known ore shoots.

The Centennial–Eureka shipped thirty-one cars of ore for the week ending Oct. 6. There are 230 men on the payroll.

Shipments from Tintic district for the week ending Oct. 6 amounted to eighty-five cars of crude ore and eight cars of concentrates, bullion shipments amounting in value to $3500.

Eureka, Oct. 5.

(Special Correspondence).—The Queen of Sheba mine, under bond and lease to the Ibapah M. Co., composed largely of Chicago parties, is 6 miles east of the Nevada line, on the western slope of the Ibapah range, and at 9200 feet altitude. The location is 100 miles south of Toana station, on the S. P., and 175 miles from the Oregon Short Line Railroad at Stockton. The mine is opened by tunnels and winzes, the ore being partly free-milling gold. The mill on the property was destroyed by fire a few months ago, and now a new 10-stamp mill, with concentrators and cyanide tanks, is being erected. The mill will be run by water, through 1400 feet of pipe, at 425 feet pressure to a 6-foot wheel, producing 40 H. P. However, steam power is also being provided. There is an abundance of water in the Ibapah range.

Ibapah, Oct. 8.

PIUTE COUNTY.

(Special Correspondence).—The Dalton mine, in Bullion canyon, near Marysvale, is being further developed by a 1400-foot tunnel and an inclined shaft, which will be connected. Work in tunnel has gone 400 feet and that in shaft 250 feet. A small tonnage of ore is produced incidentally, which carries gold, silver and lead. O. R.

Young of Salt Lake City has the supervision of the work.

Marysvale, Oct. 8.

SALT LAKE COUNTY.

(Special Correspondence).—The American Smelting & Refining Co. has closed its gold sampling and refining rooms in Salt Lake City, which for several years handled most of the bullion and aurocyanides produced in this section; and this company invites its customers to send their base product to its refinery at Argentine, Kansas.

Salt Lake City, Oct. 2.

(Special Correspondence).—It is given out that the Dalton & Lark mine, near Bingham, is under bond and lease to Eastern parties, the time named being one year, during which time said parties are to develop the property thoroughly.

The Bingham Copper & Gold Co. has confined its mining operations to development work the past few months. Near Lehi Junction, however, this company's pyritic smelter is under construction and is under the management of W. H. Nutting.

Bingham Canyon, Oct. 2.

(Special Correspondence).—The concentrating mill of the Fortune M. & M. Co. is operating by electric power, transmitted from the Jordan Narrows plant, and is crushing and concentrating about forty tons of ore per day. Besides having a crusher and two sets of rolls, the mill is equipped with screens, four three-compartment jigs, two Wilfley tables and one Frue vanner. The ore thus far milled is a lead sulphide, carrying also silver values. The product is divided into four grades: That from the No. 1 jig compartment yielding about 45% lead; No. 2 compartment 30%, and No. 3 about 15% lead; the table product runs an average of 25% lead. The entire jig and table product is estimated to carry ten ounces silver to the ton. The highest jig product carries from 12% to 15% iron, the other grades running from 25% to 30%, which is allowed for by the smelters at the rate of 15 cents per unit. The ores carry a considerable quantity of silica, which is largely eliminated by the concentrators. The jig and table products also carry from 1% to 2% copper and small gold values. The Fortune Co. has a connection with the Dalton & Lark tramway line, over which its concentrates are carried to the railroad and supplies to the mine and mill. Elmer Hill is manager of mine and mill.

The new upper and lower terminals of the Highland Boy tramway line are being constructed. The upper is at the entrance to the No. 7 tunnel at the mine. The lower is at the railroad track in Bingham canyon, the line being 12,500 feet long. The carrying capacity of the line will be 500 tons per day. The Highland Boy smelter at Murray is also being enlarged to increase its capacity to 500 tons. The week's bullion product of the Highland Boy Co. is given out as being 120,000 pounds, consisting of copper, silver and gold, same being sent to the refinery at Perth Amboy.

Shipments from the Silver Shield mine at Bingham on the 6th inst. amounted to three cars crude ore and two cars concentrates. The crude ran forty-two ounces silver, 41% lead, 2.7% copper, $2.20 gold, the concentrates yielding twenty ounces silver, 27.4% lead, $2 gold and 2.7% copper.

Bingham, Oct. 4. WASCOTT.

(Special Correspondence). — The Red Wing output for some time has been running about four cars per month, wholly the product of lessees. But from now on the Red Wing Company will take hold, with the idea of furthering development and increasing production. The building of a new concentrator is among the projects to be considered. The ores here run high in lead carbonates and silver.

The York, next to the Highland Boy, is driving a series of drifts from the incline tunnel to get at its ore body, which carries 25% lead, 3% copper and 10 ounces silver. The width of ore is about 3 feet. Some shipments are being made. The York is largely in control of A. J. Orem & Son.

Bingham, Oct. 6.

TOOELE COUNTY.

(Special Correspondence).—An occasional car of silver-lead siliceous ore is shipped from the mine of the Stockton Con. M. & M. Co. The last shipment amounted to 31,033 pounds, which, after deducting freight and smelting charges, netted the company $628.72. The returns showed that the ore ran 56.1% lead, 42.45 ounces silver, 19.3% silica, 4.1% iron, 4.1% sulphur. The shipment of another car will be made in a few days.

Stockton, Oct. 2.

(Special Correspondence).—The Chloride Point mill, in charge of M. D. Stackpole, is cyaniding about forty tons of ore per day, the precipitates on the zinc shavings running about 80% pure silver, with a small percentage of gold. The silver is largely in form of a chloride, the ores running in value from twelve to eighteen ounces per ton of ore.

Mercur, Oct. 3.

(Special Correspondence).—At the Overland development work is in progress in the mine, while the 150-ton cyanide mill is being increased to 500 tons capacity.

Sunshine, Oct. 4.

(Special Correspondence).—The West Argent M. Co., has erected a concentrating mill, which, it is thought, will be operating by Nov. 1. The mine is equipped with crushers, rolls, screens and Wilfley tables. The ores carry silver and lead, and the mill will run fifty tons per day for the first few months. A. L. Jacobson is mine Supt. and Frank R. Ball manager.

Stockton, Oct. 5.

(Special Correspondence).—The Hercules mine is shipping regularly about eight cars per month of silver-lead ore, the last shipment running 58% lead and nineteen ounces silver per ton. The property is now in charge of H. E. Zerbe.

The Utah mine, in Deep Creek section, is shipping from fifty to seventy tons of ore per month, which runs about 40% lead and 200 ounces silver. The ores are carbonates.

(Special Correspondence).—The Honerine now has five boilers, having an aggregate of 350 H. P., and has pumping facilities for handling 750 gallons of water per minute, consisting of Cameron sinkers and a Jeanesville station pump. The boilers are at the tunnel entrance, and Supt. Raddatz states that they are to try the experiment of conveying steam through 3450 feet of pipes to the pumps — that is, through 3250 feet of tunnel and thence 200 feet down a shaft. This shaft sinks near the ore body; drifts will be run from shaft to the vein as soon as the shaft shall be sunk 40 feet deeper.

Stockton, Oct. 6.

(Special Correspondence). — The West Argent incline shaft is down 600 feet, the base of which is below water level. Water being pumped is sufficient to supply the boilers and for mill work. Various drifts are run at different levels. The incline follows the dip of the vein. Veins run in opposite directions, the richest ore being found at the points of intersection. The ore is a galena and carbonate of lead, with good silver values with the lead. The mill will doubtless be in operation in a few weeks.

The Hercules is being worked by the owners, which include T. H. Benton & H. E. Zerbe, the latter being in charge. The incline shaft is 380 feet depth, most of the ore coming from the surface down to the 200 level. As is characteristic of the camp the richest ore here is found at the junctions of the veins that run in opposite directions. The ores consist of a lead and iron carbonate, the principal values being silver and lead. Besides the high grade ore that is regulary shipped to the smelters there is in the mine a large tonnage that could be classed as milling ore.

The Silver Coin mine, in charge of Alex. Maze, has made occasional shipments. A shaft will now be sunk 200 feet, and from it a level will be run to the ore body that was opened through tunnels at a higher point. This will give a depth of 500 feet.

The Stockton G. M. & M. Co, owners of the Ben Harrison and others, has a bond and two-year lease on the property of the Lion Consolidated, which joins the former. The same lode runs through both groups and plans are being made to operate them through a new shaft which is being sunk at a point some distance down the hill below the old Lion shaft. At present it is down 200 feet, and levels will be run 300 feet to the Lion lode, cutting it 200 feet below the old workings. The workings of the Lion and Ben Harrison will be connected. In the future all shipments will be through the new shaft. A new boarding house is being built and a force of sixteen men is at work in the mine. H. D. Trenam is Supt.

The Bunker Hill is being worked under lease to J. C. Reynolds and associates, who have been doing considerable dead work, but have a small tonnage ready for shipment. The ores carry silver, lead and gold, with a small percentage of copper. They are now drifting from the west end of the lower level, 200 feet below the surface. The values run about 50% lead, twenty to twenty-five ounces silver and $10 to $12 gold. Here and there is found a rich streak of chalcopyrites. Mr. Reynolds is also developing the Rush Lake group of five claims, which he owns.

The Ada group is being developed by F. J. P. Pascoe and others. WASCOTT.

Stockton, Oct. 9.

WASHINGTON.

FERRY COUNTY.

The Bodie M. Co., Toroda creek, Alex De Witz Supt., will buy a three-drill compressor, ore cars, track, ventilating apparatus and patent the claim.

OKANOGAN COUNTY.

Near Loomis the Palmer mountain tunnel is in 3675 feet.

At the Golden Zone a 1000-foot tunnel has been started. The mill is in operation.

The Quickstep, formerly the Detroit-Windsor, 6 miles from Loomis, has resumed.

WHITMAN COUNTY.

The Chickasaw M. & S. Co. has incorporated to operate the Blue Bird in the Hoodoo district, 40 miles from Palouse City; general manager, W. J. Springer, resident at Spokane.

WYOMING.

CARBON COUNTY.

At the Ferris-Haggerty M. Co.'s property, Manager I. C. Miller has the new hoisting plant completed. An electric light plant and rope tramway are under consideration.

FOREIGN.

BRITISH COLUMBIA.

The second payment has been made on the Britannia group of copper mines, 28 miles from Vancouver, which are being purchased by the Valentine syndicate of London, England. The total amount now paid has been $10,000; the next payment, $50,000, is to be made Jan. 1st.

The Kenneth M. Co., operating the Tamarac mine, near Ymir, will build a tramway 6000 feet from the Tamarac mine to the tracks of the Nelson & Fort Sheppard Railway.

At Savonas, C. E. Low of the Cinnabar M. Co. has a deposit of cinnabar. A. J. Colquhoun says: "About three tons of high-grade ore, which I would estimate should average 20% to 30%, are on the dump and a fine showing in sight." If the ore averages 1% it is all right. The "20% to 30%" is a slight exaggeration.

At Slocan the Two Friends sent a consignment to Nelson for smelting. It sampled 160 ounces silver and 33% lead, the shipment realizing $100 to the ton.

P. Corcoran, representing Dan Burns and others of San Francisco, has bought the Harris group, on White Fish creek, in the St. Mary's country, for $125,000.

Paul Johnson of the Greenwood smelter says it will be in operation by Jan. 1, 1901. He says the bulk of Boundary ores can be smelted without fluxing, and cites the Grand Forks smelter, now treating 300 tons of ore a day in one furnace, without using a pound of either iron ore or lime rock as flux. Slag is not even used, and only 10% of coke. The matte turned out carries 38% of copper. Mr. Johnson says that Boundary ore should be treated at a cost of $3 per ton.

DUTCH GUIANA.

J. H. Abbott of Paramaribo tells Two Republics that in washing for gold he has occasionally found diamonds—small ones —in the tailings, the last washings. In diamond mining the largest stones lie farthest down. Years ago a Mr. Fennelly, who was interested in gold mining with him, washed a large diamond from a pan of gravel. "Negroes do the work. We pay them 50 cents a day. It costs about 16 cents a day to maintain them. They can do work that a white man could never do, and live. All the labor there is contracted through the Government. The Government becomes a partner to the agreement, and any negro running away knows that he must settle with the Government. In gold mining we pay 5% of our returns to the Government, and a rental equivalent to about 1¾ cents per acre per year.

"When I arrived at Paramaribo I noticed the amount of gold brought into town by black men—not native Indians, for they worship gold as a god, and will not use it for barter and exchange, but black bushmen, men descended from the African negro. I found them coming down the rivers in dugouts, with bottles filled with gold dust. I made an expedition inland to a native village called Wakabashee. The trip was by river and took eighteen days. There I met an Englishman, the agent of an English mining company, who took me through the claims his company was working. I found antiquated methods in vogue, and much consequent loss and expense. They were not using mercury in their sluices and fully 50% of the gold which entered passed through and was lost.

"There are two gold belts, each about 25 miles wide, running from the coast inland across French, Dutch and British Guiana. The French, being nearest the seashore, was mined first. Then came the Dutch and finally the English sections. It was in the process of working those parts of the belts which came in the English colony that the recent diamond finds were made. It was purely accidental."

KOREA.

Chemulpo dispatches report the murder of Mr. Bland, employed at an American mine, by twenty-five Koreans, from an adjoining mine.

MEXICO.

In Chihuahua, W. B. Gester, manager quicksilver properties at Saucillo, has a new quicksilver plant ready to charge. The retorts are arranged to treat the high grade ores; capacity four tons daily. The properties are 2 miles from the main line of the Mexican Central.

George Kislingbury, formerly of the De La Mar, has a bond on a silver and gold-bearing property in Oaxaca, and is now operating it with 400 Mexican miners, the output going to custom smelters.

THE KLONDIKE.

Assistant Gold Commissioner Bell at Dawson has empowered himself to put up at public auction everything in the shape of a mining claim or mining prospect not otherwise owned than by the Government, and if such property is not sold at the regular monthly auction day in November, which is the 2d of that month, it will all be open to location by duly accredited miners having regularly issued licenses. In this list will be included those claims and fractions on Bonanza, El Dorado and Hunker creeks which were advertised some months ago to be sold at auction, but which were withdrawn just before the day of sale. It is thought that on the various main creeks the number of new claims will be from 5000 to 6000.

Personal.

J. M. CALLOW of Salt Lake City is in Montana.

D. G. LINARES has returned from Mexico to Victor, Colo.

N. P. DOOLEY has returned from Paris to De La Mar, Nev.

F. H. HARVEY of Galt, Cal., has returned from San Francisco.

HORACE F. BROWN is installing mining machinery at Lillooet, B. C.

JNO. H. IVEY is now local Supt. Superior G. M. Co., Boulder, Colo.

W. S. KEYES has returned to San Francisco from the City of Mexico.

E. D. TREADWELL has returned from San Francisco to Jerome, Ariz.

T. H. OXNAM has returned from France and is in Los Angeles, Cal., this week.

J. R. PHILLIPS, Supt. Amador Queen No. 2, Cal., mine, has returned from the East.

JNO. DERN of the Con. Mercur, Utah, Co., has returned to Salt Lake City from Europe.

A. SHARP of Rossland, B. C., is examining properties in the Pierre Lake, Wash., district.

E. H. TRERISE of the Madisonian, Mont., mine, is getting cyanide pointers at Mercur, Utah.

JAS. COLQUHOUN, manager Arizona Copper Co., has returned from Scotland to Clifton, Ariz.

C. A. MOLSON, consulting engineer of the Tom Boy mine of Telluride, Colo., is in Salt Lake City.

C. D. AKERS has been re-elected superintendent Hidden Treasure Grand M. Co., Placer county, Cal.

F. D. BAKER has completed the designs for the Eilers plant at Pueblo, Colo., and has returned to Denver.

W. B. MORSE succeeds M. J. Connor as general manager Canadian-American M. Co., Gribble Island, B. C.

F. W. WEGNER, Supt. Hoosier M. Co. Dewey, Idaho, will remain in Spokane, Wash., till March 1, 1901.

CHAS. LAUGHLIN has resigned superintendency of the Sumpter, Or., smelter, and goes to Mexico Dec. 1.

H. Z. OSBORNE has returned to Los Angeles from a visit to his mining properties in Trinity county, Cal.

W. E. DUNCAN has returned to Oroville, Cal., from inspection of his mining property in Plumas county.

J. C. WEATHERS, a mining engineer from Glasgow, Scotland, is expected in Tombstone, Ariz., on the 25th inst.

M. J. HELLER examined the Ferguson mine, Mariposa county, Cal., last week in the interest of the board of directors.

G. E. BAILEY, who is aiding in the development of the mineral resources of Trinity Co., Cal., is in San Francisco.

THOS. ELLIS, manager Southern Cross G. M. Co., has gone from Alameda, Cal., to his company's property in Oaxaca, Mexico.

D. B. HUNTLEY, general manager De Lamar mines, Idaho, is in Yankee Fork district, Idaho, examining mining property.

H. H. NICHOLSON of Denver, Colo., has returned from the Fra Cristobal mountains, New Mexico, where he had been examining a mine for the American Mining Investment Co. He is now investigating a group of copper prospects in Boulder county, Colo.

N. H. DARTON, of the U. S. Geological Survey, is at Custer, South Dakota, making an examination of the Grand Junction mine.

EDW. BIND, M. E., has returned to San Francisco from Coahuila, Mexico, after examining a coal basin for the Government.

WM. MELZCER of the Melzcer M. Co., Horcasitas, Sonora, Mexico, has given $5000 to the State of Sonora for public instruction.

O. J. SALISBURY of Salt Lake City, Utah, is looking after his mining interests in Deadwood, S. D. He is a Homestake stockholder.

R. C. GEMMELL of Salt Lake City, Utah, recently went into central California to make some mine examinations for English parties.

S. W. TRAYLOR, representing the Colorado Iron Works Co., Denver, Colorado, was in San Francisco this week and is now traversing Idaho.

VICTOR M. CLEMENT has returned to Salt Lake City from Mexico, after having examined some mines in the latter section for foreign parties.

U. G. REINARD, late of the Reward mine, Citrus, Inyo county, Cal., has gone to Quitovae, Mexico, to take charge of the mill work at the Pinton mines.

H. P. RICHMOND, manager of the mining machinery department of the Salt Lake Hardware Co., returned to Salt Lake City from Butte, Mont., on the 6th inst.

W. H. STORMS succeeds S. R. Porter as Supt. Balliol mines, Amador county, Cal. Mr. Porter will hereafter devote all his time to the Mutual mine superintending.

A. W. GEIST, formerly of Salt Lake City, is developing a mine at Ameca, Mexico, and building an electric railway 60 miles to the coast over which to transport the ores.

W. J. CASEY, president Union Gas Engine Co., San Francisco, has gone East on a business trip. He will stop over at Denver to attend the annual meeting of the Western Gas Association.

J. H. HAMMOND is in San Francisco, the first time for several years. Regarding the Camp Bird, Colorado, property, action has been delayed. He expects to be in California till November.

J. H. MUNNIK, late acting State mining engineer of the Transvaal, collected pianos in Johannesburg, mainly from the houses of mining officials, to prevent them being destroyed, by the efforts of the musical members of the German mine police, and sold about thirty in Pretoria at an average of $25 each.

Obituary.

WITH more than ordinary regret is chronicled the death of Alan Ward of Alameda, Cal., in Kiachta, Siberia, in the 23rd year of his age. He was the son of Capt. A. H. Ward, and went to Siberia in the early part of this year in the employ of an American mining company which had secured some mining concessions from the Russian Government. The caving of a gravel drift occasioned injuries which resulted in his death.

Books Received.

"Street Pavements and Paving Materials; Methods and Materials of Construction of City Pavements;" 8vo, 532 pages, 60 cuts, practical and of timely value to any one in any way interested in the subject; published by Jno. Wiley & Sons, N. Y. City. Price $4. Written by Geo. W. Tillson, C. E.

"Elements of Mineralogy, Crystallography, and Blowpipe Analysis," Alfred J. Moses and C. L. Parsons, a new and enlarged edition of this work, before favorably noticed. Parts I and IV are rewritten; parts II and III extensively revised. There are 664 figures and 413 pages of text. Published by the D. Van Nostrand Co., New York City. Price $2.00.

Catalogues Received.

The Diamond Drill and its Work is the title of a catalogue put out by the American Diamond Rock Drill Co., 120 Liberty street, New York City, describing the diamond drill of to-day, how it is made, what it is for, how it is used, what it costs, with illustrations of different makes and shapes, and testimonials from users concerning those drills.

A handsome trade treatise on Marsh Steam Pumps is issued by the American Steam Pump Co. The pamphlet shows evidence of great care in preparation and every detail is carefully worked out. The tables are full and accurate, the description studiously simple but exact, and the illustrations and typographical arrangement of high grade throughout. The Simonds Saw Co., 33 Market street, San Francisco, are Pacific coast agents for these steam pumps.

List of U. S. Patents for Pacific Coast Inventors.

REPORTED BY DEWEY, STRONG & CO., PIONEER PATENT SOLICITORS FOR PACIFIC COAST.

FOR WEEK ENDING OCTOBER 2, 1900.

658,935.—VENTILATOR—P. Abrahamson, S. F.
658,825.—POWER MECHANISM—J. Bean, Los Gatos, Cal.
658,753.—RAIL BOND—G. B. Blanchard, Seattle, Wash.
659,125.—REAMER—C. Boentgen, Astoria, Or.
659.134.—VALVE—Churchouse & Benedict, Tacoma, Wash.
659,135.—FINGER STAMP—C. W. T. Davies, S. F.
659,140.—PAPER VENDER—G. Easterbee, Portland, Or.
658,774.—PEELING KNIFE—G. E. Grier, Pomona, Cal.
659,171.—PLAITING MACHINE—T. F. Hagerty, S. F.
659,073.—BOOT HEEL—C. E. Keller, Los Angeles, Cal.
659,173.—ROASTING MACHINE—R. W. Koch, Fruitvale, Cal.
658,921.—ORE SEPARATOR—J. B. Moore, Oakland, Cal.
659,155.—INKSTAND—G. H. Nehf, Tacoma, Wash.
659,092.—GRINDING MACHINE—F. A. Nystrom, Cosmopolis, Wash.
659,103.—SAW—R. Rockwell, Oracle, Ariz.
658,962.—PIPE WRENCH—T. E. Ryan, S. F.
658,807.—ORE SIZER—Seymour & Morey, Placerville, Cal.
658,872.—CAMERA—H. E. S. Singleton, S. F.
659,109.—LIQUID DISTRIBUTOR—C. P. Smith, Los Angeles, Cal.
658,874.—TIRE VALVE—J. A. Spencer, Los Angeles, Cal.
658,879.—WHEEL—S. Sweeney, Los Angeles, Cal.
33,300.—DESIGN—J. Cort, Seattle, Wash.
33,288.—DESIGN—F. E. Libenow, Spokane, Wash.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

WEAR ADJUSTING NUT FOR VEHICLE AXLES.—No. 658,500. Sept. 25, 1900. W. H. Holliway, Oakdale, Cal. The wear between the boxes and axles of vehicles soon makes the wheels loose upon the axles, and it is necessary to provide some form of adjustment by which this wear can be compensated for. This invention is designed for that purpose. It consists of a nut having a screw-threaded interior to fit the end of the shaft or axle, an exterior set or shoulder for a washer which fits against the end of the axle-box, and a chamber intermediate between the seat and the screw threads of such diameter as to receive the end of the axle. This interior chamber is fitted with a coil or other washer against which the shouldered end of the axle abuts when the nut is screwed into place. By removing portions of this washer from time to time, the nut will turn farther upon the axle and take up any wear between it and the axle-box or like part.

METALLIC LATHING AND FIREPROOF CONSTRUCTION FOR BUILDINGS.—No. 658,497. Sept. 25, 1900. M. Carrick, San Francisco, Cal. This invention relates to lathing and finishing for buildings of that class known as "metallic and fireproof finish." The object of this invention is to provide for the construction of complete walls, ceilings and partitions in which spaces are provided for deadening sounds, means for protecting the plaster, making the construction vermin-proof, means for providing air and ventilating spaces and passages through which conducting pipes or wires may be carried. It comprises essentially the parallel floor beams, with intermediate transverse beams, strips above the upper edges of the floor beams, and a body of plastic material filling the space and supporting the floor superstructure. The lower surfaces are arched and formed by metallic lathing, and a suitable plaster or other coating to complete the ceiling finish. Suitable openings are made through the metallic portions of the structure to allow the plastic material to pass through and unite.

HORIZONTAL EARTH DRILL.—No. 658,495. Sept. 25, 1900. H. E. Williams, San Jose, Cal. This device is designed to drill horizontally through the earth. It is especially useful for making connections between water and gas mains and like conductors which are laid in the street, and the buildings or points at the sides which require surface connections, and is designed to enable such connections to be made without disturbing the asphalt or other pavement with which the surface of the street may be covered. It consists of a frame adapted to be set in the line of the hole which is be drilled, a horizontal journal shaft carrying the boring tool at the front end, mechanism by which it is rotated and means for clearing the hole as it is bored, together with means for constantly advancing the boring tool until it reaches its destination.

DOOR OR WINDOW VENTILATOR.—No. 658,935. Oct. 2, 1900. Peter Abrahamson, San Francisco, Cal. This invention relates to the class of ventilators for window sashes, transoms, doors, and other similar communications between apartments and the outer air. It consists of a frame fixed in the ventilating opening having an outer fixed plate and screen continuation. A supplemental frame is fitted and hinged to the main frame and has a latch by which it may be opened and closed with relation thereto, said supplemental frame having a plate and screen continuation in reverse position to the first named plate whereby a tortuous passage is formed from the outside to the inside of the apartment. A slidable frame moves in guides upon the hinged supplemental frame, with direction pulleys at the top of said frame and cords connecting with the slidable frame pass over the direction pulleys to a point within reach of the operator. These cords pass through tubes or channels, and may be secured to holding devices when the slide has been moved to close the passage through the screen.

Latest Market Reports.

SAN FRANCISCO, Oct. 11, 1900.

SILVER—Per oz., Troy: London, 29⅝d (standard ounce, 925 fine); New York, bar silver, 63⅞c (1000 fine); San Francisco, 63¾c; Mexican dollars, 51c.

In an editorial on the rise of silver Bradstreets in the current issue thinks there is no longer any evidence of American speculative interest in silver. Handled as the bulk of the product of American mines and smelters now is, by combinations more or less allied in interest, there is practically no opportunity for speculation in silver. At the same time it may be doubted if the present method by which such a large proportion of the white metal produced in this country is put upon the market really makes much difference in the commercial prices, owing to the fact that the activity which prevails in our copper producing industries and in other sources from which silver is produced creates a constant supply and prevents any very marked holding back of the current stock of the metal for the purpose of affecting quotations. It may furthermore be noted that the presence of the silver coinage issue as one of the elements in the present political campaign in the United States can hardly be looked on as having had any bearing upon the action of the silver market either in New York or London. The chances of an administration in the United States favorable to a return on the part of our Government to a free silver coinage policy have hardly been considered in the current discussion by the European financial press of the tendencies of the silver market or been effective in connection with the recent disposition it has shown to become stronger and to advance.

One of the chief influences governing the silver market has been the demand for China created by the military operations and the suspension of the import trade of that country. At the same time, the leading authorities on the subject give the first place to the demand of the Indian government, and it would also seem that the British financial authorities have bought more or less silver for subsidiary coinage in connection with the large expenditures occasioned by the war in South Africa. In fact, this South African demand has been described as furnishing the occasion for no small proportion of the strength of the London silver market during the last month or so. It is to India, however, that most of the recent buying of silver is attributed. The government of that country has found itself confronted with a real scarcity of rupees for circulating purposes. It must not be supposed that the change in the currency policy of India in recent years has had any effect on the habits of the native population of England's eastern dependency. On the contrary, the Hindoos have gone on melting down rupees for the purpose of personal ornamentation, and also have continued to hoard the silver coinage in preference to any other form of money or visible wealth. This has resulted in a diminution of the supply of actual money, and has forced the Indian government to meet it by large purchases of bar silver to be coined into rupees and put in circulation. The Government and the exchange banks have both been buyers in the London market, some of the recent heavy purchasing orders being openly attributed to the Indian Council for use by the mints. At the same time, the more satisfactory crop prospects and the better financial position of the population of India have tended to create a renewed demand for silver bars, of which a considerable quantity have been exported from London to the East. According to the figures, which are accepted as official, the total shipments of silver from the British capital to the East up to the beginning of October have this year attained a value of over £6,000,000, as compared with only £4,000,000 in the corresponding nine months of last year. Allowing for the increased Chinese demand, these figures point to a decidedly better absorption of silver by India.

COPPER.—New York: Lake, 1 to 3 casks, $17.00 cash; carload lots, 16.75; Electrolytic, 1 to 3 casks, 16.87½; carload lots, 16.62½; Casting, 1 to 3 casks, 16.75; carload lots, 16.62½. San Francisco: 18. Mill copper plates, 20c; bars, 22@23c.

LEAD.—New York, $4.35; Salt Lake City, $4.25; St. Louis, $4.30; San Francisco $5.00, carload lots; 5½c 1000 to 4000 lbs.; pipe 6¾, sheet 7½, bar 6c; pig, $4.70 @5.10. London, £18=3.91c per ℔.

SPELTER.—New York, $4.10; St. Louis, $3.95; San Francisco, ton lots, 5½c; 100-lb lots, 5¾c.

ANTIMONY.—New York, Cookson's, 10½c; Hallett's, 9½c; San Francisco, 1000-lb lots, 12c; 300 to 500 lbs., 13@14c; 100-lb lots, 15@18c.

IRON.—Pittsburg, Bessemer pig, $13.75; gray forge, $13.25; San Francisco, bar, per lb., 2.50c in small quantities.

STEEL.—Bessemer billets, Pittsburg, $17.00; sheet bars, $21.75; San Francisco, bar, 7c to 12c per lb.

TIN.—New York, pig, $29.50; San Francisco, ton lots, 31c; 1000 ℔s., 31¼c; 500 ℔s., 31½c; less, 32c; bar tin, ⅌ ℔, 34½c.

QUICKSILVER.—New York, $51.00; large lots: London, £9 2s 6d; San Francisco, local, $48.50 ⅌ flask of 76½ ℔s.; Export, $45.

NICKEL.—New York, 50@60c ⅌ ℔.

MAGNESIUM.—New York, $3.00 ⅌ ℔.; San Francisco, $4.00.

ZINC.—San Francisco, 5¼c; slab, 6c; bar, 7¾c.

SOLDER.—Half-and-half, 100-℔. lots, 19½c; San Francisco, Plumbers', 100-℔. lots, 16.40c.

BABBITT METAL.—San Francisco, No. 1, 10c.

ASSAY LITHARGE.—San Francisco, 10c ⅌ ℔, small lots.

BISMUTH.—New York, ⅌ ℔., $1.60 50-℔ lots; San Francisco, $2.50 to $2.75 ℔ lots.

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 30c to 35c.

PHOSPHORUS.—F. o. b. New York 50@60c ⅌ ℔.

TUNGSTEN.—New York, ⅌ ℔., 95c; San Francisco, $1.15.

FERRO-TUNGSTEN.—New York, 37%, 35c; San Francisco, 65c (60%).

FERRO-MANGANESE.—Pittsburg, 80%, domestic, $85, large lots.

PLATINUM.—San Francisco, crude, $17 ⅌ oz.; New York, $18.20 per Troy oz.

POWDER.—F. o. b. San Francisco: No. 1. 70% nitro-glycerine, per ℔., in carload lots, 15¼c; less than one ton, 17¼c. No. 1*, 60%, carload lots, 13¼c; less than one ton, 15½c. No. 1** 50%, carload lots, 11¾c; less than one ton, 13¾c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9½c; less than one ton, 11½c. No. 2** 30% carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9, in lots not less than 1000.

FUSE.—Triple tape, $3.60 per 1000 feet; double tape, $3.00; single tape, $2.65; Hemp, $2.10; Cement No. 2, $3.00; Cement No. 1, $2.65, in lots of 3000 feet and up.

CANDLES.—Granite 6s, 16 oz., 40s., 11¾c ⅌ set; 14 oz., 40s., 10½c.

CHEMICALS.—Cyanide of potassium, 98%-99%, jobbing, 32½@33½c ⅌ ℔.; carloads, 30@31c; in 10-℔. tins, 40c; sulphuric acid, 66% B, 2c ⅌ ℔.; soda ash, $1.60 ⅌ 100 ℔s. 58%; hyposulphite of soda, 2¾@3c ⅌ ℔.; blue vitriol, 5½@6c ⅌ ℔.; borax, concentrated, 7@8c ⅌ ℔.; chlorate of potash, 12@13c; roll sulphur, 6c; alum, $1.90@2.00; flour sulphur, French, 2¼@2½c; California refined, 1¾@2c; nitric acid, in carboys, 8c ⅌ ℔.; caustic soda, in drums, 3@4c ⅌ ℔.; Cal. s. soda, bbls., $1.00; sks, 95c ⅌ 100 ℔s.; chloride of lime, spot,

$2.50@2.60; nitrate of potash, in kegs, 8c; caustic potash, 10c in 40-lb. tins.

OILS.—Linseed, pure, boiled, bbl., 75c; cs., 80c; raw, bbl., 73c; cs., 78c. Deodorized Stove Gasoline, bulk, 15c; do., cs., 21c; 86° Gasoline, bulk, 21c; do., cs., 27c; 63° Naphtha or Benzine, deodorized, in bulk, per gal., 14c; do., in cs., 20c; Lard Oil, Extra Winter Strained, bbl., 70c; cs., 75c; No. 1 bbl., 50c; cs., 55c; Neatsfoot Oil, coopers' bbls., 60c; extra bbls., 65c; cs., 60c; No. 1 bbl., 52½c; cs., 57½c.

COAL. — San Francisco, coast, yard prices: Wellington, $9; Seattle, $7.00; Coos Bay, $5.50; Southfield, $9.00. Cargo lots, Eastern and foreign: Wallsend, $8.00; Brymbo, $7.50; Pennsylvania, hd., $14.00; Scotch, $8; Cumberland, $12; Cannel, $9.50; Welsh Anthracite, $12.00; Rock Springs, $8.50; Colorado Anthracite, $14.50. Coke, $16 per ton in bulk; $18 in sacks.

San Francisco Stock Board Sales.

SAN FRANCISCO, Oct. 11, 1900.

200 Andes	.09c
900 Belcher	.19c
300 B. & B	.36c
200 Caledonia	.41c
200	.40c
500 Challenge	.21c
100 Chollar	.22c
100	.23c
300 C. C. & V	$1 30
200	$1 25
100 Confidence	.79c
200 Crown P't	.13c
500 G. & C	.76c
250 H. & N	.29c
700 Mexican	.36c
100	37c
500	.35c
500 Ophir	.78c
210	.80c
60	.76c
800 Overman	.10c
100 Potosi	.21c
1100 Savage	.26c
1000 Sierra Nev	.36c
700 Union Con	.23c
600 Y Jacket	.25c

Recently Declared Mining Dividends.

Silver King, Utah, $75,000.........Oct. 15
Mary McKinney G. M. Co., Colo., 3 cents per share, $30,000........Oct. 10
Empire State M. & D. Co., Idaho, 3% on capital stock.............Oct. 15
Montana Coal & Coke Co., Montana, 30 cents per share.........Nov. 1
Portland G. M. Co., Colorado, 6 cents per share, $180,000........Oct. 15
Vindicator G. M. Co., Colorado, 5 cents per share, $55,000..........Oct. 15

SITUATIONS WANTED.

SITUATION WANTED BY MILLMAN. Have had 20 years of practical experience. Understands thoroughly pan or battery amalgamation, concentration, belts and machinery. Able to take charge of a mill or any job in a mill anywhere. Best of recommendations. Address Box 4. Virginia City, Nevada.

GRADUATE MINING ENGINEER, five years field work, surface and underground, familiar with cyaniding, surveying and draughting, desires position after Nov. 1st as Assayer and Chemist or Ass't Supt. A1 references as to ability and character. Salary small object; opportunity to prove ability considered more important. Address B. F., care this office.

WANTED.—SITUATION BY A MAN OF EXperience who is competent to take charge of a gold mine. Understands assaying, surveying, and has business qualifications. Best of references as to character and ability. Address K. C., this office.

SITUATION WANTED by a first-class miner with years of experience; up to date in timbering and working a mine; handles men with skill and economy; understands modern milling and concentrating; with business ability; best of references. Address Superintendent or Foreman. care this office.

MINING ENGINEER (technical training), twenty years' experience as surveyor, assayer, superintendent and manager of mines and mills; business qualifications; linguist; at present general manager mining and milling proposition in Mexico; desires to make a change on account of health; best references. Address S. O., Mining and Scientific Press.

WANTED SITUATION
AS MILLMAN, FOREMAN, OR ASSISTANT.
Have had eight years' experience with one of the largest mining companies in Idaho, in pan amalgamation, cyaniding and refining of bullion. Ability to do assaying. Refer to De Lamar Mining Co., De Lamar, Idaho. Address W. H., this office.

Quicksilver
—FOR SALE BY—
The Eureka Company,
OF SAN FRANCISCO.
ROOM 1, - - 320 SANSOME STREET, SAN FRANCISCO.

THE CALIFORNIA DEBRIS COMMISSION, HAVING received applications to mine by the hydraulic process from the Dewey Consolidated Gravel Mining Co., in the Homeward Bound, Evening Star and Morning Light Mines, near Iowa Hill, Placer Co., to deposit tailings in Indian Canyon; from Mary E. Ruth et als., in the Buckeye Mine, near North San Juan, Nevada Co., to deposit tailings in a worked-out pit; from the Ralston Divide Gold Mining Co., in the Pat Goggins and Blacksmith Flat Mines, near Virner, Placer Co., to deposit tailings in Long Canyon; from Nathan Gardiner, in the Sidney Placer Mine, near Igo, Shasta Co., to deposit tailings in Sidney Gulch; and from A. W. Whitney and C. Y. Hepler, in the Miocene Mine, near Crescent Mills, Plumas Co., to deposit tailings in Rush Creek, gives notice that a meeting will be held at Room 59, Flood Building, San Francisco, Cal., on October 15, 1900, at 1:30 P. M.

WE BUY very rich Ores, Dental Scraps, Tellurium Ores, Mill Wastes, Jewelers' Sweeps, Gold Retorts, Old Iron Retorts, Base Amalgam, Quicksilver, Amalgamated Plates, Gold and Silver, Old Slags.
A. M. DONALDSON & CO.,
ASSAYERS AND WASTE PRODUCT SMELTERS,
1661 Larimer St., Denver, Colo.
Donaldson's Assayers' Slag Hammer { 1 lb......$1.10 / 1 lb. 3 oz. $1.25 }

Quicksilver
For Sale in Lots to Suit.
REDINGTON & COMPANY, Wholesale Druggists, 23-25-27 Second Street, San Francisco.

WANTED.

WANTED.---A NEW OR SECOND-HAND 15 H. P. GASOLINE HOIST.
Keystone Con. Mining Co., Amador City, Cal.

WANTED.—METALLURGIST CAPABLE OF taking charge of 40-ton copper furnace using charcoal fuel, situated in Mexico. State experience and wages wanted; references. Address "Metallurgist," Mining and Scientific Press.

INFORMATION WANTED
regarding whereabouts of John R. Williams, about 70 years old. Last heard of as Supt. of a mine in Copper's Hill, Vermont, in 1866. Has an adopted son about 32 years old. Supposed to be placer mining in the West, possibly California. $25.00 reward at Deseret News Office, Salt Lake City, Utah.

WANTED.
Experienced Promoter and Stock Operators
to handle the sale of stock for an oil company. State previous experience.
For particulars, address
C. J. TALLON,
308 Market Street,........San Francisco, Cal.

Experienced Coal Miners
can secure steady employment either on contract or by day's work at the TESLA COAL MINES, Tesla, Alameda County, California. Good wages guaranteed, also good board. Good climate, and also good accommodations and houses for families.
For further particulars, please apply to the Superintendent at the Mines, or to the Company at 328 Montgomery St., San Francisco, Cal.

REFRACTORY ORES
WANTED.
1000 TONS or more which will assay $75.00 Gold per ton and over, delivered free of charge at San Francisco, Cal. Correspondence solicited.
C. J. TALLON,
308 MARKET STREET, SAN FRANCISCO, CAL.

FOR SALE.

For Sale or Bond---Very High Grade Copper Property Located in Arizona.
JOHN M. VRCHOTA, La Crosse, Wis.

A group of 12 Colorado high-grade gold mines are now offered for sale for the first time. Wide veins of rich, free-milling ore. Plenty of wood and water. Good roads, and near R. R. station. Title U. S. Patents. Capitalists or their special agents only need apply. Buyer and seller brought together for negotiations. Address E. J. FRASER (sole agent for owners), Room 522, Parrott Building. S. F., Cal.

FOR SALE.
Lease and Bond, Eighteen Months, Fasy Terms, Copper Property, New Mexico
High grade ore with good gold values. Accessible. Plenty wood and water. Strong vein. Three shafts. Will pay from start. Adjoins large producing mine. H. B. RUNKLE, El Paso, Texas

Hoist on Hand for
Immediate Shipment.
A first-class Steam Hoist, double 10x12 cylinders, drums 48″ dia. by 30″. For specifications, price, etc., address Mining and Scientific Press.

FOR SALE.
A JACOBS CONCENTRATOR, been used about four months.
Also a fine O. & S. ENGINE, 25 H. P.
25 H. P. BOILER, used about six months, in good order and condition
Also a 40 H. P. ENGINE, now running and can be seen in motion.
Address E. D. BAKER, YREKA, CAL.

FOR SALE,
Lease or Bond, 6 Months' Time.
80,000 acres of timber lands at La Tesca Municipality, Ahuacatlan, Tepic, with mineral deposits—gold, silver, zinc and land. Water power close to the mines. Address to
ELIAS GALINDO, Box 26, Tepic, Mexico.

FOR SALE.
FILTER PRESS.
Johnson, 24-chamber, acid proof, washing Filter Press, 24-in. square plates. Nearly new.
THE S. H. SUPPLY CO.
WRITE FOR CATALOGUE OF MINING MACHINERY AND SUPPLIES.
22nd and Larimer Sts., DENVER, COLO.

SPIRAL SAND PUMPS.
For Pumping Sand, Slimes, Tailings and Crushed Ores.
The Cheapest and Most Durable Pump on the Market. Manufactured by J. H. Frenier & Son.
Represented by M. S. HAUSER,
12 Front Street,............San Francisco, Cal.

CHAS. F. POTTER & CO.,
MINES AND STOCKS.
FISCAL AGENTS FOR THE
COPPER CROWN OF ARIZONA MINING CO.
425 First Ave. North,
MINNEAPOLIS, MINN.
References: Hennepin County Savings Bank, Bradstreet's Mercantile Agency, R. G. Dun & Co.

N. B.—Copper Crown of Arizona Mining Co. own a rich property near the Black Diamond, in the Dragoons, Cochise county, Arizona. We will be pleased to send "investors" full information as to ore and assays. A limited amount of $1 shares for sale at $50 per 1000, $500 per 10,000 shares.

THE ERICSSON SWEDISH
TELEPHONES
HAVE BEEN IN USE OVER 20 YEARS.
THEY ALWAYS TALK. GIVE THEM A CHANCE TO TALK TO YOU.
CATALOGUES FREE.
ERICSSON TELEPHONE CO.
20 WARREN ST. NEW YORK. N.Y.

THE FIRST RAINS
HAVE COME!
Paint your buildings ready for winter with
Buswell's Paints.
BEST FOR DURABILITY.
$1.25 and $1.50 per gallon.
LUBRICATING OILS.
COLOR CARD AND BOOKLET SENT FREE.
BUSWELL PAINT CO.,
902 Broadway, Oakland. 31 Market St., San Francisco

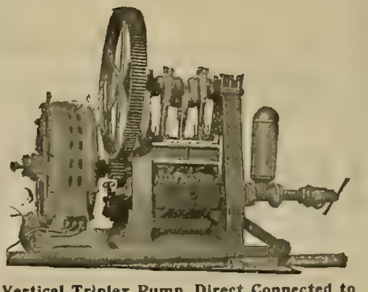
BENJAMIN T. LLOYD,
STOCKS, BONDS AND MINES.
Have immediate customers for well-developed Gold and Copper Properties.
P. O. Box 608, SALT LAKE CITY, UTAH.

MILL PLANS.
Cyanide, Concentration, Smelting, Sampling.
F. D. BAKER, Mech. Eng., DENVER.

WEST COAST OF MEXICO.
WÖHLER, BARTNING Suc's, Mazatlan (Sinaloa), Mex.
Bankers, Importers, Exporters and Commission Merchants.
Representatives and Agents of the principal Mining Companies in the State of Sinaloa and the dependencies of the Pacific coast in the States of Durango, Chihuahua, Sonora, Lower California and Jalisco.
ORE BUYERS AND EXPORTERS. - MINING SUPPLIES.

There are 500 Points to be Gained
from consulting our little "ENGINEERS' RED BOOK." In addition to answering that many problems of interest to the engineer, it tells you the good points of the
U. S. AUTOMATIC INJECTOR.
Let us mail you one of the books.
AMERICAN INJECTOR CO.,
Detroit, Mich., U. S. A.

General Electric Company's



Vertical Triplex Pump Direct Connected to GE Induction Motor.

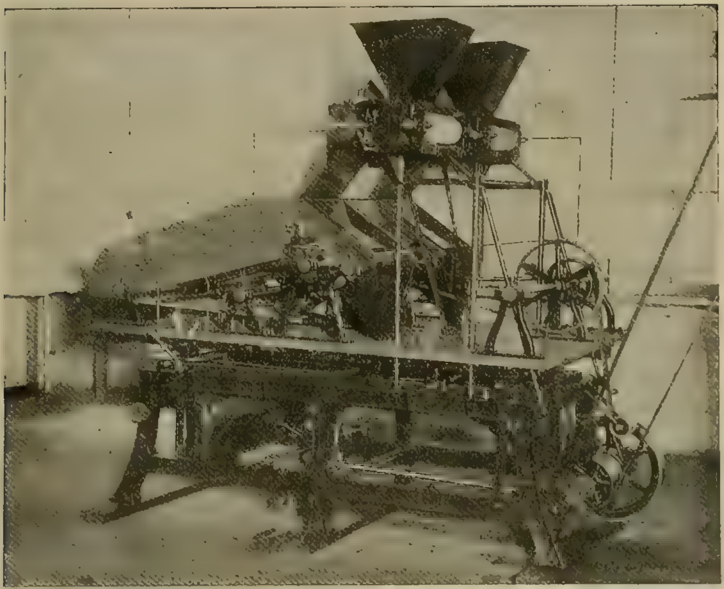
Electric Pumps
may be run automatically, may be controlled from any point in the mine, and will give the highest efficiency independent of the level to which the water is to be raised.
General Office: Schenectady, N. Y.
San Francisco Office: Claus Spreckels Bldg. Denver Office: Kittredge Building.

P. T. TAYLOR & CO.,
525 MISSION ST., SAN FRANCISCO, CAL.
GEAR WHEELS, GEAR CUTTING,
ALL DESCRIPTIONS UP TO 50 INCHES.
GEARS FOR AUTOMOBILES A SPECIALTY.
FULL INFORMATION BY MAIL.

CROWN GOLD MILLING CO.

Manufacturers of the "CROWN" CONCENTRATOR and CROWN ORE SIZER. A dry process of sizing and concentrating ore, sand or gravel. Designed to accord fully with the laws of specific gravity, and especially adapted to refractory ore or localities where there is no water.

The chief claims for the Crown Concentrator are that it occupies less floor space and has nearly four times the capacity of any wet concentrator; that it will concentrate ores containing base and refractory metals that ordinarily slime and carry off values; that it effects a saving of values far above the ordinary methods of concentration.



We have, now in operation, a complete plant for crushing, sizing and concentrating ores by the

Crown Dry Milling Process.

Mine owners desiring tests made can forward us, freight prepaid, not less than 1000 lbs. nor more than 4000 lbs. of sample, for which a charge of $20 will be made. (This amount includes assaying, etc.)

Ores for which this process is adapted and of which consignments are solicited are any concentratable ores, pulps, tailings, or sands, carrying sufficient values, whether they have heretofore been profitably concentrated or not.

* * * *

Office,..............................230 Post St.
Works,.................23 Stevenson St.
SAN FRANCISCO, CAL.

Finlayson {Patent Aerial} {WIRE ROPE} TRAMWAY

FOR TRANSPORTATION OF ORE, COAL, DIRT, TIMBER, ETC.

Perfect Grip Clip,
Absolutely Safe,
Loads Automatically,
Unloads Automatically,
Operated by One Man,
Cost of Maintenance Low,
Capacity Largest Obtainable.

ALSO SOLE MANUFACTURERS
PATENT FLATTENED STRAND
HERCULES WIRE ROPE
[TRADE MARK REGISTERED.]
—AND—
Wire Rope
OF EVERY DESCRIPTION.
MANILLA, SISAL, BLOCKS, ETC.

A. LESCHEN & SONS ROPE CO.,
Home Office: 920-922 North Main St., ST. LOUIS, MO. Branch Office: 47-49 South Canal St., CHICAGO, ILL.

The Copper King, Limited.

Pacific Coast Smelting and Refining Works.

Works:
Seal Bluff Landing,
Cal.

Mines:
Fresno County,
Cal.

Purchasers, Samplers and Smelters
of
Gold, Silver and Copper Ores, and Furnace Products.

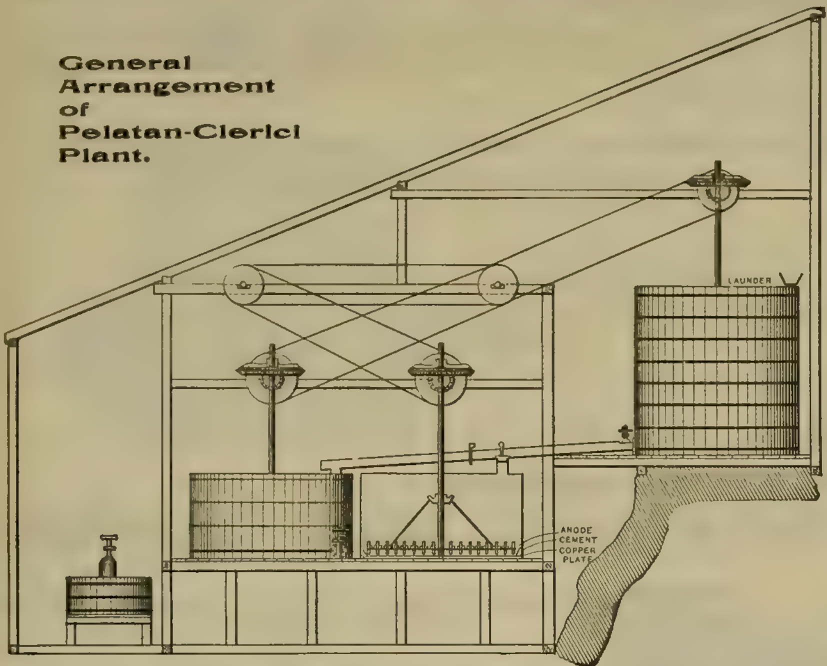
Offices:

222 Sansome St.,
San Francisco, California.

Basildon House, 7-11 Moorgate St.,
London, E. C., England.

THE "PELATAN-CLERICI" PROCESS

OF TREATING REFRACTORY ORES



General Arrangement of Pelatan-Clerici Plant.

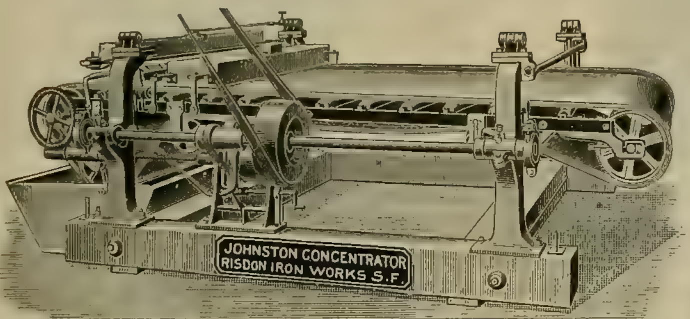
Saves the precious metals by the simplest, most economical and most efficient process known. No roasting or previous treatment, except ordinary crushing. Extraction complete in from 6 to 12 hours. Extracts equally well both fine refractory gold and coarse gold in the form of amalgam. Makes a greater saving of gold than any other process from raw material at less cost. The electric current and dissolving agent promptly dissolve the precious metals, both gold and silver. Samples of ore tested free of charge. Several mills saving over 90 per cent of values by bullion returns. Simplicity. Economy. Efficiency.

FOR PARTICULARS, WRITE TO

THE RISDON IRON WORKS,

SAN FRANCISCO, CAL.
AGENTS.

The JOHNSTON CONCENTRATOR.



DURABILITY, CAPACITY AND SIMPLICITY
: : ARE ITS ESSENTIAL POINTS. : :

SAVES MORE VERY FINE SULPHURETS
THAN ANY OTHER CONCENTRATOR MADE.

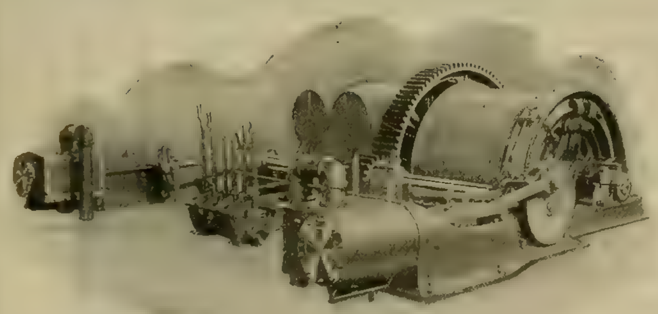
The Johnston Concentrator is slung with arms from above on an angle, giving it the oscillating motion that makes it a perfect machine. This undulating motion immediately settles the sulphurets, retaining all amalgam, leaving sulphurets very clean, one 6-ft. Johnston doing the work of two 4-ft. belt machines.

Send for Catalog No. 14.

Risdon Iron Works,

HOWARD AND BEALE STS., SAN FRANCISCO, CAL., U. S. A.

EXTRA HEAVY DOUBLE DRUM SECOND MOTION HOIST.



DO YOU REQUIRE A

HEAVY DUTY GEARED HOISTING ENGINE?

IF SO, WRITE TO US.

We have a large line of patterns for these plants and will build you one to meet your exact requirements and for ROUND OR FLAT ROPE.

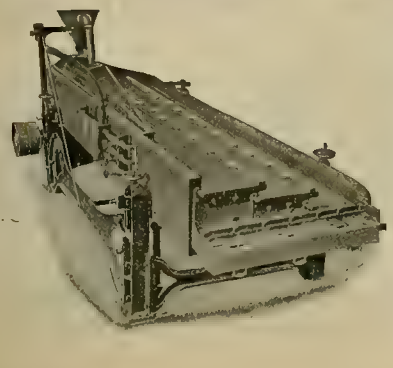
Our stock of Boilers, Pumps, Compressors, Drills and General Mine Supplies is unequaled in the United States.

YOUR CORRESPONDENCE IS SOLICITED.

The Hendrie & Bolthoff M'f'g & Supply Co.

No. 34. DENVER, - - - - - - COLORADO.

THE IMPROVED BARTLETT CONCENTRATING TABLE.



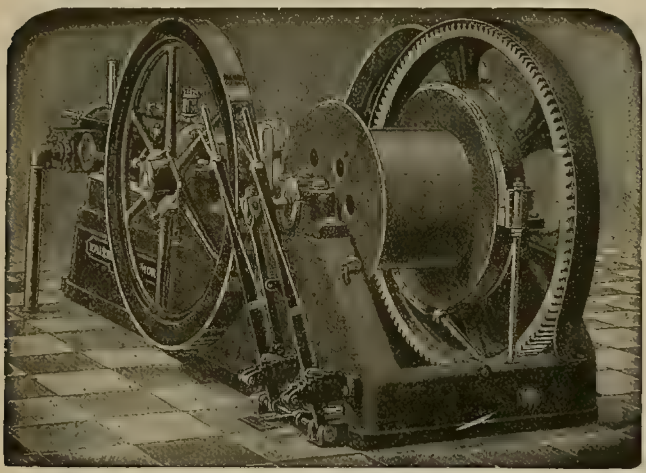
The BARTLETT CONCENTRATING TABLE has been GREATLY IMPROVED recently by the substitution of iron in place of wood wherever possible. It is now built with SOLID IRON TOP, PLANED TO A TRUE SURFACE AND POLISHED; all parts are made by template and EACH PART BEING INTERCHANGEABLE. As now constructed, the table has no special wearing parts and will last for many years. It has a CAPACITY OF FROM FIFTEEN TO FORTY-FIVE TONS IN TWENTY-FOUR HOURS, according to the class of ore worked. It is the only table in the world which will take the place of jigs and do away with all costly and complicated machinery.

It is Especially Designed for Separating Zinc from Lead.

Send for our illustrated catalogue, containing all the latest information on the concentration of ores.

THE COLORADO IRON WORKS CO.,

Established 1860. DENVER, COLO., U. S. A.



FAIRBANKS-MORSE GASOLINE-DISTILLATE GEARED HOISTER.

An efficient and reliable combination of a Fairbanks-Morse Gasoline-Distillate Engine on the same base with a Friction Hoist. Modern and up to date. We publish a special catalogue describing our Hoister which we gladly mail prospective purchasers.

FAIRBANKS-MORSE GASOLINE-DISTILLATE ENGINES.

ALL SIZES UP TO AND INCLUDING 54 HORSE POWER.
For Pumping, Milling, Lighting, Air Compressors, Etc.

FOR CATALOGUES AND FULL INFORMATION, ADDRESS

FAIRBANKS, MORSE & CO.,

310 MARKET ST., SAN FRANCISCO, CAL.
201 N. LOS ANGELES ST., LOS ANGELES, CAL.
FIRST AND STARK STS. PORTLAND, OGN.
1600 SEVENTEENTH ST., DENVER, COL.
FRANKLIN AND MONROE STS., CHICAGO, ILL.

THE MINE AND SMELTER SUPPLY CO.,

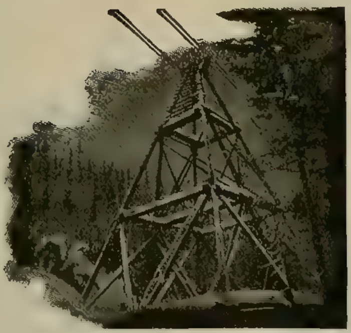
DENVER, - - COLORADO.

Mining and Milling Machinery and Supplies.

We beg to call your attention to

THE FINLAYSON PATENT WIRE ROPE TRAMWAY—

the latest and best system of double-rope automatic aerial tramway in the market.
If interested in the most economical system of transporting ores from mine to mill and to shipping stations, send for our special tramway catalogue.



We carry a complete stock of Machinery and Supplies for immediate delivery.

Send for our special catalogues on Mining Machinery, Milling Machinery, Wilfley Concentrators, Tramways, Power Transmission Machinery, Machine Tools, Etc.

THE MINE AND SMELTER SUPPLY CO.,....................Denver, Colorado
THE MINE AND SMELTER SUPPLY CO.,................Salt Lake City, Utah
THE MEXICO MINE AND SMELTER SUPPLY CO.,
No. 16 San Francisco St., City of Mexico.

BOILERS, ENGINES, STEAM HOISTERS, ELECTRIC HOISTERS, ROLLS, CRUSHERS, WILFLEY TABLES, CARS, CAGES, ORE BUCKETS, RAIL, PIPE, FITTINGS, BELTING, ETC., ETC.

GATES FINE CRUSHER.

The result of ten years' solid work. Success at last. What we wanted, and the public demanded, was a Gates Gyratory Rock and Ore Breaker (always adjustable and indestructible) so modified in design as to make one-half-inch product from three-inch sizes, rapidly and cheaply. The H. Fine Crusher will do this work. It takes the place of expensive big rolls and often prepares ore, without further crushing, fine enough for coarse concentration or cyaniding. In any event, it is the greatest and best intermediate machine between the coarse breaker and the pulverizer.

Ask for No. 1 Catalogue. :: **GATES IRON WORKS,** Dept. UU, 650 Elston Ave., CHICAGO.

CHAS. C. MOORE & CO.,

—ENGINEERS AND DEALERS IN—
MAGNOLIA ANTI-FRICTION METAL,
HAMILTON CORLISS ENGINES, N. Y. SAFETY AUTOMATIC ENGINES,
BABCOCK & WILCOX BOILERS, McINTOSH & SEYMOUR ENGINES,
GREEN'S ECONOMIZERS, HOPPES LIVE STEAM PURIFIERS,
WHEELER CONDENSERS, BARNARD-WHEELER COOLING TOWERS,
EDMISTON FEED WATER FILTERS, BUNDY STEAM TRAPS,
SNOW STEAM PUMPS, QUIMBY SCREW PUMPS,
GOUBERT FEED WATER HEATERS, STRATTON STEAM SEPARATORS,
SPENCER DAMPER REGULATORS, HYATT ROLLER BEARINGS.

Contracts for Installation of Power Plants, Any Capacity.

SEND FOR CATALOGUES AND FULL INFORMATION.

32 FIRST STREET, SAN FRANCISCO, CAL.

SEATTLE BRANCH..............313 FIRST AVE. SOUTH.
LOS ANGELES BRANCH.........103 SOUTH BROADWAY.

SMOOTH-ON CASTINGS.

TRADE MARK

An iron cement for repairing leaks or fractures in steam or hydraulic work. When hard it will withstand a red heat, steam, water or oil, and expands and contracts with heat and cold the same as iron, insuring a tight joint at all temperatures. Difficult flange connections can easily be made with Smooth-On, as it adapts itself to the flanged faces whether parallel or not. Connections are easily taken apart. Unequaled for boiler patching, and repairing blemishes in iron castings. Write for catalogue and prices. Sole proprietors and manufacturers: Smooth-On Mfg. Co., Jersey City, N. J., U. S. A.

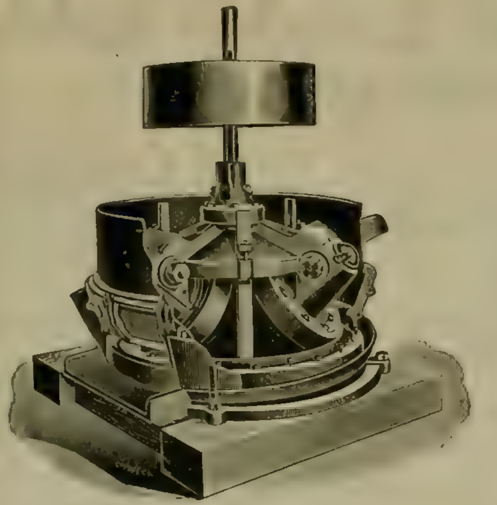
MESSRS. MADISON, BRUCE & SELLERS,
34-36 STEUART ST., SAN FRANCISCO, CAL.......................AGENTS FOR PACIFIC COAST.

"CRACK PROOF"

GOODYEAR RUBBER CO. GOLD SEAL 1872 TRADE MK.

PURE RUBBER BOOTS are the Cheapest because They are the Most Durable.
BEWARE OF IMITATIONS.
GOLD SEAL, BADGER AND PIONEER Belting, Packing and Hose.
Rubber Factory in San Francisco. Valves, Gaskets, Etc., Made to Order.

Goodyear Rubber Co.,
R. H. PEASE, President and Manager.
Nos. 573, 575, 577, 579 MARKET ST., San Francisco. Nos. 73, 75 FIRST ST., Portland, Or.



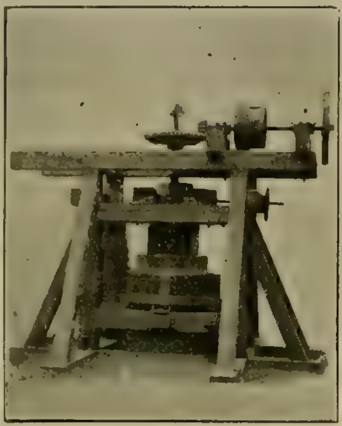
THE GRIFFIN
THREE ROLLER
ORE MILL.

The Griffin Three Roller Ore Mill is a simply constructed Mill, suitable for working all kinds of ores that require uniformly fine crushing by the wet process. This Mill is a modification of the well-known Chilian Mill, but the rollers run upon a crushing ring or die, which is inclined inwardly at an angle of about 30 degrees, the rollers themselves also being inclined to the central shaft of the Mill, thus utilizing the centrifugal force, as well as the weight of the rollers themselves as a crushing agent. The Griffin Three Roller Ore Mill is therefore a Mill of great strength, and has few wearing parts. We construct these Mills with extreme care, using only the best of raw materials, which are most carefully worked by men who are specialists as mill builders. We sell the Griffin Ore Mill on its determined merits, and will gladly supply full information regarding it to any one.

SEND FOR FREE ILLUSTRATED AND DESCRIPTIVE CATALOGUE TO

Bradley Pulverizer Co., Boston, Mass.

MYSTIC ROTARY QUARTZ CRUSHER.



WET MILL.

For cut of DRY MILL see last week's advertisement.

E. N. TAILLEUR. C. G. TAILLEUR. B. I. TURMAN.

Novelty Mining and Milling Machinery Company,
Telephone Main 1357. Office, 118 Montgomery St., San Francisco, Cal.

MINING AND MILLING MACHINERY OF ALL DESCRIPTIONS.

Mystic Rotary Quartz Crusher, Rock Breaker and Pulverizer, Combined.

THE ONLY MILL CAPABLE OF TAKING ORE DIRECT FROM THE MINE AND REDUCING IT TO PULP AT ONE OPERATION. USED FOR BOTH WET AND DRY PULVERIZING.

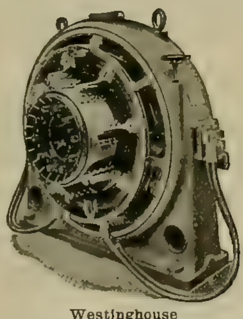
RELIABLE. DURABLE. ECONOMICAL.

STANDARD CONCENTRATOR, Best and Cheapest. CELLULAR ASBESTOS STEAM COVERING, Unequaled. OIL WELL TOOLS, from the most complete manufactory on the coast. CYANIDE TANKS, etc.

New Articles Being Added Continually. Send for Circular.

SOUTHERN CALIFORNIA OFFICE FOR MYSTIC ROTARY QUARTZ CRUSHER:
LLEWELLYN IRON WORKS, LOS ANGELES, CAL.

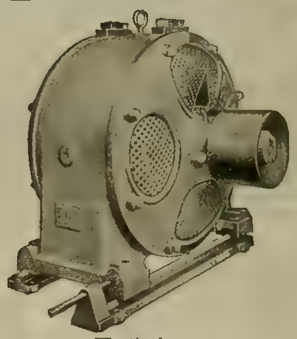
Westinghouse Electrical Apparatus
for the Operation of Mine Machinery.



Westinghouse Engine Type Generator.

The
Standard
of
Mechanical and Electrical
Efficiency.

Operating in the best equipped mines.



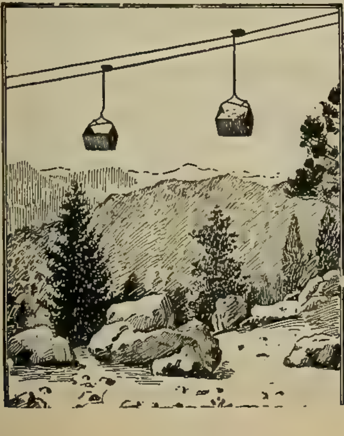
Westinghouse Induction Motor.

Westinghouse Electric
& Manufacturing Co.

All Principal Cities
in U. S. and Canada.

Pittsburg, Pa.

66m



TELL US WHERE YOU'RE AT.

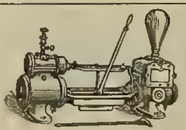
4 Cents Per Ton Per Mile

Is what it costs to transport Ore with our systems of Aerial Wire Rope Tramways.

We'd like to send you our book telling you all about it, but we can't do it unless you write us

WHERE YOU'RE AT.

THE J. H. MONTGOMERY MACHINERY CO.,
DENVER, COLO., U. S. A.



SOLE AGENCY
Worthington Steam Pumps and Water Meters.
Pumping Plants of any Capacity.

TATUM & BOWEN,
34-36 Fremont Street, San Francisco, Cal. 29-35 First Street, Portland, Or.

MACHINERY—ALL KINDS

STRICTLY C. P. ACIDS and C. P. AMMONIA

MANUFACTURED BY
The Western Chemical Co.,
DENVER, COLO.
For Laboratory Use and Fine Chemical Work
PURITY GUARANTEED.
Also COMMERCIAL ACIDS.

SELBY SMELTING AND LEAD CO.,

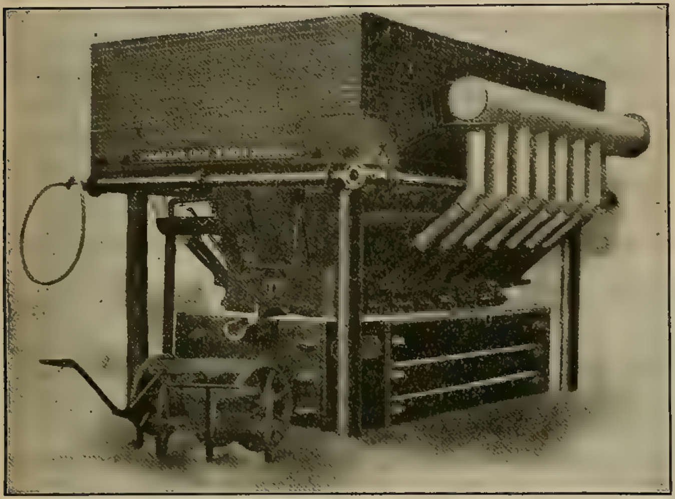
REFINERS OF GOLD AND SILVER BARS, GOLD DUST, ETC.

Buyers of Gold, Silver, Lead and Copper Ores, Gold Concentrates, Lead Bullion, Cyanide Product, Etc.

ORE AND BULLION ASSAYERS.

Works at VALLEJO JUNCTION, CAL. Office, 416 MONTGOMERY ST., SAN FRANCISCO, CAL.

THE COLORADO IRON WORKS COMPANY,



ENGINEERS AND MANUFACTURERS OF

Smelting Furnaces and Equipments.

In this advertisement we show cut of a recent Silver-Lead Cast Iron Water Jacket Furnace. Some metallurgists prefer jackets made of steel plates, and under some conditions plate copper is demanded, although more expensive. Most of the important smelters are using cast-iron jackets now, hence we give prominence to that material. There are absolutely no conditions in blast furnace practice but are as well subserved by properly proportioned cast-iron jackets, as by those of any other material.

Write for our catalogue, showing many different styles of smelters for the treatment of

GOLD, SILVER, LEAD, COPPER AND NICKEL ORES,

also the latest and best method for the economical use of jacket water (a saving of 80% to 90% guaranteed) by our patented

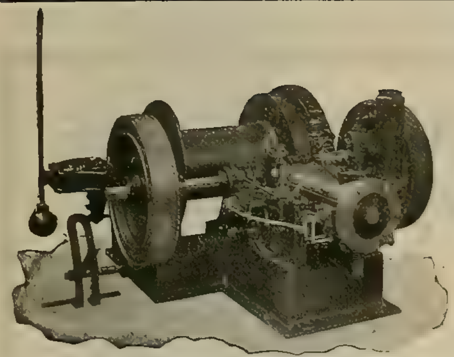
WATER VAPORIZING ATTACHMENT.

We design, manufacture and erect Mills for Concentration and Amalgamation, Milling, Chlorination and Cyanide Processes. In writing for information, give us the analysis or character of the ore to be treated, to enable us to intelligently arrive at the proper method.

Our very complete catalogue of CRUSHING MACHINERY will be sent on application.

THE COLORADO IRON WORKS COMPANY,

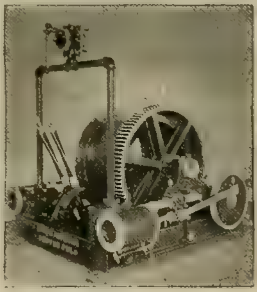
ESTABLISHED 1860. DENVER, COLORADO, U. S. A.



John Wigmore & Sons Co.,

MINING SUPPLIES,

117-123 S. Los Angeles St.,
LOS ANGELES, CAL.



The above cut illustrates my new and improved Hoister.

Hoisting Engines

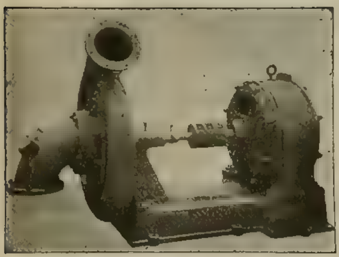
A SPECIALTY.

REVERSIBLE, LINK-MOTION, GEARED and FRICTION CLUTCH HOISTS carried in stock.

Special Machinery Built to Order.

GEO. G. JACKSON,

1724-34 Wynkoop St., DENVER, COLO.



CENTRIFUGAL PUMPS

— FOR —

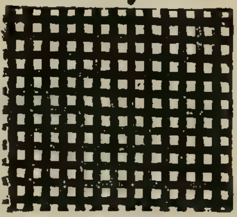
Mine Draining or Hydraulicking.

WE DESIGN PUMPS FOR ALL CONDITIONS.

WRITE FOR CATALOGUE.

BYRON JACKSON MACHINE WORKS, - SAN FRANCISCO, CAL.

"The Perfect"



DOUBLE CRIMPED STEEL MINING CLOTH

USE "THE PERFECT"

Double Crimped Mining Cloth,

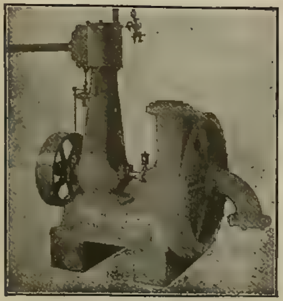
MANUFACTURED BY

THE LUDLOW-SAYLOR WIRE CO.,

Fourth and Elm Sts., ST. LOUIS, MO.

⁂

MINERS' STEEL CANDLESTICKS.



MODERN MINING MACHINERY.

QUARTZ MILLS of any capacity,

IN UNITS OF TWO AND FIVE STAMPS.

Acme Amalgamators for CAPE NOME

and other placer mining. Successfully applied to quartz mills in addition to or displacing plates.

SUCCESSFUL GRAVEL MILL RECENTLY IMPROVED.

Special Gold Dredging Pumps and Machinery. Concentrators, Feeders, Rock Breakers and Power Plants.

Largest manufacturers of Irrigation and Reclamation Pumps in the United States.

Catalogues: No. 20, Pumps; No. 22, Cape Nome; No. 25, Mining.

Krogh Manufacturing Co.,

9-17 STEVENSON STREET AND 134-136 MAIN STREET, - SAN FRANCISCO, CAL.

C. H. EVANS & CO.,

Machine Works,

183-185-187 FREMONT STREET,

Where, with Enlarged and Increased Facilities, they are better than ever prepared to do

First-Class Machine Work

Promptly, and at Reasonable Prices, and will continue the manufacture of

Thomson & Evans Steam Pumps,

Deep Well Pumps, Power Pumps, Etc.,

Also Marine Engines, Ship and Steamboat Work, Pipe Cutting, General Jobbing and Repairing.

DEWEY, STRONG & CO., Patent Solicitors, 330 Market St., San Francisco, Cal.

THE FULTON VARIABLE MOTION CONTINUOUS FLOW MINING PUMP.

Delivers a continuous stream with absolutely no water hammer so common with all other makes of pumps. Is particularly adapted to be driven by electric power, for the reason the resistance to motive power is almost uniform. I manufacture the **FULTON PUMP** in four sizes, ranging from 10 H. P. work to 50 H. P. work.

WRITE ME FULL PARTICULARS IN REGARD TO YOUR REQUIREMENTS.

The above cut is made from a photograph taken of a No. 3 FULTON PUMP at work on the 600 ft. level in the Tesla Mine at Tesla, Alameda Co., Cal.

Read what MR. O. NEWHOUSE, Consulting Engineer of the S. F. & S. J. Coal Co., has to say in regard to it.

OFFICE S. F. & S. J. COAL CO., TESLA, ALAMEDA CO., CAL., July 13, 1900.

Mr. A. T. Ames, Galt, Cal.—DEAR SIR: Replying to your favor of recent date, regarding the working of the Fulton Pump bought of you, will say: The pump is one of your No. 3 pumps, working in connection with a Fulton Double X, double plunger cylinder 5 in. diameter by 110 in. long; stroke of each plunger 2 ft. This pump is installed in our mine on the 600 ft. level, directly over our sump, and is forcing the water to the surface at one lift. We drive the pump with an electric motor, 30 H. P., direct connected to the pump with gear and pinion, and I am pleased to submit the following statement of duty:

Length of 6 in. column leading up incline to surface	805 ft.
Perpendicular head	640.88
Gauge pressure, actual	275 lbs.
" " theoretical	278.14 "
Barometer at pump	29 58 in.
" point of discharge	28.95 "
Temperature air	58 deg.
" water	76 "
Strokes double per minute, 2 ft	25
Discharge, measured by box center thereof, under 5 in. head, equal to 1⅛ cu. ft., equal to gallons per hour	4725
Diameter of pump cylinder	5 in.
Net area of pump cylinder after deducting area of piston	17.868 sq. in.
Efficiency of pump when working under above conditions	84 8) per ct.

To say that we are highly pleased with our pump expresses it very mildly.

Signed, O. NEWHOUSE, Consulting Engineer S. F. & S. J. Coal Co.

Manufactured and Sold by A. T. AMES, Galt, Cal.

THE

Pelton Water Wheel Company

Gives exclusive attention to the development and utilization of water powers by the most modern, economic and improved methods. An experience of more than fifteen years, involving both the theory and practice of hydraulic engineering as relates to power development in its widest range of application, is at the service of its customers.

Nine Thousand Wheels Now Running,

Averaging some 700,000 H. P.

ELECTRIC POWER TRANSMISSION.

Pelton wheels afford the most reliable and efficient power for such service and are running the majority of stations of this character in the United States, as well as most foreign countries. Highest efficiency and absolute regulation guaranteed under the most extreme variations of load.

The Pelton Water Wheel Company,

121 & 123 MAIN STREET, SAN FRANCISCO, CAL.

THE HUG WATER WHEEL

has a guaranteed **EFFICIENCY OF 86%**, as shown by Test Curves from Cornell University.

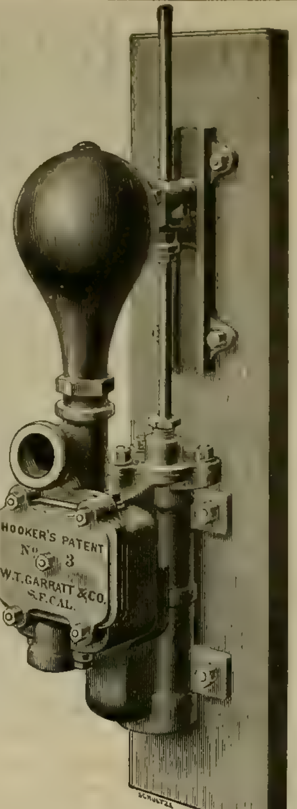
Most Economical Wheel on the Market.

No Loose Buckets Possible.

Manufactured by D. HUG,
Denver, Colo., U. S. A.

Dewey, Strong & Co., Patent Agents,

330 Market Street, San Francisco, Cal.



HOOKER'S PATENT
No. 3
W. T. GARRATT & CO.
S. F. CAL.

A GOOD MINING PUMP.

The Hooker Double Acting Pump.

Well Built, Simple, Durable, Efficient.

All Working Parts Easy of Access.

Duplicate Parts in Stock.

We furnish these pumps with suction pipes, hose and strainers complete. Estimates on application.

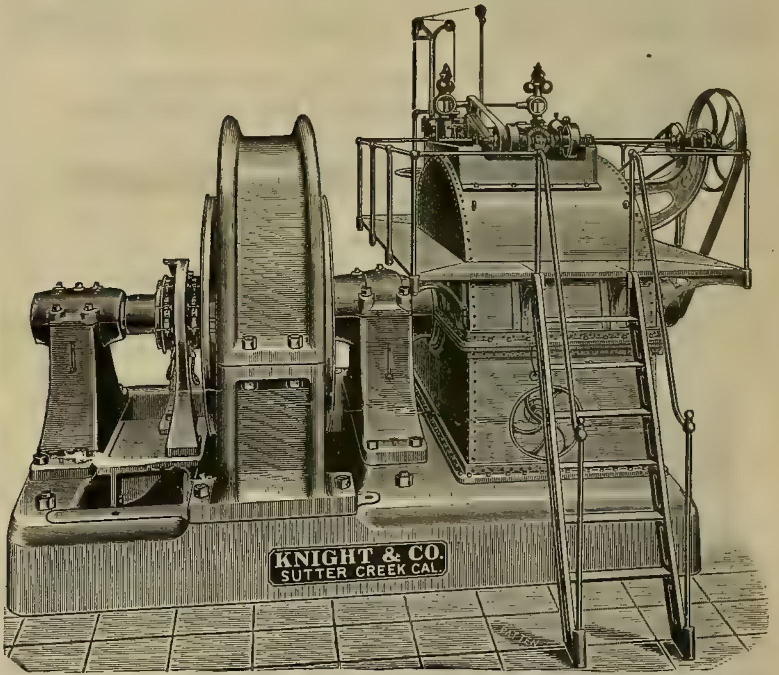
Can furnish up to number three with double brake for hand power.

Just the pump for a small mine. Larger sizes, larger capacities.

Send for our catalogue on pumps.

W. T. GARRATT & CO.,
Cor. Fremont and Natoma Sts.,
SAN FRANCISCO, CAL.

KNIGHT'S WATER WHEEL.



KNIGHT & CO.
SUTTER CREEK CAL.

The accompanying cut shows the general arrangement of **The Knight Water Wheel,** direc-coupled to a 750 kilowatt generator, with governor mounted on top of wheel casing.

These wheels are designed for **100 to 2500 H. P. Highest efficiency and regulation guaranteed.**

WHEELS FROM 6 TO 24 INCHES, ENCLOSED IN CAST-IRON CASING.

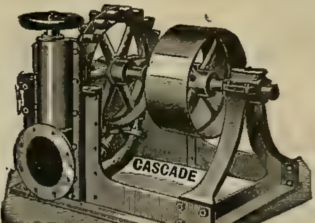
Wheels for mill and reversible hoisting works a specialty.

KNIGHT & CO., Sutter Creek, Cal.

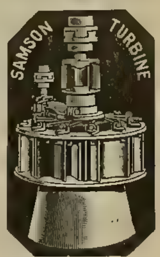
For full particulars, send for descriptive catalogue.

TURBINE AND CASCADE WATER WHEEL

Adapted to all Heads from



3 Feet to 2000 Feet.



Our experience of 38 YEARS building Water Wheels enables us to suit every requirement of Water Power Plants. We guarantee satisfaction.

State your Head and requirements. Send for pamphlet.

JAMES LEFFEL & CO.
SPRINGFIELD, OHIO, U. S. A.

PIPE BARGAINS.

Suitable for Water Mains, Mining, Irrigation, Air, Oil, etc , etc. New Spiral Welded Asphalted Steel Pipe with any style coupling desired.

460 ft. 6-in. 3,480 ft. 10-in. 1,828 ft. 14-in. 1,077 ft. 18-in.
50,000 " 8 " 2,428 " 12 " 520 " 16 " 1,623 " 24 "

All Sizes Wrought Pipe, Well Casing and Straight Riveted Pipe in Stock. Equipment of All Kinds for Mine, Railroad and Contractors' Outfits. Write for Prices and Particulars.

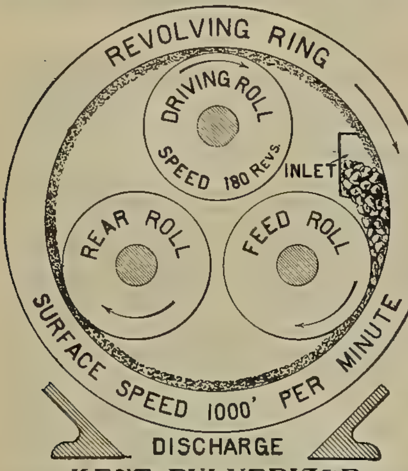
BOWES & CO., 23 Lake St., Chicago, Ill.

THE IDEAL CONVEYOR BELT

Is the one that will carry stone, ore, coal, wet or dry material, holding buckets firmly and securely; will stand all kinds of exposure, and resist the heaviest strains during a long period of service. This is what the **LEVIATHAN BELT** has done, and we quote the following from a letter from the New York Steam Co.:

"We have used Leviathan Belting for four years, up to 24-inch by 8-ply, elevating and conveying coal. Some of the Belting is outside, exposed to freezing weather; some in a steam bath. In both conditions the results have been very gratifying, over 500 tons having been handled in ten hours time."

MAIN BELTING COMPANY,
1225-41 Carpenter Street, Philadelphia.
55-57 Market St., Chicago. 120 Pearl St., Boston.
SEND FOR PRICE LISTS AND SAMPLE.



KENT PULVERIZER.

A Dry Pulverizer

FOR ORES, CEMENT and HARD SUBSTANCES.

Equals a 50-ton stamp mill. Grinds to any mesh under 8.
No slimes, no choking. Takes any fineness of feed under 1 in.
No special foundation. No quartered belts.
No internal screens. Outside separation gives 100 per cent product most uniform and granular.
No oil in product. No stoppages for oiling or adjusting.
Can be used wet. Can be moved on a truck.
Guaranteed for one year. Free new for worn out parts.
Little wear, no duplicate parts, no breakdowns.
Cost ¼ to 1-10 of any installation of same capacity.
Takes only one-half the horse power. Is automatic.

For Particulars and Catalogue

KENT MILL CO., 5 Beekman St., NEW YORK.

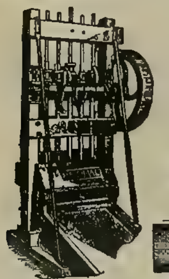
THE LATEST, BEST AND CHEAPEST PIPE WRENCH.

No Threads to Strip. No Nuts to Jam.
Made of Special Wrench Steel, and Drop Forged.

ATLAS PAT. 1888-1900.

Quick, effective and positive in adjustment. Cannot slip, crush or lock on the pipe. Made in four sizes: 10, 18, 24 and 36 inches.

ATLAS PIPE WRENCH CO.,
Flood Building, San Francisco.
NEW YORK OFFICE, 121 LIBERTY ST. WORKS, NEW HAVEN, CONN.

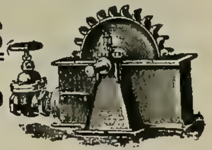


HYDRAULIC, MINING AND DREDGING MACHINERY, RIVETED STEEL PIPE,

WRITE FOR PRICES AND ESTIMATES

AMERICAN IMPULSE WATER WHEELS, ETC.

WOLFF & ZWICKER IRON WORKS

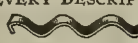


PORTLAND OREGON

CARY SPRING WORKS,
240 & 242 WEST 29th STREET, NEW YORK, U. S. A.
Telephone, 3346—38th St.

WIRE SPRINGS
OF EVERY DESCRIPTION.

MANUFACTURERS OF
All kinds of ROUND AND FLAT WIRE, TEMPERED AND UNTEMPERED.
SPRINGS
For Machinery, Rolling Shutters, Motors, Etc.



MUSIC BOX AND FINE SPRINGS OUR SPECIALTY.

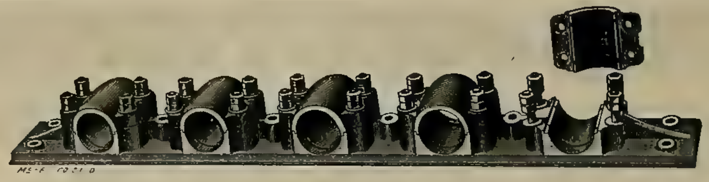
AARON'S ASSAYING, PART I.

FOURTH EDITION.

Revised, Rewritten, New, Improved.

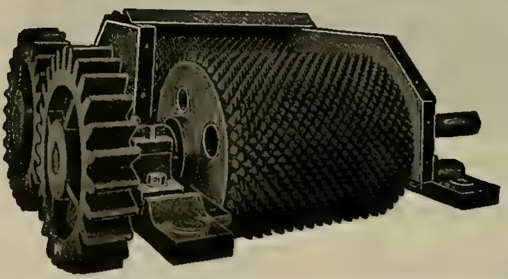
This practical treatise on assaying has long been the favorite among practical men. The new edition, just out, is up to date. Price $1, postpaid anywhere.

Book Dept., Mining and Scientific Press,
330 MARKET ST., SAN FRANCISCO, CAL.



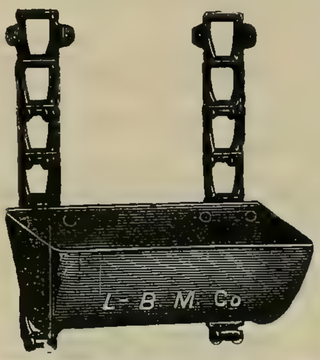
Globe Battery Stem Guide.
PATENTED AUGUST 24, 1897.
RIGID. SIMPLE. DURABLE. EFFICIENT. ECONOMICAL.
Effect a Saving in Friction Losses. No Trouble to Install.
No Alterations of Mill Necessary. No Keys or Wedges to Adjust.
—MANUFACTURED ONLY BY—
GLOBE IRON WORKS, STOCKTON, CAL., U. S. A.
Manufacturers of All Classes of Mining Machinery. Estimates Furnished.

LINK-BELT ELEVATORS —AND— CONVEYORS.



BREAKER ROLLS,
PICKING TABLES,
MALLEABLE IRON BUCKETS,
SHAFTING, PULLEYS,
GEARING, CLUTCHES, Etc.
Catalogue Upon Application.
LINK-BELT MACHINERY CO.,
Engineers, Founders, Machinists,
CHICAGO, U. S. A.
DENVER, 1328 17th St.,
A. E. LINDROOTH, Manager.

Small Portable Saw Mills and DRAG SAWING MACHINES FOR RANCHES AND MINES.

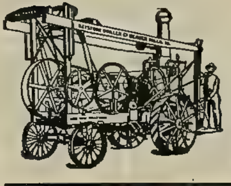


Woodworking Machinery.

LINK BELTING, SPROCKET WHEELS,
ELEVATOR BUCKETS & BOOTS,
TAKEUPS, FRICTION CLUTCH
PULLEYS, ETC.
ALL STYLES AND SIZES IN STOCK FOR IMMEDIATE DELIVERY.

JNO. D. EBY,
17 & 19 MAIN STREET, - SAN FRANCISCO, CAL.

For handling Ore, Coal, Tailings and Dredgings. Catalogue mailed on application.
ROBINS CONVEYING BELT CO. Park Row Building, NEW YORK.



Prospecting Machinery.

Multitudes in use for testing for minerals. Sizes and equipments to suit any and all conditions. Unexcelled for Placer Testing, Oil Wells, Water Wells, testing for Lead and Zinc, Iron and Coal; goes through anything; brings up everything. Large sizes drill as much as 1500 feet. In use all over the world. Every purchaser pleased. Used on boats for testing river and lake beds. Water no hindrance. No skilled labor required.

KEYSTONE DRILLER CO., Beaver Falls, Pa., U. S. A.

THEODOR LEXOW, 14 JOHN STREET, N.Y.
......Importer of......
CARBONS
(BLACK DIAMONDS)
For DIAMOND DRILLS and all Mechanical Purposes.
HENRY DEMMERT.

GENERAL PHOTO-ENGRAVING CO.
[SUCCESSORS TO DEWEY ENGRAVING CO.]
FINE ZINCOGRAPHS, HALF-TONES, AND DESIGNING.
ENGRAVINGS OF MACHINERY OUR SPECIALTY.
SEND FOR SAMPLES AND PRICES. NO. 536 CLAY STREET,
TELEPHONE BLACK 1466. SAN FRANCISCO, CAL

Fraser & Chalmers,
CHICAGO, ILL., U. S. A.

The accompanying cut shows curb and jackets of our Standard 36″ Steel Water Jacketed Blast Furnace of the Round Type for Lead Ores.

We make also Copper Matting, and every description of approved smelting and roasting furnace plant.

Our Catalogue No. 3 gives particulars, and we will be glad to have you write us for estimates.

FRASER & CHALMERS,
CHICAGO, ILL.

JEFFREY SPECIALTIES.

FOR MINE, MILL, FACTORY AND POWER PLANT.

We manufacture: Chains (Standard and Special), Sprocket Wheels, Elevator Buckets, Bolts, Boots, Coal and Coke Crushers, Dump Cars, Skip Cars, Columbian Separator (for Treating Cement, Cement Clinkers, Broken Ores, Marble, etc.), Coal Washing Machinery, Cable Conveyors, Spiral Conveyors, Labor Saving Appliances in General.

For Catalogue, Address

THE JEFFREY MFG. CO., Columbus, Ohio.
Western Branch, Equitable Bdg., Denver, Colo.

DENVER & RIO GRANDE R.R.
SCENIC LINE OF THE WORLD

The ∴ Mining Man's Favorite Route

BETWEEN

Denver, Colorado Springs, Pueblo and Florence, Cripple Creek, Leadville, Glenwood Springs, Aspen, Gunnison, Lake City, Creede, Durango, Silverton, Telluride and Ouray,

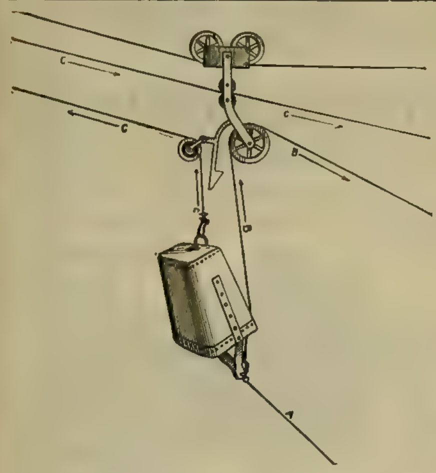
Reaching all the Mining, Milling, Cyaniding, Chlorinating and Smelting centers in Colorado and Utah, and all mining points in California, British Columbia and the Pacific Northwest by close connections and a perfect system of through car service.

Pullman Palace and Tourist Sleeping Cars between Denver and San Francisco and Los Angeles, and Pullman Palace and Tourist Sleeping Cars and Free Reclining Chair Cars between Denver and Portland. : : A Perfect Dining Car Service on All Through Trains. : :

For Illustrated Pamphlet, address

W. J. SHOTWELL,
G. A. D. & R. G. R. R.,
126 California St.,
San Francisco, Cal.

S. K. HOOPER,
G. P. & T. A.,
Denver,
Colo.



Carriage and Bucket
OF THE
HALL
PATENT
CABLE HOIST CONVEYOR
FOR
Excavating Canals and Trenches.

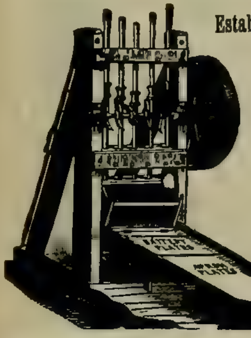
Used in excavating the Suwanee Canal, Georgia.
Only system with a bucket that is absolutely self-filling.
Also adapted to the construction of levees and embankments.

THE TRENTON IRON CO., Trenton, N. J., Manufacturers,

Also, Wire Rope Tramways, Surface and Underground Haulage Plants, etc. Wire Rope of all kinds for regular and special applications. Illustrated pamphlet on application.

For Particulars, Address, **NEWTON M. BELL, Agent, 308 Market St., San Francisco.**

☞A full stock of the Trenton Iron Co.'s Wire Ropes, made from "SPECIAL" Crucible and Plough Steel, carried in San Francisco.



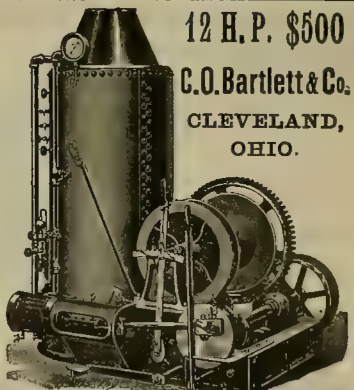
Established 1865. **NOTICE TO GOLD MINERS.** Incorporated 1890.

Silver-Plated Copper Amalgamated Plates
FOR SAVING GOLD
IN QUARTZ, GRAVEL OR BEACH MINING. MADE OF BEST SOFT LAKE SUPERIOR COPPER.

AT REDUCED PRICES.

Our Plates are guaranteed, and by actual experience are proved, the best in weight of Silver and durability. Old Mining plates replated, bought, or gold separated. THOUSANDS OF ORDERS FILLED.

SAN FRANCISCO NOVELTY AND PLATING WORKS,
☞SEND FOR CIRCULARS. Telephone Main 976. 68, 70, 72, 74 and 76 FIRST STREET, COR. MISSION, SAN FRANCISCO, CAL.

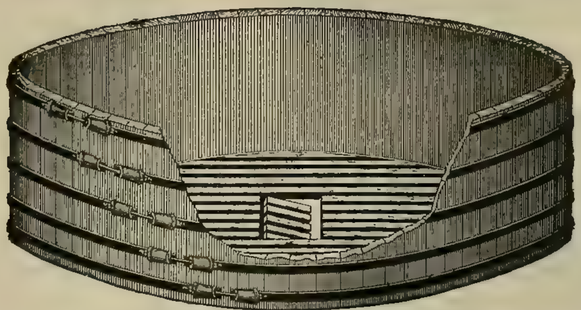


12 H. P. $500
C. O. Bartlett & Co.
CLEVELAND, OHIO.

AMERICAN AND FOREIGN
PATENTS
CAVEATS, TRADE MARKS.
DEWEY, STRONG & CO.
330 MARKET ST. S. F.

CYANIDE TANKS! MINING

LEACHING TANKS,
SOLUTION "
SUMP "
WATER "
EXTRACTION BOXES.



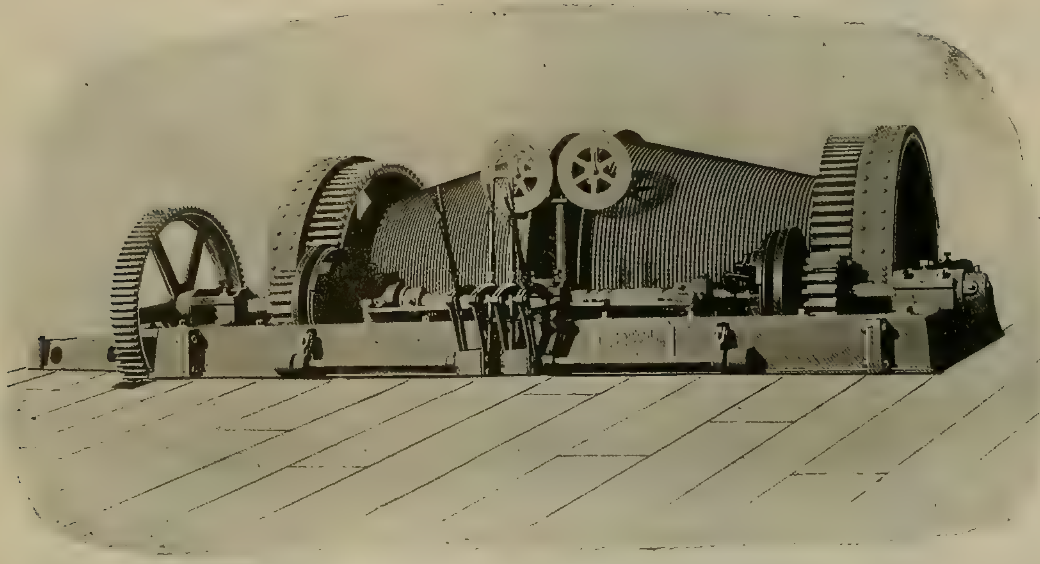
Estimates Furnished for Complete Cyanide Plants.

SEND FOR ILLUSTRATED CATALOGUE OF CYANIDE TANKS AND FIXTURES, MAILED FREE.

Pacific Tank Co., Manufacturers, 35 Beale St., San Francisco, Cal. 348 EAST SECOND STREET, Los Angeles, Cal.

MODERN ELECTRIC HOISTS IN SUCCESSFUL OPERATION.

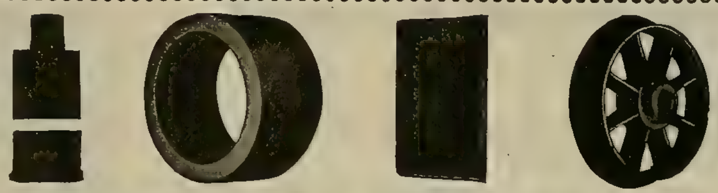
Send for Bulletin No. 1003.



200 H. P. DOUBLE DRUM ELECTRIC HOIST, OPERATED BY 60-CYCLE, 3-PHASE INDUCTION MOTOR.
Three of These Built for the British-American Corporation, Ltd., Rossland, B. C.

DENVER ENGINEERING WORKS,—SHEPARD & SEARING,—DENVER, COLO., U. S. A.

HARD TOUGH



TAYLOR IRON AND STEEL COMPANY,

HIGH BRIDGE, NEW JERSEY, U. S. A.

Sole Licensees in America under the HADFIELD System and Patents for **MANGANESE STEEL,**

Best Metal Known for Roll Shells, Stamp Shoes and Dies, Crusher Plates and Side Liners, Toggles and Toggle Bearings, Gyratory Cones and Concaves, or Liners, Mine Car Wheels, Coal Crushing Rolls, Etc.

PACIFIC COAST PARTIES INTERESTED PLEASE ADDRESS PARKE & LACY CO., SAN FRANCISCO, CAL.

WRITE FOR INFORMATION AND PRICES.

Our U. S. and Foreign Patent Agency presents many and important advantages as a Home Agency over all others, by reason of long establishment, great experience, thorough system, intimate acquaintance with the subjects of inventions in our own community, and our most extensive law and reference library, containing official American reports, with full copies of U. S. Patents since 1872. All worthy inventions patented through DEWEY, STRONG & CO.'s Patent Agency will have the benefit of a description in the *Mining and Scientific Press.* We transact every branch of patent business, and obtain patents in all countries which grant protection to inventors. The large majority of U. S. and foreign patents issued to inventors on the Pacific Coast have been obtained through our agency. We can give the best and *most reliable* advice as to the patentability of new inventions. Our prices are as low as any first-class agencies in the Eastern States, while our advantages for Pacific Coast inventors are far superior. Advice and circulars free.

DEWEY, STRONG & CO.,

PATENT AGENTS,

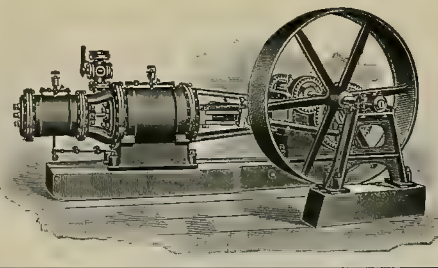
330 Market Street, San Francisco, Cal.

WHY NOT

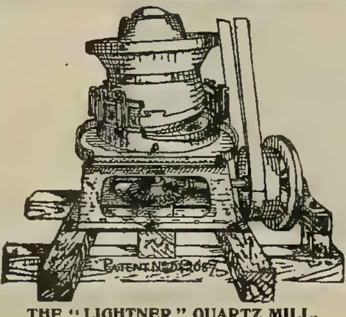
have our catalogues, specifications and prices before you purchase

AIR DRILLS OR COMPRESSORS?

Our guarantees are strong; our customers are satisfied. We can satisfy YOU.



J. Geo. Leyner,
729 Seventeenth St.,
DENVER, COLO.



THE "LIGHTNER" QUARTZ MILL.

W. H. Birch & Co.

No. 127 to 135 First St., San Francisco, Ca'.

— BUILDERS OF —

LIGHTNER QUARTZ MILLS.

No. 1 works 3 tons per day with 1½ H. P.
No. 2 " 4 to 7 " " " 2½ "
No. 3 " 10 to 15 " " " 3½ "

LARGER MILLS BUILT. SEND FOR CIRCULAR.

"Birch" Two-Stamp Mills, McGlew Concentrators, And All Kinds of Mining Machinery.

LARGE VARIETY.

Perforated Metal

THE ROBERT AITCHISON PERFORATED METAL Co
303-305 DEARBORN ST. CHICAGO ILLS.

SUPERIOR WORK.

For Best Satisfaction and Lowest Prices
— IN —
PERFORATED METALS
— AND —

MINING SCREENS

PLACE YOUR ORDERS WITH

Fraser & Chalmers,

CHICAGO, ILL., U. S. A.

SEND FOR SAMPLES, MENTIONING THIS PAPER.

Mining Screens

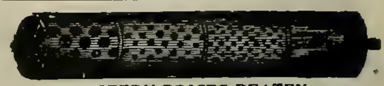
A SPECIALTY.

Diagonal Slot,
Straight "
Burred "
Round Holes.

In American planished or Russian iron or steel for all purposes. GEO. WIMMER, 312 Iowa Street, San Francisco. Telephone Mint 1332.

QUARTZ SCREENS

A specialty. Round, slot or burred slot holes. Genuine Russia Iron, Homogeneous Steel, Cast Steel or American planished Iron, Zinc, Copper or Brass Screens for all purposes. CALIFORNIA ERFORATING SCREEN Co., 145 and 147 Beale St., S. F.



—EASTERN PRICES BEATEN.—

SAN FRANCISCO
Pioneer Screen Works,
JOHN W. QUICK, Prop.

mproved Facilities! Finest Work! Lowest Prices!

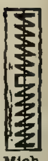
Perforated Sheet Metals, Steel, Russia Iron, merican Planish, Zinc, Copper and Brass Screens for All Uses.

MINING SCREENS A SPECIALTY.

221 and 223 First Street, San Francisco, Cal.

Notice the Shape of
GLOBE BOX--- THE BEST BABBITT.

J. M. HAYDEN & CO.
GLOBE BOX METAL
GRAND RAPIDS MICH.
THE BEST BABBIT.



Send for trial order, Ladle free.

The Globe wire lace makes the smoothest joint, runs the stillest and lasts the longest of any lacing. Sent on approval. Write us for booklet with instructions, etc. J. M. HAYDEN & Co., 58 Pearl St., Grand Rapids, Mich.

COLORADO'S GOLD

Output for 1899 is unequaled by any State in the Union. Cripple Creek, Leadville, and all the important mining towns are reached by

THE COLORADO & SOUTHERN RY...

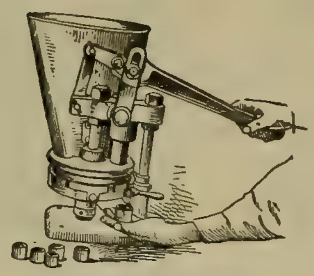
For copies of our publications on the Swandyke and Pine Creek Gold Districts, or our pamphlet "Hints to Prospectors," address

T. E. FISHER, GEN. PASS. AGT., DENVER, COLO.

ONE OF OUR MANY SPECIALTIES FOR ASSAYERS.

The Calkins Cupel Machine.

WALL PATTERN.
In position for filling mold.



THE AUTOMATIC.
Showing finished cupel being expelled.

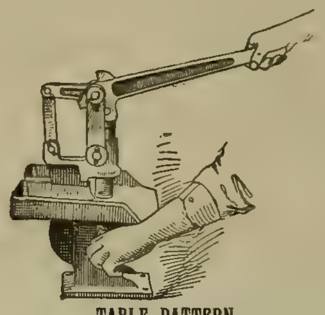


TABLE PATTERN.
Showing position of lever when greatest compression is obtained.

To Assayers:

With these machines perfect cupels can be made by anyone with great ease and rapidity.
They are the greatest labor-saving machine of the Assayer that can be had.
Compact, easily operated, can't get out of order, everlasting.

WRITE FOR OUR NEW, DESCRIPTIVE PAMPHLET IN WHICH ALL OUR SPECIALTIES ARE FULLY DESCRIBED.

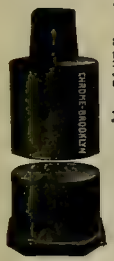
F. W. BRAUN & CO.,
Manufacturers of Modern Appliances for Assayers,
LOS ANGELES, CAL.

ADAMANTINE SHOES AND DIES.

CHROME CAST STEEL.

CANDA Improved Self-Locking CAMS.

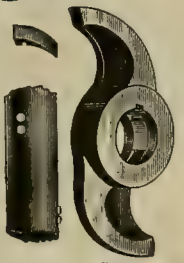
TAPPETS, BOSSES, ROLL SHELLS AND CRUSHER PLATES.



These castings are extensively used in all the mining States and Territories of North and South America. Guaranteed to prove better and cheaper than any others. Orders solicited subject to the above conditions. When ordering, send sketch with exact dimensions. Send for Illustrated Circular.

Manufactured by CHROME STEEL WORKS, Brooklyn, N. Y.

H. D. & H. W. MORRIS,
AGENTS,
Room 194 Crocker Building, San Francisco, Cal.

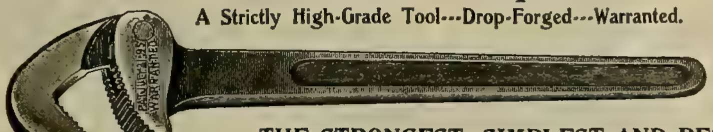


Canda Cam.

OUR 24-INCH WRENCH IS ESPECIALLY ADAPTED FOR MINE WORK.

The Johnston Patented Pipe Wrench.

A Strictly High-Grade Tool---Drop-Forged---Warranted.



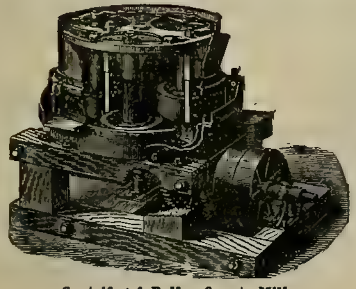
THE STRONGEST, SIMPLEST AND BEST.
Never Jams, Self-Adjusting, Self-Releasing.

MADE IN 3 SIZES:

	10 in.	16 in.	24 in.
Pipe	⅛ to 1 in.	¼ to 1½ in.	½ to 2½ in.
List	$2.25	$3.00	$6.00

WM. B. VOLGER,
SOLE MANUFACTURER,
88 Chambers St., NEW YORK.

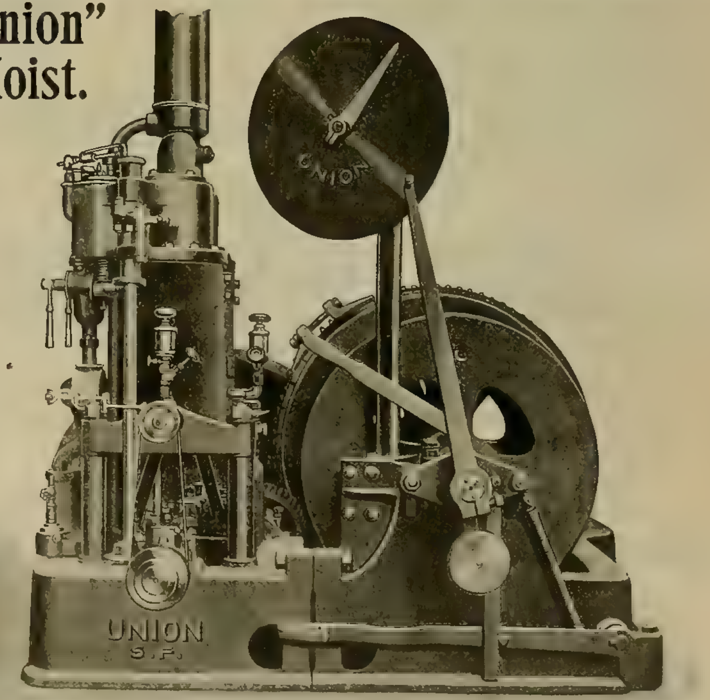
Agencies: THE MINE & SMELTER SUPPLY CO., Denver and Salt Lake City.



Centrifugal Roller Quartz Mill.

F. A. HUNTINGTON,
—Manufacturer of—
CENTRIFUGAL
Roller Quartz Mills.
CONCENTRATORS and ORE CRUSHERS.
Mining Machinery of Every Description
Steam Engines, Shingle Machines.
Room 1, 3d Floor, Mills Building,
SAN FRANCISCO, CAL.

"Union" Hoist.



The above illustrates the 25 H. P. double cylinder, single drum "Union" hoist, with all the latest improvements.

THE UNION GAS ENGINE CO.
—BUILD THE—
"Union" Gas Engines,
Which use either MANUFACTURED or NATURAL GAS, ORDINARY STOVE GASOLINE (NAPHTHA or BENZINE), DISTILLATE or KEROSENE.
STATIONARY ENGINES for All Kinds of Work in Sizes from 3 to 300 h. p in actual use.
"UNION" COMBINED HOISTS in Sizes from 2 to 130 h. p. in actual use.
"UNION" COMBINED COMPRESSORS—20, 30, 40 h. p.
HOISTS and COMPRESSORS Can Be Built in Larger Sizes to Order.
"UNION" MARINE ENGINES, 4 to 200 h. p., of Single, Double and Four-Cylinder Types.
FIFTEEN YEARS' EXPERIENCE Building Gas and Oil Engines.
"UNION" ENGINES Are In Use All Over the United States.
"UNION" ENGINES Are Simple, Durable and Economical.
Office, 248 First Street. Works, Corner First and Clementina Streets. SAN FRANCISCO, CAL.

PROFESSIONAL CARDS.

R. H. POSTLETHWAITE, M.I.E.E.
Hydraulic Mining Engineer.
River Dredging for Gold a Specialty.
1315 Leavenworth St........San Francisco, Cal.

THEO. F. VAN WAGENEN, E. M.
Consulting Mining and Hydraulic Engineer.
1508 Fillmore St., DENVER, COLO.

D. B. HUNTLEY,
Mining Engineer and Metallurgist,
De Lamar, Owyhee Co., Idaho.

BERNARD MACDONALD,
Consulting Mining Engineer.
General Manager British America Corporation, Ltd., Rossland, B. C.

A. F. WUENSCH, M. E.
Inspection and Valuation of Mines.
Ref. D. H. Moffat, Pres. 1st Nat'l Bank, Denver.
827 Equitable Bldg..................Denver, Colo.

Established 1879.
CHAS. B. GIBSON,
Chemist, Metallurgist and Mining Engineer,
81 CLARK ST., CHICAGO, ILL.

W. C. WYNKOOP, M. E.
Woodbury (Cochiti District),
New Mexico.
Economic Geology and Mine Examinations.

WM. VAN SLOOTEN,
Consulting Mining Engineer and Metallurgist.
Cable address: "Yadoplata."
35 WALL STREET..............NEW YORK, N. Y.

E. H. BENJAMIN, Mining Engineer.
A. M. HUNT, Mechanical & Hydraulic Engineer.
WYNN MEREDITH, Electrical Engineer.
C. L. CORY, Electrical & Mechanical Engineer.
EXPERT EXAMINATIONS. ADVISORY REPORTS.
CONSTRUCTION SUPERVISION.
331 Pine Street,...........San Francisco, Cal.
Telephone Main 1870. Cable Address "Edben."

DANIEL G. JEWETT.
Specialty: The Mining and Smelting of Copper or Lead Ores.
General Manager of Boston G. M. & M. Co., Venture G. M. & M. Co., The Boston Tunnel.
P. O. BOX 5, GUFFEY, PARK CO., COLO.

ABBOT A. HANKS,
CHEMIST AND ASSAYER.
Successor to Henry G. Hanks, est. 1866. The supervision of sampling of ores shipped to San Francisco a specialty.
—531—
California Street,
San Francisco.

RICHARD A. PEREZ, E. M.
Assayer and Analytical Chemist,
120 North Main St., - Los Angeles, Cal.

S. W. TYLER,
Mining and Metallurgical Engineer,
6 Windsor Hotel Block.
Cable: Retyl, Denver. DENVER, COLORADO.

The SPOKANE BUREAU OF MINING,
N. E. LINSLEY, Manager.
SPOKANE, : : WASHINGTON.
Consulting Mining and Milling Engineer.
Will Examine and Report on Mines.

FRANK C. MANDELL,
MINING ENGINEER,
U. S. Deputy Mineral Surveyor for Idaho and Oregon.
Mine Examinations, Surveys and Reports.
HAILEY, IDAHO.

CLARENCE HERSEY,
Assayer and Chemist,
(Established 1879.) LEADVILLE, COLO.
Gold, Silver and Lead..................$1.00.
Any two of above 75c; any one of above 50c.
Copper analysis...............................$1.00.
Platinum, Nickel or Tin, each..............$5.00.
Twenty-one years successful experience in the mining metropolis of Colorado.
Write for mailing envelopes and price list.

ALMARIN B. PAUL, M. E.,
ROOM 27, CROCKER BUILDING, SAN FRANCISCO.
Will act as AGENT for the sale of RELIABLE Mining Property. SPECIAL AGENT FOR
MacArthur-Forrest Cyanide Process
for California north of and including Mono, Madera and Merced counties; also for State of Nevada. Will act as agent for Eastern parties owning mining interests in California.

F. H, HARVEY,
GALT, CAL.,
Mining and Metallurgical Work in All Branches.
Assays, Chemical Analysis of Ores and experiments on rebellious ores for treatment by cyanide or other processes. Surveys and reports upon mining properties.

Simonds & Wainwright,
Mining Engineers,
Assayers and Chemists,
159 Front Street,
NEW YORK.

HUDSON H. NICHOLSON,
Consulting Mining Engineer,
Rooms 216 and 217, Boston Building,
DENVER, COLO., U. S. A.
Cable address: Aichen, Denver.
Expert examinations of and advisory reports on mining propositions.
Specialty: The chemical treatment of ores.

WM. A. AKERS,
Consulting Mining Engineer,
521 Dooly Block, SALT LAKE CITY, UTAH.

DAVIDGE & DAVIDGE, Attorneys and Counsellors at Law, Corcoran Building, Washington, D. C. Practice in the Supreme Court of the United States, the Court of Claims, the Courts of the District of Columbia, and the General Land Office. Western Union Code.

R. J. WALTER,
1452 Blake St., DENVER, COLO.
Mining Engineer and Metallurgist.
Reports on mining properties.
Assay office and chemical laboratory. Established in Colorado 1879.

W. J. ADAMS, E. M.,
Mining Engineer and Metallurgist.
Graduate of Columbia School of Mines.
Author of "Hints on Amalgamation," etc., etc.
ROOM 14, 434 CALIFORNIA STREET,
SAN FRANCISCO, CAL.

FRANK READE,
MINING and CONSULTING ENGINEER,
401 California Street,
SAN FRANCISCO.
EXPERT WITNESS IN MINING SUITS.

EDWARD L. HAFF,
MINING ENGINEER,
U. S. DEPUTY MINERAL SURVEYOR.
Mine Examinations and Reports.
National Annex Block,
P. O. Box 21. CRIPPLE CREEK, COLO.

RALPH E. STEVENS,
ATTORNEY AND COUNSELOR,
43-44 Jacobson Building, DENVER, COLO.
Special attention to examination of titles. Corporation, commercial, mining law. Collections receive prompt attention. Notary in office. Refers to Denver representative of Mining and Scientific Press.

ERNEST H. SIMONDS,
Late Instructor in Assaying, University of California.
ASSAYS AND ANALYSES.
LABORATORY TESTS OF ORES.
Special Attention Given to the Instruction of Students.
521 Sacramento St., Cor. Leidesdorff, S. F., Cal.

SAM'L A. RANK,
MINING ENGINEER,
U. S. DEPUTY MINERAL SURVEYOR.
Mine Examinations and Reports.
514 Cooper Building,
DENVER.........................COLORADO.

School of Practical Mining, Civil,
Mechanical and Electrical Engineering.
Surveying, Architecture, Drawing, Assaying, Cyanide Process and Metallurgy.
933 Market St., S. F., Cal. OPEN ALL YEAR.
A. VAN DER NAILLEN, President
Assaying of Ores, $25; Bullion and Chlorination Assay, $25; Blowpipe Assay, $10. Full course of Assaying, $50. Established 1864.
☞ Send for Circular.

LOUIS FALKENAU,
STATE ASSAY OFFICE,
538 Sacramento St., below Montgomery.
Analysis of Ores, Metals, Soils, Waters, Industrial Products, Foods, Medicines, etc., etc.
Court Experting in all branches of Chemical Technology. Working Tests of Ores and Investigation of Metallurgical and Manufacturing Processes. Consultations on all questions of applied chemistry. Instructions given in assaying and all branches of chemistry.

J. BELL,
MINES AND MINING,
630 Market St., opp. Palace Hotel,
San Francisco, Cal.

LETSON BALLIET,
Mining and Civil Engineer,
Chemist and Metallurgist,
508 California St., San Francisco, Cal.
Special attention to treatment of low grade and refractory ores by all chemical and mechanical processes.

MINERS' ASSAY OFFICE.
(JNO. HARRIGAN)
10 Stevenson Street, - San Francisco, Cal.
Telephone Clay 972.
Assaying, Analyses, Sampling, Grinding and Pulverizing of all kinds.
Practical Working Tests of Ore by all Processes. Mining Machinery Bought and Sold. Check Assays. Instructions given in Assaying. All Work Guaranteed. Mines Examined, Sampled and Reported on by M. P. BOAG, M. E. and Cyanide Expert.

Samples by Mail or Express Will Receive Prompt Attention.
ALBERT I. GOODELL,
ASSAYER AND CHEMIST,
1430 Stout Street.....................DENVER, COLO.

J. W. RICHARDS,
(Late of Aspen, Colo.)
ASSAYER AND CHEMIST. 1754 Champa Street, DENVER, COLO.
Ore Shippers' Agent. Write for Terms.

JAMES ANGUS SNEDAKER,
Mining Engineer,
721-722 Equitable Building, Denver, Colo., U. S. A.

E. E. BURLINGAME & CO.,
ASSAY OFFICE AND CHEMICAL LABORATORY
Established in Colorado, 1866. Samples by mail or express will receive prompt and careful attention
Gold & Silver Bullion Refined, Melted and Assayed OR PURCHASED.
Concentration Tests—100 lbs. or car load lots. Write for terms.
1736-1738 Lawrence St., Denver, Colo.

RELIABLE ASSAYS.

Gold...............	$ .50	Gold and Silver....	$ .75
Lead	.50	Gold, silver, copper	1 50

Samples by mail receive prompt attention.
Rich Ores and Bullion Bought.
OGDEN ASSAY CO.,
1429-16th St., Denver, Colo.

Independent Assay Office.
ESTABLISHED 1888.
D. W. Reckhart, E. M., Proprietor.
Agent for Ore Shippers.
Assays and Chemical Analysis.
Mines Examined and Reported Upon.
BULLION WORK A SPECIALTY
P. O. Box 88. Office and Laboratory:
Cor. SAN FRANCISCO & CHIHUAHUA Sts.
EL PASO, TEXAS.

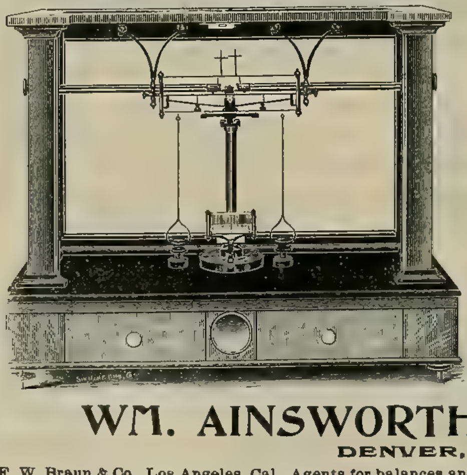
HENRY E. WOOD,
ASSAYER,
1734 Arapahoe St., DENVER, COLO.
Ore Tested in Carload Lots.
Write for Circular.

CHAS. BUTTERS & CO., Limited.
E. S. LEAVER, Manager.
Ore Testing Works,
Chemical and Metallurgical Laboratory,
Assay Office,
DOOLY BLOCK, - SALT LAKE CITY, UTAH.

Telephone, MAIN 5104. ESTABLISHED 1869. A. H. WARD.
Cable Address, LUCKWARD.
C. A. LUCKHARDT CO.,
NEVADA METALLURGICAL WORKS,
71 & 73 STEVENSON STREET, - - - - SAN FRANCISCO, CAL.
Assaying, Analyses, Sampling.
PRACTICAL WORKING TESTS OF ORE BY ALL PROCESSES.
STAMP MILL AND CONCENTRATOR IN OPERATION ON PREMISES.

Thomas Price & Son,
Assay Office, Sampling Works
And Chemical Laboratory.
526 Sacramento Street, San Francisco, Cal.

No. 0 PRECISION BALANCE.
5-INCH BEAM.



This is the most accurate and sensitive button balance made. All contacts with the beam and hangers are of agate. Improved construction throughout; extension plate glass sub-base and cylindrical reading glasses for beam and index.

For full particulars regarding this and other balances send for catalogue "A" to

WM. AINSWORTH & SONS,
DENVER, COLORADO, U. S. A.

F. W. Braun & Co., Los Angeles, Cal., Agents for balances and the Brunton Patent Pocket Transit.
John Taylor & Co., San Francisco, Cal., Agents for balances and the Brunton Patent Pocket Transit.
H. S. Crocker Co., San Francisco, Cal., Agents for the Brunton Patent Pocket Transit.
Pacific Optical Co., Los Angeles, Cal., Agents for the Brunton Patent Pocket Transit.

Ammonia Process.

The practical success of this process is well known and is demonstrated chemically, technically and mechanically in every detail on a large scale. Refractory ores and tailings containing gold, silver, copper and zinc are extracted successful and profitable. Mail average sample and $10 and receive full report about the extraction.

Pocketbook, Ammonia Process, full description, $1.

Instructions in Chemistry and all successful and practical Lixiviation Processes.

Office and Laboratories:
334 KEARNY STREET, SAN FRANCISCO, CAL.
H. HIRSCHING,
Mining Engineer and Chemist.

ALVIN PHILLIPS & CO.,
Chemists, Mining and Metallurgical Engineers,
1761 MARKET STREET,
DENVER, - COLO.

Complete Ore-Testing Works — capacity ten pounds to two tons. Modern Methods of Lixiviation, Cyanide and Chlorination. Concentration on Bartlett Table. Assaying and Bullion Refining. Chemical Analyses of Oils, Coal, Water, and all solutions. WRITE FOR PRICES.

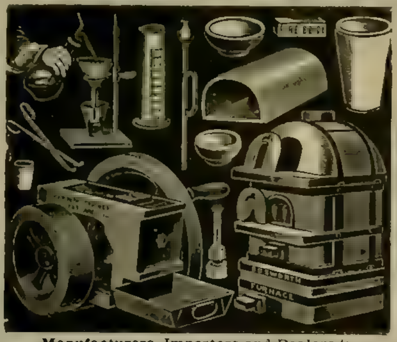
SMITH & THOMPSON,
Manufacturers of Fine
ASSAY BALANCES.
Write for Catalogue.
2219 Stout St.,
Denver, Colo.

INVENTORS, Take Notice!
L. PETERSON, MODEL MAKER,
544A MISSION STREET, bet. First and Second Sts., SAN FRANCISCO. Experimental machinery and all kinds of models. Tin and brasswork. All communications *strictly confidential.*

HERMANN J. VAN DIEREN,
Assayer and Metallurgist,
1407 Seventeenth St., DENVER, COLO.
Stamp Mill and Reduction Works: 19th St. and Platte River.

Buyer of every description of Ores and Precious Stones. Rights for sale for process of treating refractory gold ores; also process for treating low grade copper ores. Write for particulars.

THE DENVER FIRE CLAY CO.,
1742 to 1746 Champa St., DENVER, COLO.



Manufacturers, Importers and Dealers in
Chemicals, Apparatus and Assayers' Supplies
Fire Brick and Tile.
Sole Agents for the "AINSWORTH BALANCES."
WRITE FOR CATALOGUES.

THE ROESSLER & HASSLACHER CHEMICAL CO.,
100 William Street, New York.

CYANIDE
Peroxide of Sodium
Hyposulphite of Soda
Chloride of Lime
Sulphide of Iron
And Other Chemicals for Mining Purposes.

Globe Engineering Company,
(INCORPORATED.)
STIRLING WATER-TUBE BOILERS.
Unequaled for Mines and Mills.
Easily Transported. Quickly Cleaned.

EXETER HOISTING ENGINES; CORLISS, SLIDE VALVE AND AUTOMATIC CUT-OFF ENGINES; BOILERS; STEAM PUMPS; SINKING PUMPS; HIGH DUTY PUMPING ENGINES; AIR COMPRESSORS; FEED WATER HEATERS AND PURIFIERS; JET AND SURFACE CONDENSERS; WALKER'S METALLIC PISTON ROD PACKING; LOCKE DAMPER REGULATORS; REFRIGERATING MACHINERY.

STEEL MILLS, ROCK AND SHAFT HOUSES.
OTTO AERIAL ROPEWAYS.
COMPLETE DESIGNS for STEAM PLANTS for MINES and MILLS.
GLOBE ENGINEERING COMPANY,
Mechanical, Civil and Mining Engineers, 509 Mission St., San Francisco, Cal.

P & B Building Paper

A perfect insulation for cold storage houses and refrigerators.
Unequaled in residence construction.
A protection against heat, cold, dampness, dust, draught and vermin.
Demand it of your dealer — you need it in your buildings.
Paraffine Paint Co— 116 Battery, San Francisco

ESTABLISHED 1856.
Controls AND Check Assays
(A SPECIALTY.)
MARINER & HOSKINS,
ASSAYERS AND CHEMISTS,
Mining Engineers and Metallurgists.
81 South Clark Street.
Rooms 51-55,
CHICAGO, ILLINOIS.
SEND SAMPLES BY MAIL OR EXPRESS.
MAILING SACKS ON APPLICATION. : :

DEARBORN Drug and Chemical Works. Laboratories. Water Chemists. Vegetable Boiler Compounds.

ALL KINDS OF ANALYSES. WATERS FREE. OILS A SPECIALTY.

10,000 Boiler Feed Waters Are Being Treated by DEARBORN METHODS.

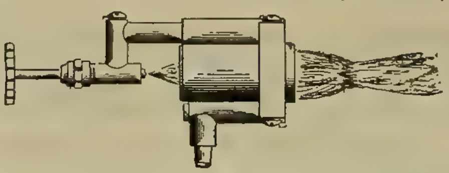
29, 30, 31, 32 and 33 Rialto Bldg. - - - CHICAGO, ILL.

IMPROVED BONE ASH.

It is 100% better than Bone Ash now being used; will absorb more lead, will never crack or split in the Muffle, can be dropped before or after using without breaking. Cupels can be made and used at once; no drying required. Excessive heat has no effect on them. Will stand shipping any distance. It takes up none of the precious metals in cupeling. Cupels much quicker. Once used always used. Sold under a positive guarantee or money refunded. Now being used by all smelters and assayers who have tried it.

Correspondence solicited.
Samples given if required.
J. J. CUMMINGS & CO., Sole Mfrs.,
Telephone Clay 972. 10 STEVENSON ST., SAN FRANCISCO, CAL.
For Sale also by Justinian Caire Co., Dealers in Assay Goods and Mining Supplies, 521-523 Market St.

Taylor's Coal Oil and Gasoline Burner
(PATENTED)



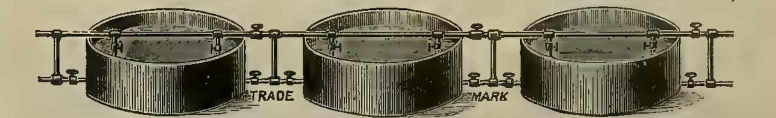
A new heating burner for Assayers and Chemists, or for brazing, in which coal oil at 33 deg. to 45 deg., Beaume and 150 deg. fire test, or gasoline at 74 deg. test can be used for fuel. Adapted to crucible, muffle and brazing work. Price $6. For sale by

JOHN TAYLOR & CO.,
63 FIRST STREET,
SAN FRANCISCO, CAL.
MINE AND MILL SUPPLIES.
Importers and Manufacturers of Assayers' Materials, Chemicals and Acids, Etc.
CATALOGUE ON APPLICATION.

TRADE MARK.
(M'ARTHUR-FORREST PROCESS.)

CYANIDE PROCESS.
The MacArthur-Forrest Cyanide Process is the Best
For the Treatment of Refractory and Low Grade Gold and Silver Ores and Tailings. We are the Originators of the Cyanide Treatment, and have kept up with the times in all Improvements in Cyanide Methods.
Successful Plants in Operation in all Western Mining States.
Samples Assayed and Fully Reported Upon. Properties Examined. Designs Furnished. For Terms and Particulars, Address
The Gold and Silver Extraction Co. of America, Ltd.
GEO. A. ANDERSON, General Manager,
Testing Works: 1716 Blake Street, Denver, Colo. 208-210 McPhee Building, Denver, Colo.
ALMARIN B. PAUL, Agent, 27 Crocker Building, San Francisco, Cal.

"PNEUMATIC" CYANIDE PROCESS.
(Patented in U. S., So. African Republic, New Zealand, Victoria, New So. Wales, So. Australia.)



WILL DO IN 7 HOURS WHAT REQUIRES FROM 2 TO 6 DAYS BY OLDER METHODS.
SEND FOR PAMPHLET.
THE PNEUMATIC CYANIDE PROCESS CO., 306 Boston Bldg., Denver, Colo.

New Process of Copper Extraction.
CHEAP, CLEAN AND EFFECTIVE.
THE GARDINER LEACHING PROCESS
FOR COPPER ORES.
TESTS MADE ON ANY QUANTITY OF ORES AT REASONABLE RATES.
FULL PARTICULARS ON APPLICATION.
THE AMERICAN COPPER MINING & EXTRACTION CO., DENVER, COLO.

ST. LOUIS SAMPLING & TESTING WORKS,
1225 and 1227 Spruce St.,
ST. LOUIS, MO.
The Largest and Most Complete Ore Testing Works in Existence for Making all Kinds of Practical Working Tests of Ore, etc., to Determine the Most Suitable Method of Treatment.
PLANT FOR COAL WASHING, COKING AND STEAMING TESTS OF FUELS. ASSAYS, ANALYSES, CHEMICAL AND PHYSICAL INVESTIGATIONS OF ALL KINDS. MINERAL PROPERTIES, MINES AND METALLURGICAL PROCESSES EXAMINED AND REPORTED UPON. CORRESPONDENCE SOLICITED.

Are You Confronted With a Difficult Ore-Separating Problem?
THE WETHERILL MAGNETIC SEPARATING PROCESS
may prove the solution. Apply to Wetherill Separating Company, 52 Broadway, N. Y.

BULLOCK DIAMOND DRILLS

If you are interested in prospecting send for our new Diamond Drill Catalogue (No. 33).

BULLOCK MINING MACHINERY

PORTABLE HOISTS—Send for our new Catalogue (No. 40). CHAMPION MINE VENTILATORS—Send for our new Catalogue (No. 35).
HOISTING AND HAULAGE PLANTS, ORE CARS, SKIPS, CAGES, ETC., ETC.

PARKE & LACY CO., Agent,
21 & 23 Fremont St., San Francisco, Cal.

M. C. BULLOCK MFG. CO.,
1172 West Lake St., Chicago, Ill., U. S. A.

THE RAND DRILL COMPANY,

PIONEERS IN ROCK DRILLING AND AIR COMPRESSING MACHINERY,

100 BROADWAY, NEW YORK.
223 FIRST ST., SAN FRANCISCO, CAL.
1328 MONADNOCK BLK., CHICAGO, ILL.

Has been awarded

THREE GOLD MEDALS

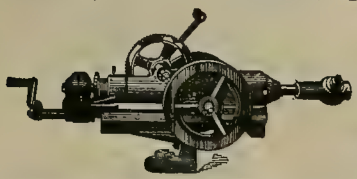
at the

PARIS EXPOSITION

for

AIR COMPRESSORS and ROCK DRILLS.

THE JACKSON HAND POWER ROCK DRILL.



Works in Any Rock, in Any Position.

Write for Circulars and References.

THE JACKSON DRILL & M'F'G CO.,
1756 Larimer Street, DENVER, COLO.

Sole Licensees for all Foreign Countries and Eastern United States: THORNTON N. MOTLEY COMPANY (INC.), 43 John St., New York.

AGENTS: CHAS. B. BOOTHE & CO., 126 SO. LOS ANGELES ST., LOS ANGELES, CAL.

FIRTH'S DRILL STEEL.

USE THE BEST.

Has no equal in Hard Rock Drilling.

ABNER DOBLE COMPANY, GEN. AGTS.,
FREMONT AND HOWARD STS, SAN FRANCISCO.

Sold by Seattle Hardware Co., Seattle, Wash.

Established 1837.

I. C. Yawger,

Successor to VICTOR BISHOP & CO.

IMPORTER OF CARBONS FOR DIAMOND DRILLS.

21 Maiden Lane, - NEW YORK.

DIAMOND DRILLS
FOR PROSPECTING.
AMERICAN DIAMOND ROCK DRILL CO.
120 LIBERTY ST N.Y.

MACHINERY BARGAINS.

I have some splendid Air Compressors, Hoisting Engines, Rock Drills, Rock Crushers, Channeling Machines, Steam Pumps, Boilers, Steam Shovels, Locomotives and Relaying Rails, all in splendid condition. Send for printed list and specify your requirements. I can save you money. WILLIS SHAW, 627 New York Life Building, CHICAGO.

TELEPHONE MAIN 5303
Union Photo-Engraving Co.
DESIGNING HALF-TONES ZINC ETCHING
523 MARKET ST
SAN FRANCISCO, CAL.

SULLIVAN

Diamond Core Drills

FOR PROSPECTING. Catalogue 29.

The most extensive line of sizes and styles ever offered.

CONTRACTORS FOR PROSPECTING WITH DIAMOND DRILL.

ROCK DRILLS

FOR MINING. Catalogue 30.

Superior valve and ratchet motions. The highest possible grade.

Send for Our New Catalogues.

Sullivan Machinery Co.,

New York. Pittsburg. Claremont, N. H.

Main Office, CHICAGO..........ROOMS 1220-1221, 135 ADAMS ST.
Western Office, DENVER....................832 SEVENTEENTH ST.
Pacific Agency, SAN FRANCISCO, HENSHAW, BULKLEY & CO.
Northwest Office, SPOKANE, WASH.........101 S. HOWARD ST.

Cable Address, Diamond, Chicago. Codes: A. B. C. 4th Edition, Postal Directory, Western Union, Liebers.

CANTON STEEL COMPANY,

—— Manufacturers of ——

CANTON DRILL STEEL.

UNEQUALED FOR TOUGHNESS AND ROCK-CUTTING QUALITIES. WRITE FOR 1900 STEEL LIST, CONTAINING ENDORSEMENTS AND USEFUL INFORMATION.

Works: CANTON, OHIO. Branch Warehouse: DENVER, COLO.

TO SECURE GOOD RESULTS BUY

JESSOP'S STEEL

FOR TOOLS, MINING DRILLS, ETC.

Chief American Office, 91 John St., New York, N. Y.

Wm. Jessop & Sons, Ltd. Manufactory, Sheffield, England.

I. WILLARD BEAM, Agent, 29 MAIN STREET, SAN FRANCISCO, CAL.

THE WM. HAMILTON MANUFACTURING CO.,
LIMITED,

MINING MACHINERY,

PETERBOROUGH, ONTARIO,

CANADA.

McFARLANE & CO.,

1734 FIFTEENTH ST., DENVER, COLO.

Mining and Milling Machinery.

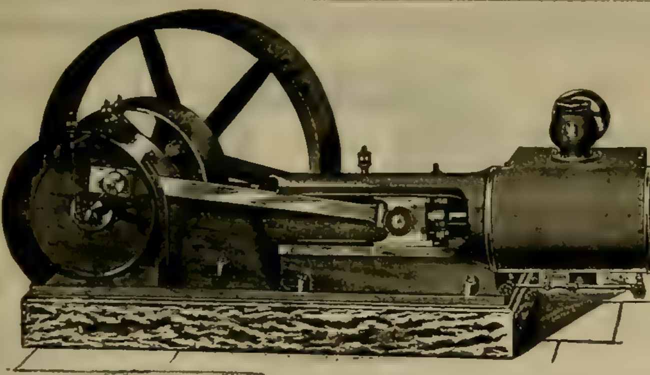
STAMP AND CONCENTRATING MILLS BUILT AND ERECTED.

STEAM AND ELECTRIC HOISTS, CRUSHERS, ROLLS, REVOLVING SCREENS, JIGS. ORE CARS, CYANIDE TANKS, CORNISH PUMPS, CORLISS ENGINES.

THE CAL. ANTI-CALORIC COMPANY,

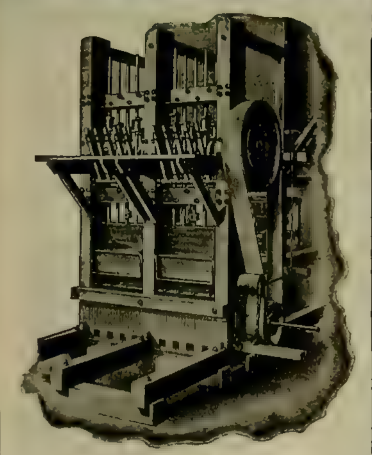
Tel. Main 5752. Office, 217-219 Mission St., San Francisco, Cal.

Sole Manufacturers of CAL. ANTI-CALORIC SECTIONAL COVERINGS AND BLOCKS FOR BOILERS. PLASTIC (dry) for Steam Domes, Etc. Sole Agents for the Boston Asbestos Paper Co. Asbestos Goods of All Kinds. Send for Information. Factory, Potrero.



ENGINES, BOILERS,
UP-TO-DATE MACHINERY.
WRITE US FOR PARTICULARS.
THE COMPRESSED AIR MACHINERY CO., 11-13 First St., San Francisco, Cal.

THE EDW. P. ALLIS CO.,
MILWAUKEE, WIS.



TEN STAMP BATTERY.

Mining, Milling and Smelting Plants.

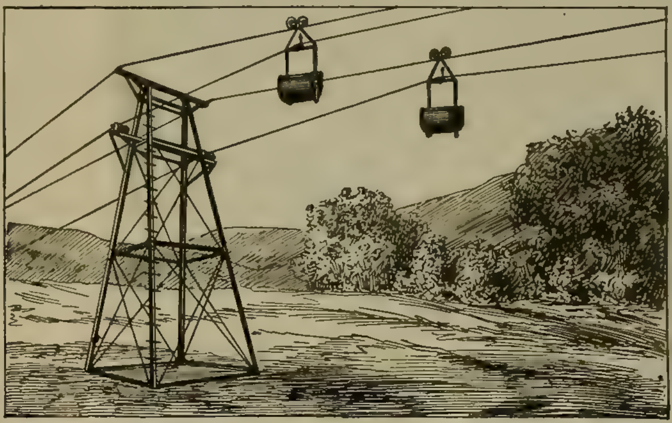
MINING MACHINERY OF EVERY DESCRIPTION.
HOISTING ENGINES
REYNOLDS CORLISS ENGINES.

THE MARION STEAM SHOVEL CO.,

Steam Shovels Dredges and Traction Dredges
Suitable for all kinds of Excavating Work, making a specialty of
PLACER MINING MACHINES,
separate or self-contained, either as a dry land excavator or floating dredge.
The Marion Steam Shovel Co.
MARION, OHIO.
GEO. W. BARNHART, No. 4 Sutter St., San Francisco, Cal.

DEWEY, STRONG & CO., Patent Solicitors, 330 Market St., San Francisco, Cal.

VULCAN DOUBLE ROPE TRAMWAYS.
VULCAN ROPEWAYS (SINGLE ROPE SYSTEM).
AUTOMATIC LOADING AND DUMPING APPLIANCES



AND OTHER ROPE HAULAGE SYSTEMS.

SEND FOR CATALOGUE.

Vulcan Iron Works, Manufacturers of Mining Machinery, SAN FRANCISCO, CALIFORNIA.

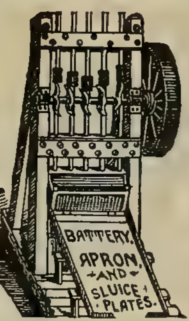
SHOES and DIES
of SUPERIOR quality and at prices 20 to 30% lower than any other maker.
FURNISHED BY
ARTHUR KOPPEL, 66 Broad St., N. Y. City.
WRITE FOR PARTICULARS.

MINING CARS of every description.
PORTABLE RAILWAYS, Rolling Stock, Railway Outfits for Mines of every description. Export Work a specialty.
ARTHUR KOPPEL, 66 Broad St., N. Y. City.
SEND FOR CATALOGUE AND ESTIMATES.

Pacific Coast Agents, Baker & Hamilton, San Francisco and Sacramento.

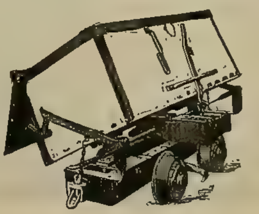
The Best MINE PUMPS in the World.
COMPOUND CONDENSING AND TRIPLE EXPANSION STATION PUMPS.
We carry in our Denver store a stock of Improved Pattern Sinkers and Duplex Station Pumps, with duplicate parts for repairs.
Write for Catalogue and Estimates.

Jeanesville Iron Works Co.,
JEANESVILLE, PA.
Western Office,
Columbia Hotel Building,
1328 17th St.
Denver, Colo.
Telephone 2298 A.
A. MIDDLEBROOK, Manager.



To Gold Miners!
Silver Plated Copper Amalgamating Plates
For Saving Gold in Quartz and Placer Mining.
ONLY BEST COPPER AND REFINED SILVER USED. OLD MINING PLATES BOUGHT OR TAKEN IN EXCHANGE FOR NEW PLATES. GOLD EXTRACTED FROM OLD PLATES AT A MODERATE COST. OLD PLATES REPLATED. GOLD, SILVER, NICKEL, COPPER AND BRASS PLATING.
Denniston San Francisco Plating Works,
652 Mission Street, Cor. Annie, San Francisco, Cal.
E. G. DENNISTON, ... Proprietor.
——:Send for Circular.:——

OUR CARS HAVE BEEN IN USE FOR NINE YEARS.
TRUAX
CARS ALWAYS IN STOCK TO FILL RUSH ORDERS.
ORE CARS
CUT REPRESENTS OUR SIDE DUMP CARS.
SEND FOR PAMPHLET.
TRUAX MFG. CO.
CARS MADE FOR ALL KINDS OF WORK.
69 Stevenson St., S.F.



Founded by Mathew Carey, 1785.

HENRY CAREY BAIRD & CO.,
INDUSTRIAL PUBLISHERS, BOOKSELLERS & IMPORTERS,
810 Walnut St., Philadelphia, Pa., U. S. A.

☞ *Our New and Revised Catalogue of Practical and Scientific Books, 92 pages, 8vo; a Catalogue of Books on Steam and the Steam Engine, Machinery, etc.; a Catalogue of Books on Sanitary Science, Gas Fitting, Plumbing, etc., and our other Catalogues and Circulars, the whole covering every branch of Science applied to the Arts, sent free and free of postage to any one in any part of the world who will furnish his address.*

DELINQUENT SALE NOTICE.

MAMMOTH GARFIELD GOLD MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Shasta County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment levied on the 5th day of June, 1900, the several amounts set opposite the names of the respective shareholders, as follows:

Name.	No. Cert.	No. Shares.	Amt.
Andrew Corbin	13	20.000	$3500 00
Philip Corbin	14	20,000	3500 00
Charles Glover	16	1,750	306 25
Jos. S. Silver	5	5	87
J. M. Spring	15	2,000	350 00

And in accordance with law, and an order from the Board of Directors, made on the 5th day of June, 1900, so many shares of each parcel of such stock as may be necessary, will be sold at public auction, at the office of the company, Rooms 54 and 59, No. 120 Sutter street, San Francisco, California, on TUESDAY, the 2nd day of October, 1900, at the hour of 2 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

SAM W. CHEYNEY, Secretary.

Office—Rooms 54 and 59, No. 120 Sutter street, San Francisco, California.

POSTPONEMENT.

The date of sale of the above described delinquent stock has been postponed to THURSDAY, the 1st day of November, 1900, at the hour of 2 o'clock P. M. of said day. By order of the Board of Directors

SAM W. CHEYNEY, Secretary.

Office—Rooms 54 and 59, No. 120 Sutter street, San Francisco, California.

Hoskins' Patent Hydro Carbon Blow-Pipe and Assay Furnaces.

No dust. No ashes. Cheap, effective, economical, portable and automatic.

SEND FOR PRICE LIST TO

W. HOSKINS, 81 South Clark St., Room 55, CHICAGO, ILL.

HEALD'S

BUSINESS COLLEGE.

24 Post Street, - - - San Francisco.

MINING AND CIVIL ENGINEERING DEPARTMENT: Mathematics, Draughting, Strength of Material, Chemistry, Assaying, Blow-Pipe Analysis, Geology, Mineralogy, Surveying, etc., under the direction of Prof. O. H. Packer, an engineer of national reputation.

ELECTRICAL DEPARTMENT: Theory and Practice; Construction,

BUSINESS: Bookkeeping, Shorthand, Typing, Modern Languages, etc.

Twenty teachers; individual instruction; can enter at any time; Catalogue and Journal free.

THE MINES OF Eastern Oregon

Which are now attracting so much attention are reached only by the lines of the

OREGON RAILROAD & NAVIGATION CO.

For Descriptive Pamphlets, Through Rates, Etc., Address

E. C. WARD, Gen. Agt.,
630 Market Street, San Francisco.

DEWEY, STRONG & CO.
SCIENTIFIC PRESS PATENTS PATENT AGENCY
330 MARKET ST. S.F.

ASSESSMENT NOTICES.

MARINA MARSICANO GOLD MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Sunny Hill, Shasta County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 15th day of September, 1900, an assessment (No. 24) of 2 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, 217 Sacramento street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 23d day of October, 1900, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 12th day of November, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

CHAS. BOVONE, Secretary.

Office—217 Sacramento street, San Francisco, California.

CALIFORNIA BORAX COMPANY.—Location of principal place of business, San Francisco, California; location of works, San Bernardino County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 10th day of October, 1900, an assessment (No. 4) of seventy-five (75) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, No. 310 Pine street, Room 36, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 19th day of November, 1900, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 10th day of December, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

J. W. PEW, Secretary.

Office—No. 310 Pine street, Room 36, San Francisco, California.

DELINQUENT SALE NOTICE.

AMERICAN OIL AND REFINERY COMPANY.—Location of principal place of business, San Francisco, California; location of works, Contra Costa County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment levied on the 21st day of August, 1900, the several amounts set opposite the names of the respective shareholders, as follows:

Name.	No. Cert.	No. Shares.	Amt.
Abbott, William	720	50	$5 00
Abbott, William	721	50	5 00
Abbott, William	722	50	5 00
Abbott, William	723	25	2 50
Abbott, William	724	25	2 50
Arnoldy, Marie	379	1	10
Berry, Jos. M	189	1	10
Burger, John	105	15	1 50
Christy, Miss Helen	322	2	20
Cochran, J. H	393	4	40
Corbiere, C. C	564	250	25 00
Corbiere, C. C	565	5	50
Cowsert, J. W	384	10	1 00
Crane, Roxie E	140	5	50
Ehrlich, Henry	438	100	10 00
Ehrlich, Henry	461	25	2 50
Ehrlich, Dr. Henry	793	75	7 50
Fenger, H. M	472	10	1 00
Fenger, H. M	474	5	50
Fenger, H. M	474	5	50
Fenger, H. M	475	3	30
Fenger, H. M	476	3	30
Fenger, H. M	477	2	20
Fenger, H. M	478	2	20
Folger, A., Jr	222	1	10
Gibson, Miss Nellie I	376	3	30
Goodenough, S	514	480	48 00
Grey, Martin	255	5	50
Haraszthy, Mrs. Natalia	192	100	10 00
Haraszthy, A. F	621	935	93 50
Haraszthy, A. F	733	219	21 90
Heald, G. W	261	1	10
Holbrook, W. E., Trustee (no certificate issued)	...	15,800	1580 00
Jacobsen, Miss Lillian H	239	10	1 00
Jones, A. K	293	1	10
Keifer, Elizabeth B.	69	1	10
Lederer, Mrs. A. G	601	2	20
Lord, Leona E	327	2,000	200 00
Maxwell, Claude John	168	1	10
Maloney, John	161	2	20
Metz, Walter N	145	5	50
Morse, Dr. Chas	703	9	90
Odle, Mrs. John	218	1	10
Opman, John	294	25	2 50
Parker, M. W	765	10	1 00
Reed, Elmer	352	3	30
Rose, Jesse J	331	5	50
Slayback, Mrs. Deborah	36	25	2 50
Snydam, F. A	182	5	50
Stover, W. M	515	500	50 00
Truett, J. F	241	2	20
Union Cons. Oil & Transportation Co. (no certificate issued)	...	5,000	500 00
Walser, Mark (no certificate issued)	...	32,184	3218 40

And in accordance with law, and an order from the Board of Directors, made on the 21st day of August, 1900, so many shares of each parcel of such stock as may be necessary, will be sold at public auction at the office of said corporation, in Rooms 322–323 Parrott building, San Francisco, California, on MONDAY, the 29th day of October, 1900, at the hour of 1 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

J. C. ANTHONY, Secretary.

Office—Rooms 322–323 Parrott building, San Francisco, California.

ANY BOOK

ON ANY SUBJECT

Connected with Mining, Metallurgical, Mechanical or Industrial Interests,

WILL BE SENT ANYWHERE, POSTPAID,

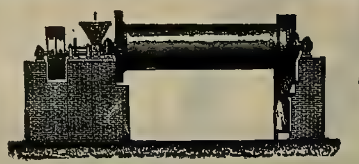
AT PUBLISHER'S PRICES.

SEND FOR CATALOGUE OF LINE DESIRED.

ADDRESS BOOK DEPT. MINING AND SCIENTIFIC PRESS,

NO. 330 MARKET STREET, SAN FRANCISCO, CAL.

THE DAVIDSEN



PATENT TUBEMILL.

FOR FINE GRINDING,

Uniformity of Output, Effectiveness, Simplicity, or Economy of Operation and Maintenance, "THE DAVIDSEN" HAS NO EQUAL.

ENORMOUS GRINDING SURFACE. ❧ SLOW SPEED. ❧ ANY DEGREE OF FINENESS.

WRITE FOR CATALOGS.

F·L·SMIDTH & CO
ENGINEERS
66 MAIDEN LANE, NEW YORK
COPENHAGEN, VESTERGADE 29.K. LONDON. 9 BRIDGE ST., S.W.

THE SMIDTH BALLMILL

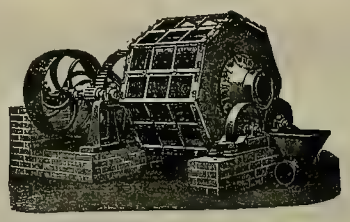
Crushes, Grinds and Sifts in One Operation, Working Continuously.

AMONG ITS SPECIAL FEATURES OF MERIT ARE:

Maximum Output, Slow Speed, Low Horse Power, Absolute Uniformity, Ease of Access, Slight Cost of Repairs.

OUR AUTOMATIC FEEDER INSURES REGULARITY AND EFFECTIVENESS.

THE SMIDTH BALLMILL.



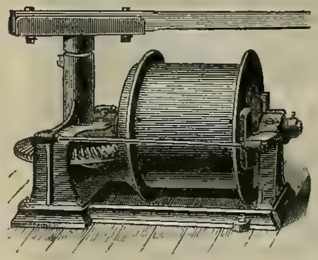
BEST. CHEAPEST. MOST SIMPLE.

JOSHUA HENDY MACHINE WORKS,

No. 42 FREMONT STREET, SAN FRANCISCO, CAL.

—BUILDERS OF—

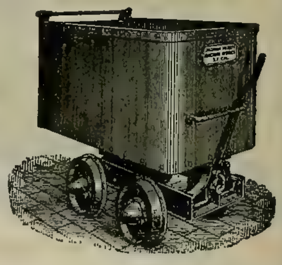
"Davis" Horse Power Whims. Ore and Rock Cars.



Specialty of
PROSPECTING,
MINING and
MILLING
PLANTS.

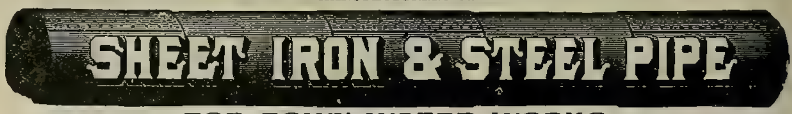
ORE and WATER BUCKETS.

"T" RAIL OF USUAL WEIGHTS, EITHER NEW OR SECOND-HAND, FOR SALE CHEAP.



FRANCIS SMITH & CO.,

—MANUFACTURERS OF—



SHEET IRON & STEEL PIPE

FOR TOWN WATER WORKS.

Hydraulic, Irrigation and Power Plants, Well Pipe, Etc., all sizes.

46 FREMONT STREET, - - - - SAN FRANCISCO, CAL.

Iron cut, punched and formed, for making pipe on ground where required. All kinds of Tools supplied for making Pipe. Estimates given when required. Are prepared for coating all sizes of Pipes with Asphaltum.

THE BUCYRUS COMPANY,

DESIGNERS AND BUILDERS OF

DREDGES, STEAM SHOVELS, EXCAVATING MACHINERY, WRECKING CARS, LOCOMOTIVE CRANES, PILE DRIVERS, CENTRIFUGAL PUMPS, WITH SIMPLE, COMPOUND OR TRIPLE EXPANSION ENGINES,

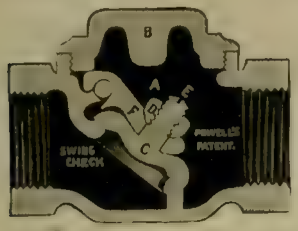
MACHINERY FOR PLACER MINING.

SOUTH MILWAUKEE, WISCONSIN.

MINE BELL SIGNALS. Adopted, Used and in Force in Accordance with Law.

We print in legal size, 12x36 inches, the Mine Bell Signals and Rules provided for in the Voorhies Act passed by the California Legislature. The law is entitled "An Act to Establish a Uniform System of Bell Signals to Be Used in All Mines Operated in the State of California, for the Protection of Miners." We furnish these Signals and Rules, printed on cloth so as to withstand dampness. 50 Cents a Copy.

MINING AND SCIENTIFIC PRESS, 330 Market St., San Francisco, Cal.



Powell's Patent
Swing Check Valve.

SIMPLE, EFFECTIVE AND TIGHT.

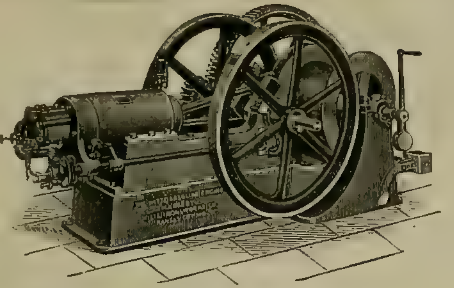
Can quickly and easily be reground at any time. Works equally well in either a horizontal or vertical position. Try them. Jobbers on the Pacific coast can furnish them. Manufactured by

THE WM. POWELL CO.,
CINCINNATI, O.

D. Campbell Davies & Co.,
REPRESENTING THE LARGEST
EUROPEAN and AMERICAN
MANUFACTURERS
— OF —
Mills, Mine and Smelting
Machinery Supplies.

EXPORT TRADE A SPECIALTY.

Apartado No. 83,
DURANGO, - - - MEXICO.



WITTE GASOLINE HOISTS
ARE MONEY EARNERS.

Made for use in places far from factory. Are built in parts and in duplicate. Renewals easy and quick to get. Strong, substantial and reliable.

Operate on GAS, GASOLINE or DISTILLATE.

There Are Others, but None as SAFE AND RELIABLE.

Write for Illustrated Catalogue G.

WITTE IRON WORKS CO.,
515 WEST 5th ST.,
KANSAS CITY, MO., U. S. A.

Hendrie & Bolthoff Mfg. & S. Co., Denver, Colo.
C. B. Boothe & Co., Los Angeles, Cal.
Tracy Engineering Co., San Francisco, Cal.

OIL OR GREASE?

Whichever you use, you will obtain the BEST RESULTS if you feed it to the bearings from a

We have them for all purposes, all styles, all sizes.

TRADE PENBERTHY MARK

Send for Circulars

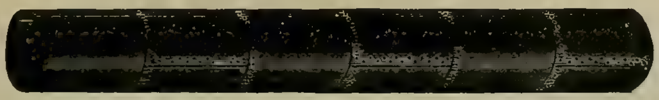
OILER OR GREASE CUP

And DO NOT FORGET we Manufacture and Guarantee the ERWIN STEAM RAM MOST ECONOMICAL WATER ELEVATING DEVICE.

And the World Renowned PENBERTHY AUTOMATIC INJECTOR Over 200,000 in Use

PENBERTHY INJECTOR CO.
WINDSOR, CANADA. DETROIT, MICHIGAN.

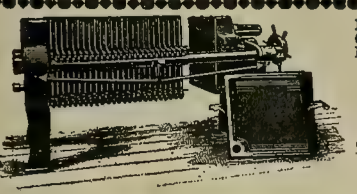
RIVETED IRON AND STEEL PIPE



FOR HYDRAULIC MINES, IRRIGATION AND POWER PLANTS. Manufactured from the best grades of IRON or STEEL by MODERN MACHINERY.

AGENTS FOR THE Celebrated CANTON STEEL.

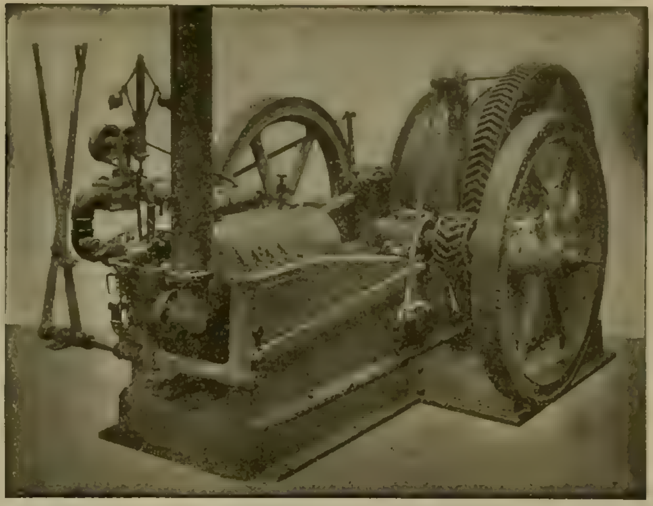
Schaw, Ingram, Batcher & Co., 539 Mission St., SAN FRANCISCO. 211 to 219 J St., SACRAMENTO.



FOR Removing Slimes
BROMINE
CYANIDE
CHLORINATION
And Other Aquarious Chemical Solutions.
Our FILTER PRESS
Removes all Slimes and Hastens the Deposition of the Metals.

THE STILWELL-BIERCE & SMITH-VAILE CO., 276 Lehman St., Dayton, Ohio. Risdon Iron & Locomotive Works, San Francisco, Cal.; C. B. Boothe & Co., Los Angeles, Cal., Sales Agents.

HERCULES HOISTS Are Sold the World Over.



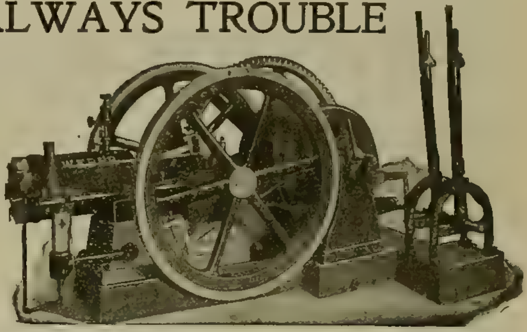
Hercules Gasoline Hoist--Speed 385 Ft.; Load 2500 Lbs.

HERCULES GAS ENGINE WORKS,............141-143 FIRST STREET, SAN FRANCISCO, CAL.

THERE IS ALWAYS TROUBLE

with a second-class Gasoline or Oil Engine or Hoist, and there is no good excuse for buying that kind when the Weber is so easy to get. Write for particulars.

WEBER GAS & GASOLINE ENGINE CO.,
P. O. Box 1132-I,
Kansas City, Mo.



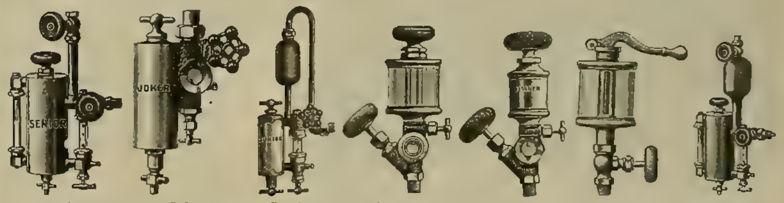
For Valves,
Whistles,
Lubricators,
Oil Cups,
Grease Cups,
Oiling Devices,
Brass and Iron
Steam Specialties,
Go to Headquarters

ALL goods bearing the name "Lunkenheimer" are warranted first-class, and endorsed by intelligent steam-users everywhere. Specify "Lunkenheimer" make. Our catalogue will post you. Write for one.

The Lunkenheimer Company,
BRANCHES NEW YORK, LONDON. GENERAL OFFICES AND FACTORIES Cincinnati, U. S. A.

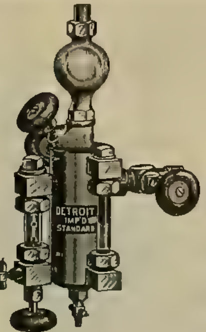
BRANCHES: NEW YORK, 26 Cortlandt St.; PHILADELPHIA, Bourse Bldg.; LONDON, S. E., 35 Gt. Dover St.; MEXICO CITY, Puente de San Francisco No. 6.

SIGHT FEED LUBRICATORS.



Senior. Joker. Junior. Mars. Banner. Oil Pump. Spray Feed.

If you want practical and reliable cups, use "The Lunkenheimer;" they satisfy the most exacting. Specify "Lunkenheimer" make. In stock by dealers everywhere.



ALL ABOUT
Sight Feed Lubricators.

Our new catalogue for 1900 is ready for distribution. It explains in detail the principles governing the operation of Sight Feed Lubricators, using sectional view to show the internal construction, and containing cuts of the different styles in parts before being assembled into the complete lubricators, thus enabling every one to understand their construction and operation thoroughly.

In addition it shows our full line of Glass Oilers, Oil Pumps, Oiling Devices, Multiple Oilers, Valves, Etc. It will be sent to any address on application.

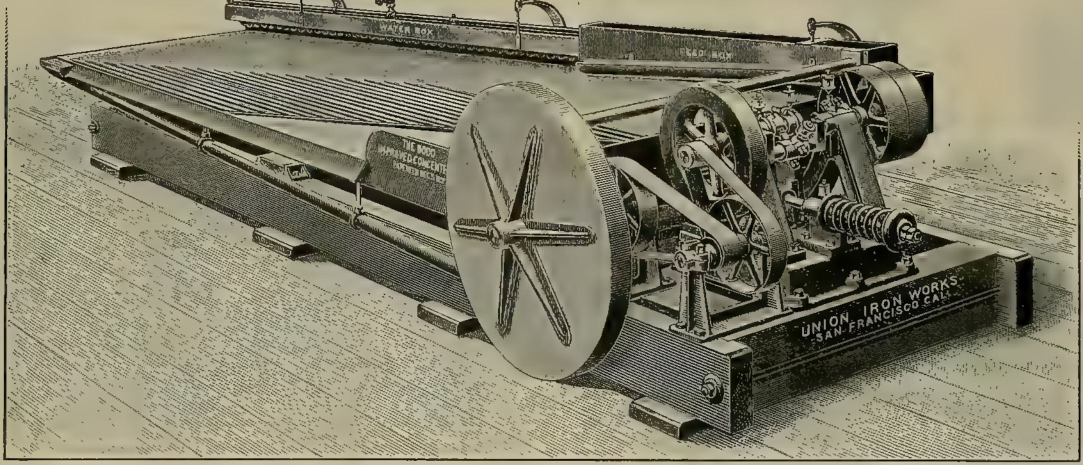
DETROIT LUBRICATOR CO., DETROIT, MICH.

Mining Hoist.

THE GOLDEN GATE GAS ENGINE
Will raise more ore than any other AT LESS COST.
MANY IN USE, Giving Satisfaction.
Built for any Capacity and for any Purpose.
Pumping Water, Propelling Boats, Hoisting Ore, Machine Shop Power, Etc.
Send for Particulars and Catalogue.
ADAM SCHILLING & SONS,
213 & 215 Main St., San Francisco, Cal.

UNION IRON WORKS,

222 Market Street, San Francisco, Cal.


WATER BOX
FEED BOX
THE DODD IMPROVED CONCENTRATOR
UNION IRON WORKS SAN FRANCISCO CAL.

Patented Dec. 5, 1899; May 29, 1900.

THE DODD CONCENTRATING TABLE,

which we illustrate herewith, is the latest and most improved machine of this class now made.

This type of machine is so well known that little or no description is required. It is specially adapted for ores carrying a heavy percentage of sulphurets; has a large capacity and effects a clean separation.

The operating mechanism can be easily adjusted to meet the requirements of any character or condition of ore; it is simple, durable and efficient, and gives universal satisfaction.

For further particulars, address UNION IRON WORKS, San Francisco, Cal.

THE HALLIDIE ROPEWAY

For Transporting Ore, Fuel, Earth, Sugar Cane, etc., by Wire Ropes.

SIMPLE, ECONOMICAL, PRACTICAL, DURABLE.

LOADS MECHANICALLY. DUMPS AUTOMATICALLY.

WIRE TRAMWAYS (Single and Double Rope Systems),

Cableways, Transmission by Wire Ropes,
Incline Planes, Cable Grips,
Logging by Cables, Automatic Loaders,

PLOWING, SCRAPING AND TRANSPORTING by Wire Ropes,

DESIGNED, SUPPLIED AND ERECTED. Estimates Furnished.

Improved GRIP PULLEY.

Patents Nos. 483,442; 610,353.

EFFECTIVE, SIMPLE, AUTOMATIC.

Saves Wear on Wire Rope and Cable.

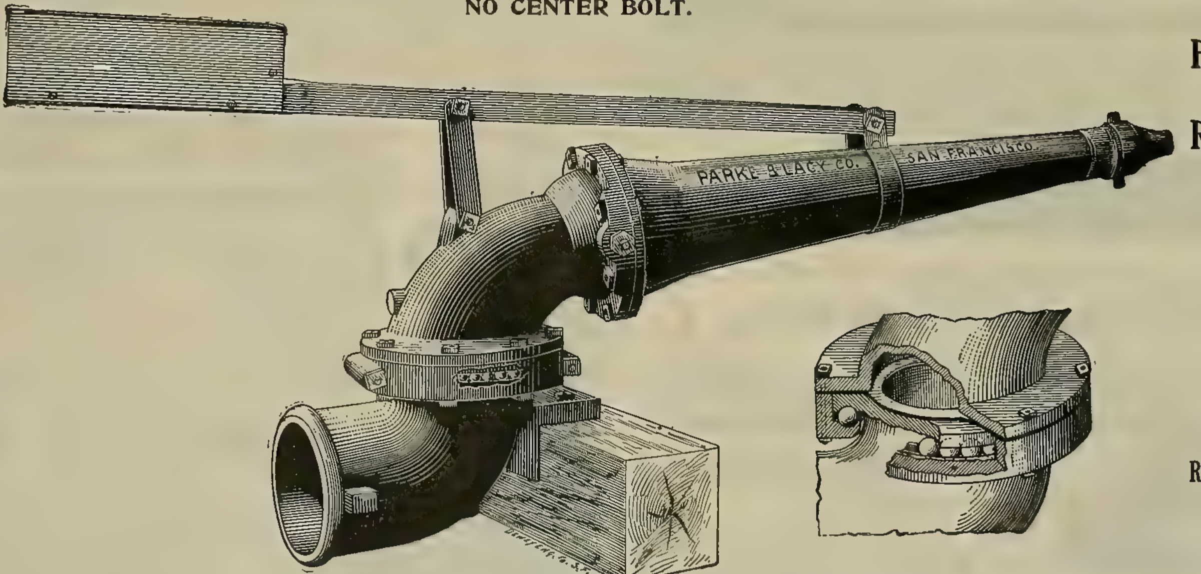
Send for Illustrated Pamphlet.

Correspondence Solicited.

CALIFORNIA WIRE WORKS, - 9 Fremont St., San Francisco, Cal.

SIMMONS PATENT DOUBLE-JOINTED, BALL BEARING GIANTS, With Weighting Attachment.

NO CENTER BOLT.



- Deflectors,
- Retorts,
- Water Gates,
- Hydraulic Water Pipe
- Valves, Etc.
- Huntington Quartz Mills,

- Paul Ball Mill,
- Rock Breakers,
- Rolls, Etc.

Sole Agent for INGERSOLL-SERGEANT Rock Drills and Air Compressors, BULLOCK DRILLS.

PARKE & LACY CO., 21 & 23 FREMONT ST., SAN FRANCISCO, CAL.

Sole Agent for KNOWLES PUMPS and PULSOMETER PUMPS.

MINING AND SCIENTIFIC PRESS.
AND PACIFIC ELECTRICAL REVIEW.

Whole No. 2100.—VOLUME LXXXI. Number 16. SAN FRANCISCO, SATURDAY, OCTOBER 20, 1900. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

Advantages of Electric Motors.

They are capable of direct connection to the machinery to be operated, which means that their power, however great it may be and however large the machine, can be transmitted by the shaft instead of requiring a belt and a pulley on the driven machine large enough to receive, by the friction of the belt traveling upon it, the needed power. As 1000 feet of belting 1 inch wide must pass around a pulley in a minute to transmit 1 H. P., it is evident that the handling of 100 H. P. will require a large pulley and a heavy belt, which is not only inconvenient and sometimes dangerous, but occupies considerable floor space, and requires that the machine be heavy enough in design to support the large pulley and the strain of the belt. Motors are capable of regulation and control of their speed and driving power with great convenience, so that electrically driven machines can be started, stopped, reversed or speeded up by the use of small instruments known generally as regulators, which may be placed close to the machine or in any other convenient location, while machinery driven by belting can be merely started or stopped, and then only with a considerable manual effort in shifting the belt, or can be run at other speeds only by bodily removing the belt to a driving pulley of different size. Motors, when used for driving machinery, are usually attached directly to the machine, and, being much less bulky than other means of driving, the entire machine is independent of any line shafting, and therefore may be located in a convenient position without regard to this limitation, and in many cases can even be picked up and shifted from one place to another, as the exigencies of its work require.

Electricity permits the saving of one-half the power otherwise required. This results from the fact that when the tool is stopped the motor is stopped and draws no power, whereas in belt driving when the tool is stopped the belt or one of the belts is simply shifted and continues to run on an idle pulley.

View of the International Line at Nogales, Arizona.—See Page 465.

Increasing Business.

The general advance in the manufacturing industries of San Francisco and California is typified by such enlargement of manufacturing facilities as that of the Geo. E. Dow Pumping Engine Co., which on the 1st inst. moved into new and larger buildings. For twenty years the Dow Steam Pump Works have been manufacturing pumping machinery at Nos. 108 to 120 Beale St., San Francisco, and in modernizing methods of construction it was found requisite to have larger and better surroundings. The accompanying picture gives graphic representation of the appearance of the new shops and offices of the new company, extending on First street, San Francisco, from Natoma to Howard street, and on Howard from First to Fremont, giving the company about 50,000 square feet of floor surface. The offices of the company are at 179 First street. The specialties of the company are steam, electric and power pumps and hydraulic machinery; the Dow pumps are found on several United States battleships and cruisers. Dow pumps were on the great battleship Oregon, built by the Union Iron Works of San Francisco; Dow pumps are on the battleship Wisconsin, similarly built, that beat the world's record in her official trial trip in Santa Barbara channel on the 11th inst.

GEO. E. DOW PUMPING ENGINE CO.
MACHINE SHOPS
FOUNDRIES
Geo. E. Dow Pumping Engine Co.

New Works of the Geo. E. Dow Pumping Engine Co., San Francisco, Cal.

MINING AND SCIENTIFIC PRESS.

ESTABLISHED 1860.

Published Every Saturday at 330 Market St., San Francisco, Cal.

ANNUAL SUBSCRIPTION:
United States, Mexico and Canada.......$3 00
All Other Countries in the Postal Union....... 4 00

Entered at the S. F. Postoffice as second-class mail matter.

J. F. HALLORAN.......Publisher.

Special Representatives:
EASTERN.
E. H. HAVEN.......150 Nassau St., New York City.
MIDDLE WEST.
CHAS. D. SPALDING.......153 La Salle St., Chicago, Ill.
INTER-MOUNTAIN.
W. A. SCOTT.......43 Jacobson Building, Denver, Colo.
SOUTHERN CALIFORNIA.
W. D. CURTIS.......223 W. Second St., Los Angeles, Cal.

San Francisco, October 20, 1900.

TABLE OF CONTENTS.

ILLUSTRATIONS.—View of the International Line at Nogales, Arizona; New Works of the Geo. E. Dow Pumping Engine Co., San Francisco, Cal., 461. View of Nogales, Arizona; View of Nogales, Sonora, Mexico, 465. Enclosed Electric Motor, 466. Mining and Metallurgical Patents, 467. Splicing Wire Rope, 468.
EDITORIAL.—Advantages of Electric Motors; Increasing Business, 461. Business not Politics; A Good Idea; Probable Consolidation; Value of Properties in the Transvaal; Miscellaneous, 462.
MINING SUMMARY.—469-470.
LATEST MARKET REPORTS.—470.
MISCELLANEOUS.—Concentrates, 463. "How to Make Gold Dredging Pay," 464. An Interesting Locality; The Selection of a Working Process, 465. Refining California Petroleum; Duplex System of Telegraphy; Formation of Lode Matter; Enclosed Electric Motor; The Cazo Reduction Process; The Fatigue of Metals, 466. Mining and Metallurgical Patents, 467. Machine Mine Rock Drills on the Pacific Coast; Splicing Wire Rope; Movement of Ground Water; Effect of Drouth on Boilers, 468. Personal; Commercial Paragraphs; Recently Declared Mining Dividends; List of U. S. Patents for Pacific Coast Inventors, 470.

PURCHASE of the Guggenheim smelting interests by the American Smelting & Refining Co. is again asserted, the consummation of the deal to be announced before Jan. 1. When the smelter combine was formed eighteen months ago effort was made to include the Pueblo, Colo., plant and the several Mexican establishments of the Guggenheims; but the proffered price was considered insufficient by the latter. Negotiations have since gone on, and it appears probable that the consolidation will be effected before the close of the year. The figure mentioned, however, $38,000,000, is manifestly an exaggeration. A proposition that had been the subject of considerable negotiation was based about as follows: The Guggenheims to get for all their interests $35,000,000 of American Smelting & Refining Co.'s stock, half in common, half preferred, and they to pay the American Smelting & Refining Co. $10,000,000 in cash. If the preferred stock were quoted at 90 and the common stock at 40, $17,500,000 of each would be worth $22,750,000, and if the $10,000,000 in cash were deducted therefrom, it would represent $12,750,000 as, approximately, what the proffer would net the Guggenheims for their holdings on that basis. It is probable that their properties will be so absorbed.

◆

IT is expected that when cessation of hostilities enables resumption of gold mining in the Transvaal, the value of the properties will be enhanced, because of a direct saving per ton of ore treated and an increase in the tonnage mined. Among other anticipated economies are counted the cheapening of the cost of labor and supplies, the suppression of the dynamite monopoly and the ceasing of the traffic in stolen amalgam. It is expected by the sanguine that the ultimate result of such aggregated savings over the former system will represent an increase in annual dividends of over $25,000,000, based on the tonnage of ore crushed in 1899. Those who figure that way apparently overlook that while the result may be a lessening of costs, it must necessarily be some time before the dividends can be expected to greatly materialize, as the British Government will naturally expect that much of the cost of the war shall be borne by the industry that that war relieved from some of its former restrictions. Now that the South African Republic is no more, it is possible that the cyanide patents may be brought forward in that English colony. The Dutch courts held the MacArthur-Forrest patents to be invalid; but the general recognition of those patents in British courts may serve as a precedent in the Witwatersrand, which now becomes a British colony, and where 35% of the gold recovered is by the cyanide process.

Business, Not Politics.

A little local item in the issue of the 10th inst. of the Mother Lode Magnet, a paper published at Jamestown, Tuolumne county, Cal., is one of the best bits of mining news seen for a long time. It is a brief statement to the effect that Tuolumne county, Cal., supervisors are making repairs on the roads under their control. Ordinarily, whatever is done for the miners in the way of good roads, or any roads at all, is done by the miners themselves, at their own individual expense, and there is nothing that so retards mining development in the State of California to-day as the lack of roads. "No thoroughfare" might be written in a great many instances as the cause of the languishing or death of many a promising mining district in the State. It has not been uncommon for mining men for six months in the year to come into this office declaring that they would be eternally blest if they ever went near such and such a locality again; that they would prefer a trip to a point a thousand miles distant, because of the discomfort and delay attendant upon a lack of communication, at the same time telling of wagon loads of machinery blocked and mired along the road they traveled, and giving details of the expense consequent upon such a state of affairs.

Comment has been made on this before, and the subject is reverted to now only to say that very often it is the fault of the miners themselves. They have the control of these things in their own hands, and with organization and proper use of their votes they could vote supervisors into office that would see that the roads were bettered. This suggestion is consistent with our invariable rule never to have anything to do with politics, but there is no partisan politics in this; it is purely general; it is for the greatest good to the greatest number. Too often men are influenced by partisan pleas and elect a man because he is a good fellow, or because he needs the office, or because he belongs to their party, or because they believe lies that have been told about his opponent; but, viewing the voting as a business proposition, it is good business for the miner everywhere to vote for and stand by the man that he has pretty good reason to believe will work for and stand by him. When we say "the miner" we mean everybody in any way connected, directly or indirectly, with the prosperity of the mining industry, and who look to it, directly or indirectly, for aid in their business. It is the business of the owners of mining property, of resident local merchants, of those who make or supply mining machinery, just as much as the business of the miner, to aid in securing good roads, and the only way to secure them is to put men in office who will see that sufficient tax is levied to raise the money and that that money shall be economically and intelligently spent for the purpose for which it was assessed.

The Tuolumne county, Cal., supervisors deserve credit for the effort to better their roads, and apparently if they had more money at their disposal they would do more than they propose doing. This is a homely subject; there is nothing technical nor particularly scientific about it, but it is a business proposition that has been neglected and now is as good a time as any to act upon the suggestion, in California and anywhere else that good roads would help in developing a mining district.

The proposition is so self-evident that it requires no discussion or argument. It is not business to attempt to put up with such miserable makeshifts as some of the "roads" found in mining districts, and the same ordinary rules of business require that what is taken from the people by taxation should be properly spent. For instance, in the county of Amador, California, there is a special road tax of 20 cents on the $100; there is a general road fund beside. In that county the property is taxed for road purposes this year to the amount of over $24,000, so that so far as Amador is concerned the people of that county are paying for good roads; but they are not getting them. That trouble lies largely with wrong system and mistaken ideas of how the money should be expended. There is considerable public money annually fooled away in "repairs" to bad roads, that leave things no better than they were. The money is spent; that is about all that can be said. It were better to have one mile of good road every year than have such excuses for roads as exist, even where the money is supplied for such purposes. There is no reason why in any mining district there should not be good roads if modern and intelligent methods are adopted.

A high average for a good road, including stone bridges, culverts and other requirements, is $5000 a mile. In Amador county for its $24,000 could be built annually five miles of good, permanent road that would be a good investment for the county; the gain would be many times what the five miles cost, and in a few years it would have what it has not now.

There are few things of greater importance to this west half of America than this matter of roads. A horse can draw on a poor road about four times as much as he can carry on his back; on a good macadamized road he can pull about ten times as much, on a wooden road twenty-five times as much, and on a tramway fifty times as much.

All this has been said over and over again, but, though trite, it deserves iteration and reiteration. It is an ever-present subject and needs more intelligent attention than it appears to be receiving. Accepted everywhere as a silent precept, it should be considered more as an active duty. With the miners themselves rests the remedy. Public spirit, public opinion and the plainest dictates of business are with them—the remedy is organization by the different county miners' associations and a fixed determination to see that money is raised for good road work and spent in such a way as to insure permanent benefit.

A Good Idea.

Spokane, Wash., wants to hold a mining exposition next year. The mining men of that city and section rightly recognize the need of advertising. A mining exposition is good business for any mining center. It is not enough that there should be valuable mining ground, but it is equally essential that the fact be widely known. A mining exposition would be a good thing for Spokane and the Northwest; it would aid in the development of the mineral resources of that great section. A just display of ores, of mining machinery and supplies, an exposition of processes and ore treatment, and a plain, fair presentation of general mining resources would be a grand advertisement for Spokane or for any other mining center. A mining exposition did much for Denver; a mining fair held in San Francisco in 1898 had good effects, still felt; the more public attention can be attracted toward any mining region the more prosperous it becomes. By means of such expositions as Spokane projects, a section gets gilt-edge advertising that it could not get in any other way. Of course, the sum, intent and object of all such advertising is to attract the attention of capital seeking investment. The banks of every large city, East and West, are crammed with money drawing from 3% to 5%, in want of something better, in the opinion of its owners, in which to invest it. In ordinary lines of trade and manufacture competition cuts so into profits that the margin between loss and gain is slight. Investors realize that causes unforeseen and uncontrollable may turn a likely enterprise into disaster. Some of them, too, are inclined to realize that a rightly managed mining investment in a good district stands better chance for profit than in enterprises where ordinary trade rules prevail, and they are inclined to put money into a business in the product of which no competition exists. Of such business gold mining is the only example.

It would be a good thing for San Francisco to have an exposition of that kind. California has yielded an annual average of $26,000,000 in gold alone for over fifty years, and in many parts of the Eastern States and Europe, where the subject is given any attention at all, the impression prevails that California mines are worked out. That is only natural, for it is impossible for any one not knowing differently to imagine how any section of the universe could continue to yield gold profitably for so long a period of time. Of course, Californians know that what has been mined bears the same relation to what remains to be got out that the index of a volume does to the volume itself. Colorado understands the art of advertising and is profiting by it; Spokane, Baker City, Rossland and other enterprising points feel the need of the increased impetus consequent upon such enterprise and commendable endeavor.

Concentrates.

THE density of a gas is one-half its molecular weight.

GLYCERINE is still advancing, and is currently quoted at 17 cents.

COLORADO has paid nearly $300,000,000 in gold mining dividends.

WHEN water falls from a height, every 1390 feet fallen generates 1° C.

SOUTH AFRICAN gold bullion produced by the cyanide process averages about .825 fine.

SULPHIDES of all alkali metals are soluble in water, those of other metals are insoluble.

THE deepest Belgian coal mine is at the Produits colliery at Mons—a depth of 3790 feet.

NATURALLY, an electric pump in a mine has to be geared, because of the high speed rotation of the motors.

CALIFORNIA has in recent years produced 392 tons asbestos, valued at $21,400. The industry is not in present active condition.

IN the U. S. patent office a rejected application is no longer considered a bar to a new application for a patent for the same invention.

A NEAT MODEL showing the movements of slide valves can be had for the asking by any engineer from the Lunkenheimer Co., Cincinnati, Ohio.

THE fare from St. Michaels to Dawson is $40; Dawson to White Horse, $20; thence by rail to Skaguay, $20; thence to Seattle, $16; thence to San Francisco, $12.

THE average cost of smelting or treating silver-lead ores in 1888 and 1890 was $4.50 per ton. In 1895 it had been reduced to $2.80 per ton, and is now about $2.25.

A BILL was introduced in the U. S. Senate at the last session appropriating $25,000 annually to each State and Territory for a mining school therein, but was not acted upon.

CHLORIDE OF SILVER can be made by adding hydrochloric acid to nitrate of silver. If allowed to stand in the light, it will change color from violet to black.

ELECTRIC HEATING APPARATUS is now in common use in many offices and buildings. The entire Odeon theater on the Calle Esmeralda, Buenos Ayres, S. A., is electrically heated.

THE iron ore from Texada Island, B. C., gives 69% metallic iron, .03% phosphorus, .036% sulphur. The cylinders on the battleship Oregon were made from charcoal iron from that ore.

THEORETICALLY, air can be used to circulate around the cylinder of a gas engine to carry off the surplus heat, but in practice water is essential, being less bulky and of greater heat-absorbing power.

REGARDING the "glass oil pipe line," concerning which so many inquiries have been received, the pipe is made by the Appert Glass Co. at Port Alleghany, Pa., in 5-foot lengths of 4 inches diameter.

A GASOLINE ENGINE may be used with economy in operating a mine pump, either geared or belt connected, and with due regard to fire precautions and necessary ventilation need not be considered extra hazardous.

TUNNELS are of use to drain, or shorten distance, as the Sutro tunnel in Nevada, the Newhouse tunnel in Colorado; but, with rare exceptions, no tunnels in this country have ever discovered anything that made them a financial success.

A CURRENT of electricity entering and flowing along a conductor causes no damage to it; electrolytic action takes place at the point where the current leaves it. Statements as to the effect of electrolysis have been greatly exaggerated.

THE last annual convention of the California State Miners' Association was held in San Francisco Oct. 23, 1899. The next one will convene Nov. 19, 1900. The expenditures of the Association for the year ending Oct. 23, 1899, were $15,165.94.

THE Witwatersrand gold output went from 23,155 ounces in 1887 to 4,295,608 in 1898; the 1899 output stopped in September of that year, and was 3,502,051 ounces up to Aug. 31 of that year. The total output to that date was 23,628,263 ounces gold.

"WHITE GOLD" has been found at various times and in various places, notably near Oro Blanco, Mojave Co., Arizona, the unusual color being due to a slight admixture of gallium. It is about .840 fine. It is found in minute quantity in crystallized flakes.

AT the present price of gold in London, 78s 11d for bars and 76s 8d for coin, the price of sight exchange at which gold can be imported is about 4.83½. An advance in the price of gold by the Bank of England would reduce the import gold point in exchange by 1 cent for each half penny.

AT Butte and Anaconda, Montana, the amalgamated properties employ 6060 men, as follows: Anaconda, 3657; Parrot, 282; Colorado, 215; Washoe, 193; Butte & Boston, 628; Boston & Montana, 1085. The Montana Ore Purchasing Co. employs 453 men and the Clark properties 428—a total of 881.

THE Mexican mining law says that "the unit of concession or mining claim shall be a solid of indefinite depth, limited as to its exterior boundaries by a section of the surface embraced within a horizontal plane measuring 100 meters on all four sides, and in depth by vertical planes passing through the same."

RECORDS of experience in mining and milling are always of value and their recital would contribute to the common stock of knowledge. Their receipt would be of service to this paper and the mining industry in general, and our readers are courteously solicited to furnish such notes whenever agreeable and convenient.

LIQUID CHLORINE is chlorine gas compressed to liquid by a pressure of 200 pounds. One drum of liquid chlorine weighs 300 pounds, holds 115 pounds liquid chlorine and takes the place of 972 pounds manganese, 1080 pounds salt and 2160 pounds sulphuric acid. A drum is 10 inches diameter and 5 feet long.

A MOTOR-GENERATOR is a transforming device consisting of two machines; a motor and a generator mechanically connected together. A dynamotor is a transforming device containing both motor and generator action in one metallic field, with two armatures or with an armature having two separate windings.

ORE carrying 50% lead and fifty ounces silver per ton would be "high grade" as a smelting ore; with fifty ounces silver and no lead it would be considered "low grade" for either smelting or amalgamating. Ore carrying 100 ounces silver would be high grade, considered as an amalgamating ore, and low grade viewed as smelting ore.

PALLADIUM is obtained chiefly from a gold ore found in Brazil. The ordinary process of producing it from the ore is, after addition of silver, to fuse, then treat with nitric acid, the silver and palladium dissolving, the gold remaining undissolved. The silver precipitates as chloride; the palladium as a cyanide; the latter being ignited decomposes, leaving palladium.

A VARIETY of antidotes are proposed in the case of swallowing corrosive sublimate. The best, in every way, is considered to be the immediate swallowing of the white of eggs. The white of one egg will neutralize four grains corrosive sublimate in the human stomach. "Concentrates" is unable to give any antidote for poisoning by inhaling the vapor or fumes of mercury.

A "LONG-STROKE" engine has a stroke about twice the diameter of the cylinder. A 20x48-inch, or a 16x30-inch, would be a long-stroke engine. Short-stroke engines have a cylinder with a diameter as large or larger than the length of stroke. Slow-speed machinery needs a slow-speed engine. An engine a little larger than required is more satisfactory in the long run, or the short run, than one that is too small for the load laid on it.

IN acute cases of lead poisoning sulphate of zinc, to cause vomiting, should be administered, followed by sulphate of magnesia in milk, mixed with white of egg. In chronic cases of lead poisoning give iodide of potassium three times a day in five-grain doses and sweetened dilute sulphuric acid in water. At the first indication of lead poisoning the work should be promptly discontinued and proper treatment at once adopted. All the soluble salts of lead are poisonous.

THE nickel matte produced by smelting the nickel ores at Sudbury, Ontario, Canada, contains about 350 pounds copper and 350 pounds nickel in a ton. The other 1300 pounds is sulphur and iron. The freight on the 2000 pounds to the New York City refinery is $5.50. Last year the Canadian Copper Co. (the owners) shipped 18,000 tons matte to New York City. Nickel ore or matte comes into the United States duty free. The refined metal pays a duty of $120 per ton.

A GASOLINE FIRE is best extinguished with flour, sand or earth in the order named; water should not be used. If the gasoline be confined in small space, ammonia will smother it. Some users of gasoline find it well to hang a bottle containing about a gallon of ammonia from the top of the tank or room containing the gasoline, by a string or fusible link, so that if the gasoline takes fire the bottle will fall and be broken, releasing the ammonia and promptly putting out the burning gasoline.

THE largest gas engines in the world are using blast furnace gas for fuel. At the Duedlinger Iron Works, Luxemburg, are two 1000 H. P. gas engines and one 500 H. P. gas engine in which blast furnace gas is utilized. The largest single cylinder gas engine is in operation in Belgium. The cylinder is 51.1x54.1 inches. The Westinghouse works at Pittsburg build the biggest gas engines in this country—650 H. P. The Union Gas Engine Co. of San Francisco has built a 300 H. P. gas engine.

TELEGRAPH POLES can be prevented from rotting in the ground by surrounding the portion of the pole in the ground with an earthenware pipe, similar to a small drain pipe, the end of the pipe coming just above the surrounding soil. Into the space between the pole and the pipe is placed a mixture of sand and resin. The resin is melted and poured into the pipe in that condition. When it solidifies the sand and resin form a watertight preventive against the butt of the pole rotting.

CALCULATIONS on the subject made some time ago by F. W. Dean of the American Society of Mechanical Engineers, indicate that since 1870 the cost of steam power has been reduced from 30% to 40%. He attributes 17% of this improvement to higher steam pressure and ratios of expansion, multiple-cylinder engines, steam jacketing and drying or superheating the steam; 5% to the use of vertical engines; 7% to improved boilers; 7% to economizers heating the feed water, and 2% to improved grates. The weight of steam used per horse power per hour has fallen from 20 pounds to 12.5 pounds. He finds the compound engine the usual, and on the whole most successful, form of engine.

BITUMEN is any unsaturated hydrocarbon mixture of mineral occurrence, whether solid, liquid or gaseous. Bitumens, from natural gas to asphaltum, include compounds and mixtures of compounds belonging to all the known series of hydrocarbons. They may be classed as follows: Solid—asphaltum; semi-fluid—maltha; fluid—petroleum; volatile—naphtha; gaseous—natural gas. Some of these fluid varieties of bitumen pass by insensible degrees and by natural causes into maltha, which is a semi-fluid viscous form of bitumen, known as mineral tar and just as clearly to be distinguished in consistence from petroleum as common tar is to be distinguished from olive oil. The change by which California petroleum is converted into maltha is due to two causes, evaporation and indirect oxidation.

SMELTER treatment charge on copper ores varies with the nature of the gangue; minimum treatment charge would be about $6 per ton, maximum about $9. Copper in ore is paid for at a price based on the New York daily quotations for casting copper, less 6 cents per pound. "Dry assay" is the net assay, less an arbitrary reduction of 1.3% which is common to the trade. Nine and five-eighths cents per pound would be equivalent to $1.92 per unit, or for each per cent of copper in the ore. An ore with a favorable gangue, containing a little in excess of 3%, would pay the cost of treatment, and anything in excess of 3% would be in the nature of profit after deduction of charges for mining, transportation, etc. If the ore contains precious metals, these are ordinarily allowed for on the basis of 90% of the value at current metal quotations.

SECRETARY BLISS of the Interior Department writes regarding the $500 expenditure required upon mining claims, saying that "while an expenditure of $100 in labor or improvements admits the claimant to occupancy for one year, $500 is required for continued occupancy and enjoyment. While several claims in common may be embraced in the same application for patent survey and notice, a single expenditure of $500 will suffice for but a single claim. Whatever constitutes a proper annual expenditure under Section 2324 may unquestionably be treated as part of the greater expenditure exacted by Section 2325, and since the former is deemed to have been made upon each of several claims held in common when it is made upon any one of them for the benefit of all, so under Section 2325 the expenditure will be deemed to have been made upon each of several claims held in common, and included in one application for patent when it is made upon any one of them for the benefit of all; but the expenditure of money must equal in value that which would be required on all of the claims if they were separate or independent."

ALL poisons are traced to the circulation, and it is observed that death is the result; but there is no satisfactory explanation of the fatal effects or how the poison operates. The blood seems to be so changed by the poison as to render it unfit to perform its proper functions; but neither chemistry nor physiology throws any light upon the changes produced by any poison in the blood or the vital organs. It has been clearly shown that no substance acts as a poison until it has been absorbed and passed through the arterial capillary system. The sooner the poison reaches the blood the more rapidly does it act, and it depends not so much upon the quantity as the amount absorbed in a given time. The time for this absorption, under favorable circumstances, is only a few seconds. The fatal effects are produced when the absorption takes place more rapidly than the elimination. The fatal proportion of poison present in the blood at any one time is infinitesimally small (one-sixteenth grain of strychnine has caused death in four hours). The blood is about one-thirteenth of the body by weight, and the proportion of the poison by weight compared with the blood would be less than one part in one million. The poison of a cobra is in even smaller proportion; yet the blood, urine, saliva or milk of an animal poisoned by a cobra, when injected into the blood of another animal, will produce death.

THE case of A. Walrath vs. the Champion G. M. Co. was reported at great length and fully illustrated herein at the time. The suit was from Nevada Co., Cal., and was brought for an injunction and $300,000 damages. End lines and extralateral rights were involved. It was claimed by the plaintiff that the Champion had gone under the surface of the Providence to some extent. The case was tried in the United States Court of this circuit, which gave judgment for the defendant. An appeal was taken to the United States Circuit Court of Appeals with like result, and finally the United States Supreme Court made these decisions final. In the judgment thus upheld it was decreed that the patent to the Providence mine was confined to the Providence lode and to the surface ground as surveyed and marked in the diagram filed in the Land Office. The Act of 1872, in granting all other veins that were within the surface lines of previous locations, did not create any new lines for such other veins nor invest the court with any authority to make new lines for such other veins. When the end lines of a mining location are once fixed they bound the extralateral rights to all of the lodes that are thereafter found within the surface location. It necessarily followed that the end lines of the Providence survey must be considered by the court as the end lines of any and all lodes or veins which lie inside of such surface lines.

" How to Make Gold Dredging Pay."

In the current number of Cassier's Magazine is an article with the above title, written by A. W. Robinson.

A great deal has appeared in this paper during the last four years on this subject, chiefly original contributions from experienced men, and those articles have formed the base of much that has been reproduced elsewhere concerning this form of securing gold.

Mr. Robinson's article is not a strictly technical one, and partakes more of the nature of an essay than a specific exposition of the subject, but contains some salient points that, even though said before, deserve repetition. In a general way the article is of considerable value from the standpoint of a civil and mechanical engineer. Mr. Robinson says:

Dredging for gold seems at first sight to be a simple proposition, and yet the numerous failures that have occurred make it necessary to exercise caution and to examine carefully the causes of failure, as well as to study the elements of success. If properly conducted, it is one of the safest forms of mining, for the reason that the ground can be examined, tested and the probabilities determined beforehand with reasonable accuracy. It then becomes analogous to manufacturing, with the ground as the raw material and the gold as the product. To attain success in manufacturing, a man must be master of his business, must have an ample supply of raw material and must be able to sell at a proper advance over cost of production. In other words, there must be good men, good material and good markets, and this may be all summed up in two words—good management. As good management is essential to success in ordinary business affairs, so is it in the business of dredging for gold.

There is this advantage over other forms of manufacturing, in that the product is of uniform fixed value, and always marketable without expense of selling. Every ounce of gold won is that much money to its owner and a permanent addition to the wealth of the world. Gold dredging is, however, analogous to manufacturing in that the cost of production must be less than the value of the product. Given good management, therefore, to begin with, the two cardinal points to be determined are, first, the value and extent of the ground and, second, the cost of working it. The success of the whole enterprise depends on the correct determination of these two questions.

As to the first point, namely, the value and extent of the ground, a thorough examination should be made by a person possessing the necessary ability and experience, and one who is able to draw sound conclusions from his observations. This is not work for a young college graduate, nor yet for the so-called practical miner, although both may render efficient help. Still less is it the business of men in other walks of life, who, thirsting for riches, turn to gold mining, expecting an immediate fortune. His opinion will be safest who has had not only the wide experience in all lines connected with his work, but who has likewise the honesty of purpose and soundness of judgment to avoid deceiving himself or his clients, and who can determine whether or not the proposition has in it the elements of financial success.

Many men whose opinions are trustworthy on other subjects are entirely unable to form a sane or just conclusion on matters connected with gold. Many, if not most, men also are inclined to put a better face on the question than usually exists, and the sight of a few yellow colors leads them at once to figure out a bonanza. If investors would only bring to bear on gold mining the same prudence and business sense which is necessary in any other business, it would greatly reduce the number of failures. The same care should be exercised in preparing a full statement of all facts and figures bearing on the case, as in any carefully thought-out manufacturing enterprise. How often do we see the opinions of cheap and incompetent men accepted instead of carefully ascertained facts.

The business of legitimate mining and dredging for gold has suffered much from the evil reputation occasioned by the failure of many schemes that ought never to have been entered upon. Had a competent engineer been consulted, many of these enterprises would never have been begun, or at least would have been carried on in a very different manner. The investor has to guard against two classes of evil advice. One is that of the professional swindler who 'promotes' the property for the sole purpose of transmitting the funds of the subscribers into his own pocket, and the other is the well-meaning man who perhaps has a fairly good thing if properly worked, but who has more self-confidence than experience and skill.

The ground should be surveyed—if not accurately, at least approximately—and a map prepared on which may be recorded the positions of the test pits, the area available and the extent of the ground worked over each season. Test pits should be sunk at sufficiently frequent intervals to place the nature of the ground beyond conjecture. The examination should show the full depth of the gravel, the nature of the bedrock, if any, and the distribution of the values, whether they are greatest at the surface, in layers or on the bottom. Values are never uniformly distributed, and nothing is more deceptive than a glib statement of so much per cubic yard. It requires the most careful judgment to arrive at a fair average value which will represent the whole.

The nature of the material should also be ascertained, and this not only on the surface. The sizes and percentages of the gravel, from coarsest to finest, should be measured. This is necessary to determine the character of screens to be used, or whether any at all are necessary. The action of the gravel while being washed or sluiced should be experimentally determined. Some gravels wash very freely; others, again, are of a clayey or sticky nature, which renders them very difficult to wash. Such gravel requires very careful treatment in order to avoid loss of gold. Other deposits are of a very hard or cemented nature, often with large boulders, which increase the difficulty of working, and, if not fully provided for, failure will ensue.

The condition of water supply is most important. Water is essential to the recovery of gold, and its presence in suitable quantities is a great desideratum. In dredging beds of rivers, the depth, speed of current, fluctuations of level, extent and duration of floods must all be closely observed and their bearing on the proposed enterprise considered. In many rivers the richest pay is found in the 'bars,' which are shoals or deposits of gravel brought down by the current and formed by slack water. These are frequently dry at low water, and the dredger must, therefore, be able to cut its own flotation into a dry bank.

Gold dredging is not necessarily confined to river beds or natural water courses. Any deposit may be worked with a floating dredge in which the water can be impounded, and a small stream let into the pond in which the dredger is situated, sufficient to supply evaporation and leakage, and to keep the pond clean enough for washing purposes. The same water can be used over and over again in this way, but the dredger must be specially adapted to each case. A dredger which will be suitable for a river channel may not do the work at all in an enclosed piece of ground, and vice versa.

The disposition of tailings is a subject which must be carefully studied. Unless the dredger can get rid of all material passed through without choking or piling up in such a manner as to interrupt its work, it is liable to be stopped, and the entire enterprise brought to a standstill until the difficulty can be remedied. The configuration of the ground, the character of the material, the depth of the water and the height of ground worked above water all enter into the question and should be carefully determined.

As to the gold itself, the question is threefold. There are to be considered, first, the character of the gold; second, its value per cubic yard of material handled; third, the best method of saving it. On the satisfactory determination of these points the whole success of the enterprise depends, and here long experience and sound judgment are absolutely necessary. The gold may be fine or coarse, of all degrees, and may be easy to save or difficult to save, and the most effective method of saving it depends upon its character. There is no 'new discovery' for gold saving. All known methods depend on one thing for their successful action, namely, the great specific gravity of the gold as compared with gravel. Their separation can be effected only by washing with water, aided sometimes by amalgamation, but the methods of washing are subject to wide variation. There are the two extremes of heavy hydraulic sluicing with large volumes of water, carrying down boulders and everything before it, and the thin film of fine concentrates, requiring delicate adjustment for saving fine gold.

As to the value per cubic yard, this is perhaps the most difficult point on which to obtain a reliable estimate. The difficulty is not so much that it can not be ascertained, but that men involuntarily exaggerate the findings, and there is an extraordinary inclination to take the best and richest spots as an indication of the whole. The only safe way to do is to wash out a considerable quantity for each test, say not less than a cubic yard, taking care that all the material—boulders and all—is included in the measurement, and carefully weigh the result. A sufficient number of these tests, carefully made, will indicate the average value.

In many places in the United States, Chinamen or tramp miners can be found working along banks of streams or on river bars with rocker and pan. Wherever these remain any length of time there is sure to be gold in paying quantities. It may, however, exist only on the surface, for these men can not work deep.

After all the foregoing points have been settled, there remains the final question—What will it cost to work the property ? This is a broad question, and the answer to it is to be found only by subdividing it into all the points which affect the cost, and making a careful analysis and estimate. These points include (1) transportation, (2) cost of living and wages, (3) cost of fuel, (4) cost of lumber and other material of construction, (5) water supply, (6) character of material, (7) depth of working and (8) study of any special difficulties that may be presented. It is impossible to give any data as to these various points or the general conclusions that may be drawn from them. Each locality will have its own characteristics which may be more or less favorable. The dredger itself will be designed to suit the conditions as they exist and its output and operating expenses estimated. The actual output should not be estimated to be more than half the theoretical, and a liberal allowance should be made for contingencies and repairs. Under favorable conditions dredging can be done for 4 or 5 cents per cubic yard, or even less, and under difficult and costly conditions the cost may rise to 20 or 30 cents, or even more.

The dredger itself is a most important factor in the cost of operating, but it is not proposed here to go into the mechanical detail of its construction, as that is a large subject by itself. It is sufficient to say that for all ordinary conditions the elevator or ladder type of dredger has become recognized as the standard. It is usually composed of the following elements: (1) The dredging machine proper, (2) a revolving screen in which the material is washed and the coarse stones are removed, (3) a centrifugal pump for supplying water to the screen, (4) gold-saving tables or sluices and (5) apparatus for disposing of tailings.

All these elements are suitably combined upon a hull with boilers, engines and accessories. It is absolutely essential that the dredger be designed and built by those experienced in such work, and that every detail should be of ample strength and suitable for the purpose. A great many dredgers have been built; and while they are by no means finally perfect, experience has developed their construction along certain lines which have been shown to be the best. This experience has cost large sums of money, and he would be foolish indeed who would undertake to build a dredger out of his own unaided genius without a thorough knowledge of the work of others in this line. These dredgers must, as a rule, work in remote places and be operated by ordinary labor. It is, therefore, of the first importance that they should be of the simplest possible construction, with every part of ample strength, and not liable to get out of order. The earlier dredgers were very deficient in this respect, and, if breakdowns and repairs are frequent, the profits may be quickly converted into losses.

When a dredger is standing still from breakdown there is a four-fold loss going on: (1) Interest on investment, (2) cost of replacing the broken part, (3) expenses of crew and administration and (4) loss of gold that would be gained if running. The first cost of the part that failed is but a trifle to the other losses, and the first cost, therefore, of the entire dredger is of slight importance, provided it is of proper design, well built and capable of working continuously without breaking down. Some repairs there must inevitably be, owing to the severity of the work and the wear and tear due to handling the material; but a distinction must be made between such natural wear and parts structurally weak which may fail without warning. In a good design not only will all parts subject to natural wear be capable of ready renewal, but all important parts subject to strain will be of the strongest design and have a large factor of safety.

Suppose a dredger is earning $400 per day, and is delayed thirty days through the breakage of some part not readily replaced. There are $12,000 lost, without counting interest, or cost of repairs, or wages. A fraction of that amount, put into better design and better material at the outset, would have been the best possible investment. Steel castings can now be obtained at about twice the cost of iron castings, and should be used wherever possible instead of iron, regardless of the extra cost. Some dredging machines on the market are but cheap affairs, made to sell, not to last, and no care or trouble is taken to adapt them to their work. Indeed, the builders of them rarely have that experience in operating and maintaining them that is necessary. A cheap dredger is necessarily a poor one, for the requisite strength and quality can not be obtained without cost; but, on the other hand, an expensive dredger is not necessarily a good one.

When the cost of fuel is high, special attention should be paid to economy of steam in the design of the dredger, such as using compound condensing engines and efficient boilers. If fuel be cheap and abundant and skilled labor high, simple high-pressure engines will answer every purpose. Water power may also be utilized to good advantage for driving a dredger or series of dredgers, employing electric transmission. The perfection of modern electrical apparatus for the generation and transmission of power is such that it is, on the whole, quite as reliable as steam. So far from being more complicated, it is, in fact, simpler, for the substitution of simple electric motors for boilers, pipes, pumps, engines and valves involves fewer parts and less liability to derangement.

In addition to all the technical and commercial elements which have been touched upon, the financial strength of the company intending to operate is of not less importance. It would be useless here to make recommendations as to amount of capital required, as circumstances are widely different. The funds should, however, be available before beginning, and should be sufficient to meet and overcome any reasonable obstacle or difficulty that may arise. That must be left to the judgment of the business man and the engineer in taking up each special case. Enough has been said to point out the way and to indicate the lines on which this class of work may be successfully carried on. There are few more promising or more profitable fields of work when carefully administered, and the ground available has as yet scarcely been touched. Unfortunately in many cases large sums of money have been squandered without result because of the lack of knowledge and experience to provide for all the points essential to success. All of these failures can be traced to perfectly preventable causes, and, when rightly judged, they serve as landmarks to point the safe way.

An Interesting Locality.

"The Line City" is the title given the town of Nogales, Arizona-Mexico, which occupies the unique distinction of lying in two different countries—the United States and Mexico. It is on the extreme southern edge of the frontier, in Pima county, Ariz., part of the "Gadsden Purchase" in 1853, and from a mining point of view is an important place, being the gateway through which passes considerable of the traffic between the mining regions of Arizona and the State of Sonora, Mexico. Through the town runs "the international line," as depicted in the picture on the front page, for which we are indebted to the courtesy of Mr. A. T. Bird, of the Oasis, of Nogales. North of the line is United States territory, south of it lies the Mexican Republic. On this page are given two additional views—one of Nogales, Sonora, Mexico, the other of Nogales, Arizona.

View of Nogales, Arizona.

View of Nogales, Sonora, Mexico.

The Selection of a Working Process.*

By Charles M. Fassett.

A few years since a professor in one of the German universities said to an American mining engineer, who was telling the professor of gold being found in galena, "It cannot exist." He was an old man and has since died, leaving an undying name on account of his discoveries in the science of metallurgy; but with all his learning and lifelong research he could not believe possible the existence of gold in a combination now familiar to everyone. No one thought it possible that precious metal could live in sandstone until Silver Reef was discovered; no one believed gold could exist in porphyry until Cripple Creek was found; and now that we know gold is being profitably extracted from such improbable materials as mica schist, hornblende, and granite, the conservative man will be careful not to say that it cannot exist in basalt, lava, or any other rock, and we may all have to fall back upon the unscientific but extremely safe old California dictum: "Gold is where you find it."

Starting then from this point, and after having found it, the question arises: How shall we get the metal from the rock and put it into shape for utilization for minting or the arts. The great bulk of gold produced to-day is obtained by the use of stamp mills and amalgamation, in many instances supplemented by various processes for extracting the residue of precious metal from the tailings. This is the cheapest method of extraction known and is limited in its use only by the condition of the gold as to its being free or combined with, or entangled in, base combinations. No ore is absolutely free milling, nor is any gold ore entirely base; every ore containing notable quantities of gold will yield at least a part of its value to mercury, and this process should always, in my opinion, receive the first consideration in settling the problem of a working method. If you can obtain half the value on the plates it is reasonably certain that enough more can be obtained by subsequent treatment on the ground, either by concentration, cyanidization, chlorination or pan amalgamation, to render this process the most available.

Smelting is the oldest, the best known and the most generally applicable method of ore reduction now practiced. If ores could be smelted as cheaply as they can be milled, it is safe to say that this would be practically the only process in use in the world to-day. It is essentially a chemical process—a breaking up and reuniting of the molecules of the ores, fuels and fluxes, by the aid of heat—and distinct from the essentially mechanical process of milling. It is interesting to the chemist to note that while a complete analysis is absolutely necessary to determine the proper method of fluxing a smelting ore, it is of little or no use when applied to a milling or other physical process. The adaptability of an ore for treatment by a chemical process is determined by its chemical analysis; for a physical or mechanical process, by physical tests.

I need not consider the smelting process at length, as in its relation to the owner of a developing mine it is simply, on account of its expense, a temporary expedient or a last resort. Nine-tenths of the smelting is done at custom works, run independently from any mine, and, from the very conditions surrounding the industry, it will continue to be conducted in this manner except in infrequent cases. The cost of smelting a neutral ore is not great, but when combined with the usual extra charges on detrimental constituents and railroad freights, it often amounts to a prohibition.

Competition and improved processes, however, have greatly cheapened this process in late years, and made it possible to ship ore at a profit from mines heretofore unavailable. Within the past fifteen years I know of a smelter in Nevada where $24 per ton was the treatment charge, and they paid only 62½% of the value of the silver and 95% of the gold at $20 per ounce. How many of you who are now shipping ore could do so under such a tariff as this?

Matte smelting, and pyritic smelting, in which process the sulphur in the ore furnishes the greater part of the fuel, are concentration methods of great utility and will always be used in remote districts where transportation charges on the crude ore are prohibitory, and mechnical concentration inapplicable. The cost of a plant is not great, and the cost of treatment is low if a proper mixture of ores and good fuel are available; but the very highest skill is demanded both in the construction and running of such works, and owing to the comparative newness of the process, such skill is not readily available.

Mechanical concentration is often practiced on smelting ores, and its utilization has brought millions of wealth into circulation that otherwise would be still lying idle in low-grade rock. It is a boon to the miner, saving freight and treatment charges on waste and detrimental material, making a valuable and much sought product of an ore which in its crude state would be hard to treat.

If you have a mine which is in a condition to produce ore in sufficient quantities to justify the erection of a mill, the first thing to be done is to obtain a sample of ore which will represent, in its assay, value and principal characteristics, the ore that you will be able to mine. This is the most important and, perhaps, the most difficult thing to do. It is utterly foolish to go to the expense of having working tests made on your ore unless you can produce ore in sufficient quantity and can take a representative sample. It seems unnecessary to say this, but the Pacific coast is dotted with expensive evidence that these conditions have not been fulfilled. When you have obtained your sample and assayed it (it should weigh 100 to 500 pounds), try these processes, beginning with an amalgamation test, and when you have found a method that seems most available, go back to it and try it over and over again, varying the conditions in every way you can think of, such as fine and coarse pulverization, concentration before and after milling, etc. Experiments made carefully on small quantities of ore will be found of great use in determining upon a process, and in many cases will tell you very closely what can be expected on a large scale. Send part of your ore to the smelters, and to any crazy scientist whom you may hear is working on a new process. Take time to let them all have a trial at it, and remember that, as no two ores are alike, yours may be just the ore that is adapted to some embryotic method that will treat it successfully. When they have solved the problem the world sees the dazzling light of genius in their eyes.

When you are ready to build a mill, get the best man you can find to design it for you. It is always economical. Don't buy any piece of machinery because it is cheap; wait, if necessary, until you are able to buy the best, for I can say to you from bitter and expensive experience, that it is folly to expect good results from poor practice. Maybe your ore is good enough to stand expensive mistakes in your equipment, but the time comes in the history of every mine when profits can be had only by the most careful and economical management of the best possible equipment. Above all, don't build the mill until you have the mine. Keep in mind the first step in the old recipe for preparing a rabbit pie: "First catch your rabbit."

---

*Condensed.

Refining California Petroleum.

In obtaining refined products from native crude oil, the first step consists of placing the crude oil in large, hollow, cylindrical stills, enclosed in and supported by brickwork and suspended over large furnaces; heated by liquid fuel above the boiling point, the vapors rise from the surface of the oil, entering large iron pipes immersed in water, passing through these pipes condensed in liquid form and emerging from the pipe as a distillate.

In this first process of distilling, different sections of the oil are separated into series. Those that come off of the still first are lighter in weight and in color, and have a low boiling point. As the process of distilling goes on, the boiling point continues to rise, until it requires several hundred degrees of heat to lift the vapors out of the still. The products now obtained are crude distillates, on the one hand, and the part remaining in the still is refined asphaltum. With some refiners this is all that is done in the handling of the crude oil, and the sales are made of the refined asphaltum, and the crude distillates—whose value is only a little above that of crude oil.

A complete refining plant is equipped with a large number of tanks, in which these various divisions of the oil are stored, and taken from them separately, and, by being excluded from the light and carried through a process of cleansing by the use of sulphuric acid, alkali and water, and again put through the process of distillation for the final separation, made ready for the particular use to which they are adapted; other portions are exposed to the sun and air and rain and left in the open tanks for some time to effect the curing and ageing process, which renders them more susceptible to the action of the acids, alkali and water in the purifying process. These oils are finally finished by filtration so as to remove from them anything of a foreign nature that is not an oil perfect in form and color.

The lighter oils are those that are treated in such a manner as to exclude them from the light, and are calculated for use as illuminants, or as oil for power use in generating power in distillate engines. While the article supplied by the refineries for use as generative power is termed distillate, it is, in fact, a refined oil, and as much pains and skill is required to produce a satisfactory gas engine distillate as is necessary to produce a satisfactory burning oil for domestic use.

The other class of oils is intended for lubricating, and the process of preparing them for market requires considerable time and a large number of tanks, as the oils have to be changed from place to place as they pass through the various cleansing processes. When finished, these oils are nearly odorless, and have an appearance far removed from that of the crude oil.

When crude oil is divided up into its various components and hydrocarbons, the colors in the finished oil show all the colors of the solar spectrum, starting with the white and ending with black.

◆

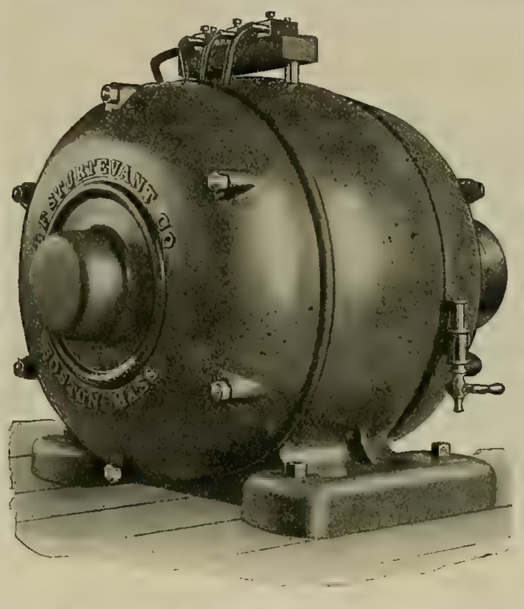
By the duplex system of telegraphy two operators can transmit simultaneously in opposite directions. This is attained by winding the receiving relays with two coils of wire in opposite directions, one winding being connected to the line and the other to a set of resistance coils and condensers which are so adjusted that the electrical length and static capacity are the same as the real line. The home power divides equally, half passing around the core in one direction to the real line, and half in the opposite direction to the artificial line, the result being that the core is not magnetized by it, and it is not susceptible to the home power. As the power coming over the line from the distant station only passes through one of the coils, and there is none coming in from the artificial line to counteract it, the core is affected by any change in power at the distant station. The receiver is a polarized relay whose armature closes the sounder when moved in one direction, and opens it when moved in the other. The transmitter is an instrument worked by an ordinary telegraph key and local circuit. It is so arranged that when the key is depressed the negative pole is connected to the line, and when positive the key is opened.

◆

Concerning the article in the issue of the 13th inst., on the formation of lode matter, it may in general be said that whatever be the facts in any particular case regarding the present deposition of minerals, it is manifest that the chemical changes of the earth are constant though varying in degree, and that though at this time the formation of new mineral deposits is perhaps less active and confined to fewer localities than has been the case at other periods of time, they are still forming. It is, however, probable that these formations are more largely observed in old mines which are being reopened by unwatering and that the mineral simply accumulates locally. One instance is that of a mine in the Joplin, Mo., lead belt, which laid idle for some years, and, upon being unwatered about two years ago, presented some interesting examples of secondary accretion. Large cubes of galena had during the period of the mine's abandonment been eaten away, and tiny cubes of the same material had formed upon the surface of them. There are also, doubtless, instances where minerals are dissolved at one point and redeposited elsewhere, more or less remote; but, as a whole, that is a period of rest, and it is doubtful if more than isolated cases may be cited where minerals from which the ores of the metals are obtained are depositing with any degree of even geological activity. The epoch in which the Comstock and other large mineral deposits were formed is referable to a remote period of time with which the present period of deposition bears but poor comparison.

Enclosed Electric Motor.

Herewith appears an illustration of a bi-polar type of enclosed motor, manufactured both as a motor directly connected to a propeller fan and as an independent machine. For the former purpose it is used on all sizes of fans up to and including the 54-inch. For larger sizes the four and eight pole types are employed. As will be observed, the motor is entirely enclosed, and thus protected from dust. A low temperature rise can be maintained without greatly increasing the size and weight above that of the ordinary open type. The machine is capable of continuous operation for ten hours, with a maximum temperature rise not exceeding 60° F. Yokes extending out from the field ring support the armature shaft. The end casings are independent, and can be instantly removed to give access to the entire interior. The bearings and brushes can be reached by removing the caps in the center of the casings. The brushes are of hard carbon, in holders of a modified reaction type, which allows of easy adjustment when it becomes necessary to reverse the direction of rotation of the motor. The bearings are self-oiling and self-aligning, and are fitted with composition sleeves, removable from the outer ends of the boxes. These motors, in sizes from $\frac{1}{6}$ to 5 H. P., are built by the B. F. Sturtevant Co., Boston, Mass.



The Cazo Reduction Process.

The treatment in reducing silver ores, known as the Cazo process, was invented by A. Barba in Peru, and from there introduced into Spanish possessions in America, including Mexico. It is a simple amalgamation process considered adapted for native silver, chlorides, bromides, and iodides of silver, which are treated in hot solutions by this method. The Cazo kettle or boiler consists of a wooden tub with a bottom made of a spherical segment of copper about 2 feet in diameter. The wooden board or tub is jointed to it by means of copper rivets. The Cazo or boiler is placed on a furnace and contains from 200 to 300 pounds of finely pulverized mineral, each charged together with from $\frac{1}{5}$ to $\frac{1}{10}$ of salt and water sufficient to form a liquid paste. The man in charge of the operation keeps a slow fire to produce a low boiling temperature, and adds from time to time small quantities of quicksilver. The chlorides and bromides of silver are dissolved in the solution of salt and are decomposed by the copper of the kettle. The reduced silver amalgamates itself with the mercury. The object of adding the mercury only a little at a time is in order that the chlorides and bromides of silver be reduced by the copper and not by an excess of mercury. The man in charge of the operation stirs the mass constantly by means of a ladle. From time to time a sample of the amalgam is taken from the bottom of the kettle, and when it has the appearance of lead filings the operation is completed. This takes place generally in about six hours. Then the charge is taken out and a new one put in its place, and when a sufficient number are obtained they are put together, the amalgam washed and strained, and the quicksilver distilled to obtain the silver. The loss in quicksilver is variously estimated from 2% or 3% to a weight equal to that of the silver recovered.

Sometimes this method has been employed with minerals containing silver sulphurets and sulphide, but then the minerals have to be previously roasted with salt. The roasting must be carried on sufficiently long to decompose and volatilize the greater parts of salts of iron and copper, otherwise the loss of mercury would be excessive. The practice in Mexico generally is to use two parts of mercury for each part of silver, but experiments carried out on a large scale by Becquerel Bros. and M. Dupont shows that by using four or five times as much mercury per unit of silver a greater amount of silver is recovered. The relative value of silver and the loss of mercury necessary to obtain a certain increase regulates the proportion of the two metals.

According to M. Dupont the amalgam obtained by the Mexican process has for its formula Hg^2 Ag, whereas by increasing the use of quicksilver he obtains amalgams with a formula of Hg^4 Ag. If a great excess of mercury is used it will combine with the copper of the Cazo and will be lost for amalgamation with the silver, whereas a small excess is not detrimental, because the reduced silver will keep the walls of the copper kettle clean. At all events the quicksilver must be added in small doses.

Regarding the quantity of salt to be used in this process the solution of salt employed should have a density of from 15° to 20° Beaume. When the proper minerals are used in this process the silver obtained is 995 fine. M. Dupont has applied this process to nearly every variety of silver ores by preliminary roasting, Becquerel Bros. have used it in the treatment of silver galenas.

The Fatigue of Metals.

In discussing crystallization of iron and steel under shocks and vibrations, one important factor which destroys the best metal when subjected to long-continued shocks is ignored or passed over, while the secondary effect of this cause, the granular appearance of the fracture, is given attention. The factor thus forgotten is the ability of a beam, an axle, or a stamp stem to conduct vibrations speedily away from the point of impact, and distribute the motions thus caused uniformly and uninterruptedly from particle to particle through the mass of the metal during the longest possible period of time without fatiguing the metal. This immediately raises the question, "What is fatigue of metal?" a question more easily asked than answered. One must be a little arbitrary in conception of the term and nature of the fatigue of a metal that he may have something tangible to start on.

We all know, speak and reason about the conductivity of a metal, by which is understood its property to transmit heat or electricity through its mass with greater or less facility, according to its nature, whether it be a good or bad conductor. Given a metal known to be a good conductor of heat, for instance, we know that, other things being equal, its conductivity can be impaired in various ways—by flaws, impurities, hollow spaces, irregularities in outlines, want of uniform density, etc. The heat impinging against the metal not being conducted away readily on account of the obstacle encountered in the shape of any of the defects mentioned, it follows that at or near the point of contact of metal with the fire the metal becomes hotter than it would if conductivity were unimpaired. The greater the impairment the greater the heat, and the more frequently the heating is repeated the more speedy will be the failure of the metal thus abused.

On the other hand, supposing a metal to be an ideal conductor, it stands to reason that in the course of time a period will ensue where the particles are not as responsive, as ready for work as they used to be; that is, the metal becomes worn out, and will readily break at the weakest point.

In speaking of conductivity, one fancies in his mind the heat striking first the extreme outer layers or layer of a metal, and, by virtue of the close contact of its particles, traveling from particle to particle until the end or other side of the metal is reached. As a matter of fact, one can feel or in other ways observe this movement of heat along a bar of metal. Motion imparted to a structure, or part of a structure, will be and is transmitted from particle to particle in a similar way as heat or electricity. That is to say, motion imparted to a piece of metal at the point of contact will cause vibration of the molecules, but the vibrations thus set up must travel along the various points of contact of the crystals or fibers, and hence is subjected during its passage from one end of the metal to the other to the same influences as is heat or electricity.

If there are impurities, flaws, irregularities of structure, unequal density, motion will be retarded, deflected or arrested, just as a cracked bell will give no ringing sound because the crack has broken the continuity of the metal, and the vibrations produced by striking the bell are arrested by the crack in their onward movement.

It is also reasonable to assume that in the case of inequalities in the metal of one kind or another certain portions of the structure—beam, axles, stamp stems, etc.—are more severely affected by the motion than the rest of the metal, because certain portions are less conductive or less able to carry the vibrations along. One can imagine this to take place in a manner analogous to a weight unequally distributed. When equally distributed a body may be amply able to carry it, but will break down if the weight is put on one point only.

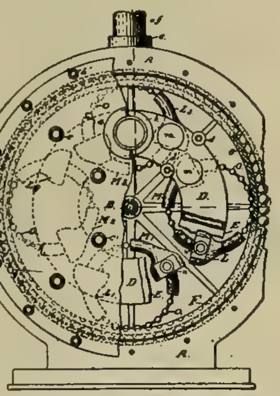
Likewise, if the force of impact remains the same for a partly defective metal as for a perfectly sound one, the sound portions in the defective metal must necessarily be taxed more than if the whole of the metal was sound. But even if perfect in every particle, it is natural that vibrations many times repeated must eventually produce a deteriorating effect, since there is nothing of artificial creation which is indestructible. When that point of deterioration in a piece of metal subjected to repeated vibrations is reached where, even in the soundest piece of metal, the motion wave is not carried along as freely from particle to particle as originally, then one may conceive the metal to be what is called fatigued—tired, in a state of weariness, inability to respond with its inherent strength. What the actual condition and nature of a piece of metal is when it is fatigued probably no metallurgist is able to describe or knows. We may, however, assume that fracture of metal in ordinary service must be preceded by an initial separation of the particles at their points of contact, and this initial separation must be preceded likewise by a loosening of the particles, a relaxation of the force of cohesion.

Mining and Metallurgical Patents.

Patents Issued October 9, 1900.

Specially Reported for the MINING AND SCIENTIFIC PRESS.

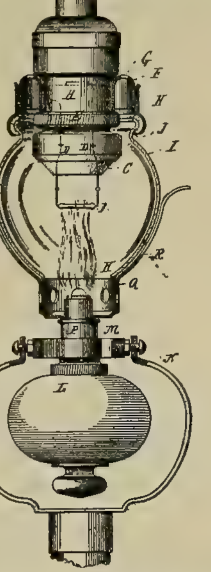
STEAM MOTOR.—No. 659,219; J. H. Fedeler, New York.



Combination in steam or water motor of one or more piston rings or series of balls with wheel F, pipe M connected to pipe y by nut S.

◆

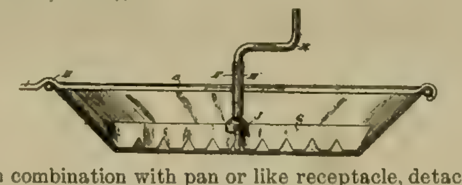
GLOWER HEATING APPARATUS FOR ELECTRIC LAMPS.—No. 659,268; J. Van Vleck and W. N. Stevens, New York.



In an electric lamp of type specified, glower cylindrical support therefor, arched or bent over ring F, upon support provided with openings G, and secured upon ring globe L having opening K, inclosing glower fixed sleeve surrounding glower and portion of support open to atmosphere at top and bottom deflecting surface immediately above glower; whereby heating flame introduced at bottom of sleeve will impinge upon glower and deflecting surface and thereafter pass off through annular space between sleeve and support.

◆

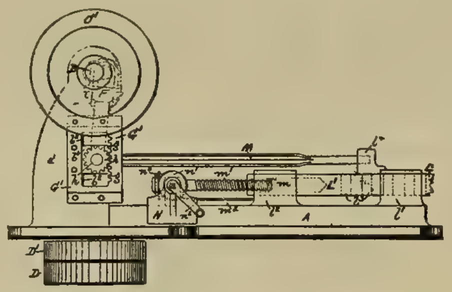
MINER'S SEPARATING PAN.—No. 659,237; A. J. Ketelsen, Chicago.



In combination with pan or like receptacle, detachable separator adapted to be supported upon pan and projected thereinto comprising brace bar having hooked end adapted to engage one end of pan and offset portion adapted to engage opposite end of pan, extended portion constituting handle of offset end of rod, magnetic separator blades supported centrally of bar adapted to project into pan and means for agitating blades.

◆

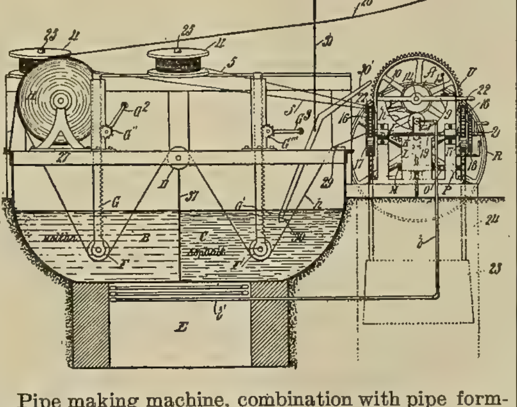
MACHINE FOR SHARPENING ROCK DRILLS, ETC.—No. 659,371; W. E. Kimber, Johannesburg, South Africa.



In combination frame comprising base plate A, vertical sides a a′, driving shaft B mounted in bearings in upper ends of sides a a′, flywheels C C′, fast and loose pulleys D D′, vertical recesses formed in sides a a′, blocks b b′ arranged to slide therein, liners b^2, roll E, fitted with detachable die e corresponding to cutting face of drill to be sharpened and with its extremities projecting through blocks b b′ to outside of sides a a′, connecting rod F, formed with two arms f f′ loosely embracing turned down ends of roll E to inside of blocks b b′, plates G G′ fixed to outside of vertical members a a′ constructed with an open center, rack or teeth g formed on inner front vertical edge thereof, stationary plate H arranged in from of roll E secured to sides a a′ formed with central aperture or opening for drill and with radial slots countersunk along radial edges, corresponding in number to wings of drill opening into central aperture i, holders and centering devices i′ fitted within radial slots formed with shoulders i^2 on two opposite sides to fit countersunk radial edges of slots, constructed hollow or concave at extremities to correspond to convexity of outer edges of wing of finished drill, projection k formed on extremities of holders i′ and projecting beyond surface of plate H at back to prevent metal of drill being rolled beyond desired point, projections j formed on holders i′ on inside, disk J provided with curved eccentrically disposed slots corresponding to holders i′ into which projections j project, lever K attached to disk J for rotating it in either direction, cap or cover L attached to plate H for holding parts in position, guides l′ l^2 formed on base plate A, bar L′ formed with holes l^3, stop l^4, for shank of drill, nut m fitted in forward end of bar L′, screw m′ traversing nut m, bracket m^2 supporting other extremity of screw m′, bevel wheel n^3 secured to end of screw m′ beyond bracket m^2, bracket N fixed to base plate A formed with boss n, spindle rotating in boss n, handle n^2 connected to one end, bevel wheel n′ to other, bevel wheel n′ gearing bevel wheel n^3, for supporting drill endwise and feeding drill forward while being sharpened.

◆

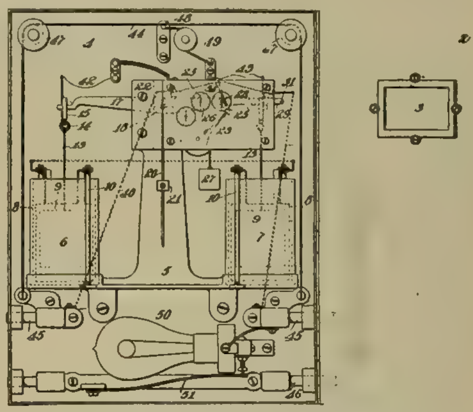
PIPE MAKING APPARATUS.—No. 659,437; A. S. Dixon, Los Angeles, Cal.



Pipe making machine, combination with pipe forming mandrel; compressing roller mounted in ways beneath mandrel; screws at ends of roller for moving roller up and down; sprocket nuts for supporting raising and lowering screws; chain driving sproket wheel provided with means for rotating same; sprocket chain led around sprocket nuts and around sprocket chain driving sprocket wheel.

◆

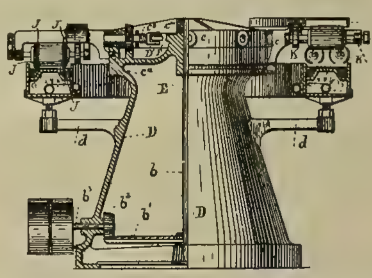
ELECTRIC METER.—No. 659,389; T. A. Edison, Llewellyn Park, N. J.



In an electric meter, combination with balanced scale beam, and two electrolytic cells, movable electrodes of which are connected to extremities of scale beam, a register train, escapement operated thereby controlled by oscillation of scale beam, movable contact operated by register train at each movement of escapement, two fixed contacts with each of which movable contact successively engages, divided resistance shunting both cells, connection between center of such resistance and movable contact, whereby current will be successively reversed through both cells.

◆

MEANS FOR APPLYING FLUID METALS.—No. 659,380; W. H. Smyth, Berkeley, Cal.



Can soldering machine comprising endwise clamp can carrier adapted to effect axial rotation and travel of can, its axis horizontal, solder bath, means for applying solder therefrom to can, hood above path of soldered can provided with air inlet whereby current of air is directed upon the can while still grasped by clamps.

◆

FLASH POWDER.—No. 659,331; A. Weiss, Strasburg, Germany.

As a new article of manufacture, a flash powder for use in taking photographs by artificial light, consisting of a mixture of powdered aluminum and powdered perchlorate of potassium, in proportions substantially as set forth.

◆

PROCESS OF EXTRACTING ZINC AND COPPER FROM THEIR ORES.—No. 659,338; C. G. Collins, New York.

Process of treating ores of copper and zinc, and other metals soluble only in strong solution of solvent, which consists in immersing comminuted ore, in solution containing sodium sulphate and bisulphate (niter cake), in proportion to contained copper and zinc therein, sufficient in strength to dissolve only copper and zinc therefrom, and subsequently recovering these metals from solution.

◆

PROCESS OF EXTRACTING COPPER AND ZINC FROM THEIR ORES.—No. 659,339; C. G. Collins, New York.

Introducing the comminuted ore into a solution of sodium sulphate containing hydrochloric and sulphuric acid not exceeding 5° Baume, subsequently recoving these metals from the solution.

◆

AT St. Paul, Minn., on the 14th inst., Henry Floyd claims to have tramsmitted 30,200 volts of electricity through an underground cable 3 miles long. The cable consists of three copper conductors, each about the size of an ordinary lead pencil, each being inclosed in a paper tube, the whole incased in a lead sheet and drawn through vitrified clay conduits. The cable is part of the system by which the St. Paul Gas Light & Power Co. will utilize the water power at Apple river, Wis., the other 24 miles of wire being overhead.

◆

THE Census Bureau at Washington sent back the papers to their Trinity county, Cal., man and hauled him over the coals for not making returns on the factories in his district, as they had received word that "the Adele Co. was making 100 tons of cement per day at a place called Lewiston." The original reference was to the handling of cement gravel and extraction of gold therefrom.

Machine Mine Rock Drills on the Pacific Coast.

NUMBER II.

Written for the MINING AND SCIENTIFIC PRESS
by A. E. CHODZKO.

In concluding this review of the rock drills used on the Pacific coast, a few general considerations concerning the economical side of machine work will not be out of place, assuming, for instance, the case where a certain length of tunnel or drift is to be excavated and taking it for granted, which is no exception, that the men in charge are experienced miners, i. e., that they place their holes to the best advantage as regards the ground formation, and consequently that the amount of explosive used is a minimum under the circumstances.

The total cost of the work, besides this element, will consist, for each rock drill used, of three principal items, namely:

First—Cost of the compressed air consumed by the machine, including : (a) cost of motive power ; (b) supplies and maintenance ; (c) attendance.

Second—Wages of miner and helper.

Third—Cost of repairs.

With reference to the cost of compressed air, it is obviously desirable that each machine should use the least possible amount of air to do a certain work, and this result can be attained in two principal ways, applied singly or in combination, namely: By having the valve motion arranged so as to avoid unnecessary cushioning at the usual piston stroke, or, in other words, so as to deliver as powerful a blow as consistent with the size of the cylinder and the air pressure. Also by reducing the clearance, which in many rock drills represents a very high percentage of the total capacity of the cylinder.

This reduction in the quantity of air consumed by each machine amounts to saying that either the time of actual running of the compressor will be reduced, or else that more rock drills can be operated with the same compressor.

The importance of this cost of compressed air may vary in different places. There are such cases, for instance, where a mine is using its own system of water power, and where the compressor is started and stopped automatically. The running expenses would then vary but little with the air consumption ; the supplies item alone would be affected thereby, and a wasteful type of drills would merely require the purchase of a larger compressor at the start. This, however, represents an exception, and in a majority of cases a reduced air consumption is a desirable feature of a drill.

Second—Wages of miner and helper. This part of the cost is in direct proportion to the time, and the desirability of a machine delivering a powerful blow, i. e., drilling in a given time a maximum length of hole, is evident.

Third—Next comes the cost of repairs, which is not necessarily in proportion to the time of operation of the machine. It will be readily understood that, if it is doing heavier work during fewer hours, the cost of repairs may be the same or even higher than if the drill is working more leisurely during a longer time.

Without referring to any specific figures, it may be noted that should the average cost of repairs per day equal the amount of wages paid to the men in charge, seven new machines could be purchased every year for the money required to keep one of them in repair, a state of affairs which few miners would be likely to accept.

It is, therefore, safe to say that, for all possible reasons, economy in rock drilling means rapidity. But, passing from general considerations to precise figures, one instance might be quoted, among others, with reference to a large mine where an exact account was kept of the actual cost of drilling, with the following results, the miner being paid $3 and the helper $2.50 per day:

	Per cent.
Power	23.1
Wages	74.1
Repairs	2.8
Total	100.0

This shows that it is an erroneous, though not uncommon, view to state that the cheapest machine is the one which costs less to keep in repair. In the large tunnel enterprises where rock drills were first used this point had been so well understood that in many instances they would not even go to the trouble of repairing a disabled drill; it was simply thrown aside and a new one put in its place. It is safe to say—and the writer can tell it from personal experience—that the machines were worked for all there was in them, and when they failed they were really fit for the scrap pile. To make time at any cost was the only motto, and, under the circumstances, the right one. It would probably be carrying things too far to apply the same process in a mine where a few rock drills only are in operation; but the principle remains the same, namely, that the most economical machine is the one that will drill the greatest length of holes in a given time. Power of action and, if possible, reduced air consumption are, therefore, the two points to be borne in mind when selecting a machine drill.

(TO BE CONTINUED.)

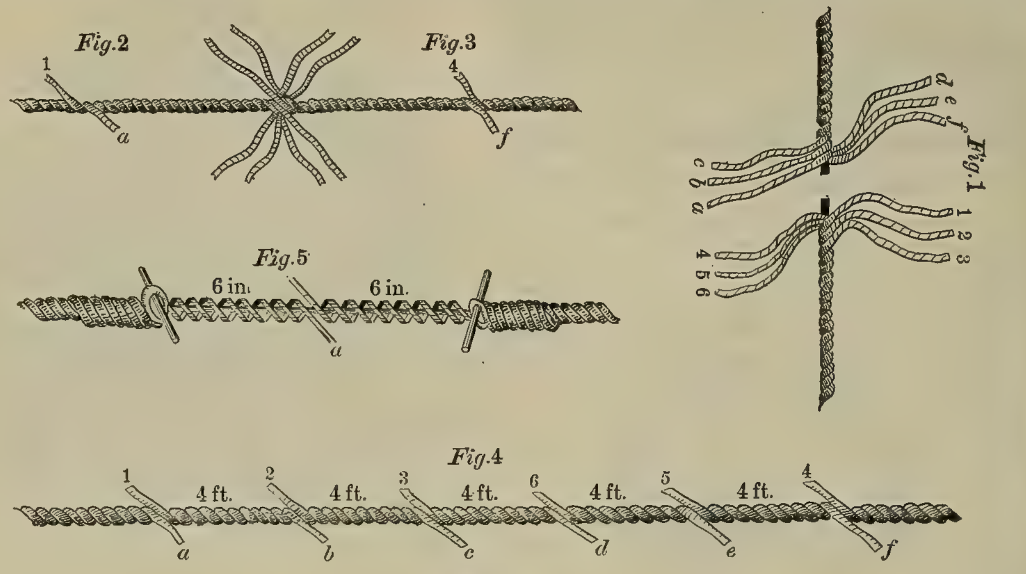
Splicing Wire Rope.

In the issue of Sept. 29 appeared an illustrated article on "How to Splice a Wire Rope." The matter is of sufficient interest to warrant further notice. The annexed is a way recommended by John A. Roebling's Sons' Co., manufacturers of wire rope, Trenton, N. J.:

Directions for making a long splice in an endless running rope of ½ half inch diameter: Tools required—One pair of nippers for cutting off ends of strands ; a pair of pliers to pull through and straighten ends of strands ; a point to open strands ; a knife for cutting the core and two rope nippers, with sticks to untwist the rope ; also a wooden mallet.

First—Haul the two ends taut, with block and fall, until they overlap each other about 20 feet. Next open the strands of both ends of the rope for a distance of 10 feet each ; cut off both hemp cores as closely as possible (see Fig. 1), and then bring the open bunches of strands face to face, so that the opposite strands interlock regularly with each other.

Second—Unlay any strand (a) and follow up with the strand 1 of the other end, laying it tightly into the open groove left upon unwinding a, and making the twist of the strand agree exactly with the lay of the open groove, until all but 6 inches of 1 are laid in, and a has become 20 feet long. Next cut off a within 6 inches of the rope (see Fig. 2), leaving two short ends, which must be tied temporarily.



Splicing Wire Rope.

Third—Unlay a strand (4) of the opposite end and follow up with a strand f, laying it into the open groove, as before, and treat it precisely as in the first case (see Fig. 3). Next pursue the same course with b and 2, stopping, however, within 4 feet of the first set ; next with e and 5 ; also with c, 3 and d, 4. We now have the strands all laid into each other's places, with the respective ends passing each other at points 4 feet apart, as shown in Fig. 4.

Fourth—These ends must now be secured and disposed of, without increasing the size of the rope, in the following manner: Nipper two rope slings around the wire rope, say 6 inches on each side of the crossing point of two strands. Insert a stick through the loop and twist them in opposite directions, thus opening the lay of the rope (see Fig. 5). Now cut out the core for 6 inches on the left, and stick the end of 1 under a, into the place occupied by the core. Next cut out the core in the same way on the right, and stick in the end of a in place of the core. The ends of the strands must be straightened before they are stuck in.

Now loosen the rope nipper and let the wire rope close. Any slight inequality can be taken out by pounding the rope with a wooden mallet.

Next shift the rope nippers and repeat the operation at the other five places.

After the rope has run for a day the locality of the splice can no longer be discovered. There are no ends turned under or sticking out, as in ordinary splices, and the rope is not increased in size, nor appreciably weakened in strength.

The foregoing rules apply only to ropes with hemp centers. Ropes with wire centers may be spliced in same manner as hemp ropes by putting in long splice.

◆

MINING is the noblest of industries. From it all cruelties of competition have been eliminated. In the wake of the successful miner destitution, despair and death do not follow—his enrichment does not mean another's impoverishment. The miner delves into the earth and brings forth something which adds to the comfort, happiness and wealth of the world—he is a producer, and the world stands ready to buy his product. Gold mining is the only industry of magnitude that is not directly under the domination of trusts and monopolies. It defies the manipulation of politicians and is one industry to-day which offers a fair return for money invested and labor expended.

Movement of Ground Water.

The amount of water stored in saturated soil—that is, below the ground water surface—is, in round numbers, two-fifths of the whole bulk. Usually three-quarters as much is to be found even in soil above the plane of saturation, except during dry times in a surface layer 1 to 5 feet thick. Saturated sandstone may contain as much as 38% in bulk of water, equivalent to immense and deep lakes in widespread and level-lying areas of sandstone. Even compact marbles and granites contain an appreciable percentage of water. It is probable that water penetrates the earth's crust in some degree to a depth of more than 10,000 feet.

Consolidated and deep-lying rocks have, in growing compact, lost much water. Fine silt deposited in water contains more than half its bulk of water, but, on compression by overlying sediment, part of the water is driven out, either upward, downward or sidewise. Evidently, vast quantities of water must so have been expelled from the enormous masses of rock that now underlie mountain regions, much of the rocks at present having less than 1% of pore space. Such water-bearing sediments, when carried down several thousand feet, must in higher temperature expand and drive out water in some direction, the water flowing much the more readily from its lessened viscosity at a higher temperature. The gradual deposition of mineral matter from the stationary film of water around the grains of a standstone, and the conseqquent absorption of other mineral matter by the film from neighboring circulating water, and again the deposition of this absorbed material, until the rock becomes much more compact and less porous, must occasion the expulsion of great quantities of water in the case of vast bodies of rock. The consolidation of 50,000 square miles of sediment 1000 feet deep, with an original pore space of 33% reduced to 3%, must require the expulsion of a sheet of water 50,000 square miles in area and 300 feet deep, and its replacement by solid rock material—enough material to take the Mississippi river 60,000 years to supply, even with 150,000,000 tons carried in solution annually to the sea. Such subterranean movements of water are extremely gradual, lasting through long periods of time.

Effect of Drouth on Boilers.

Some of the causes which contribute to produce variations in the amount of scale formed in a boiler in any specified time are often overlooked. The amount of rainfall during the season has a direct bearing on the scale formation, though few steam users would think it possible.

Unusual deposits of scale are generally due to an increased hardness of the water, when the supply must be drawn from the lower strata where it has become impregnated with lime and magnesia. On the other hand, in seasons of heavy rain the surface water, which is much softer, is largely used, the proportion of scale being smaller.

From this it can be seen that during a dry season boilers should be cleaned more frequently, and an inspection should be made about twice as often as before. During a time of abundant rainfall a general loosening of the incrustation may be expected, and its lodging over the fire sheet should be guarded against.—Locomotive.

MINING SUMMARY.

ARIZONA.

GILA COUNTY.

The second furnace increases the Old Dominion copper output nearly 800,000 pounds per month.

MOJAVE COUNTY.

(Special Correspondence).—The strike in the White Hills mines is considered important, as showing that there is a second mineral zone at the comparatively shallow depth of 600 feet. The rich ores of this camp were seemingly exhausted at 300 feet, little ore being found below that level. To all appearance, after producing several millions of dollars on the surface, the mine played out, and from being a lively camp, affording work to 500 men, it dwindled to a small prospecting outfit of fifteen men, which the company in control has kept at work for the past year. The new discovery, however, has rejuvenated the old camp. Already fifty men have been put on and more are to be added. Bullion is being shipped and the mill is running steadily. The ledge in the new find is from 1 to 3 feet wide.

W. B. Scott of Chicago has put twelve men at work on his claims near the summit of the River Range, on the El Dorado canyon road. Mr. Scott paid $12,000 for the property, consisting of six claims. In one shaft is 4 feet of ore running $25 in gold. The river is 7 miles to the west and all down hill.

The Maguire gold mine, 3 miles from Kingman, employs six men. Water has been found in great quantity and the work of erecting a mill will soon begin. The Huntington mill people, who are interested, will put in one of their 60-ton mills.

Kingman, Oct. 14.

At Chloride W. Miller, Supt. Connor-Minnesota group, has men in the lower drifts enlarging and developing. The concentrator is being put in condition for work.

PIMA COUNTY.

F. Guerra, in Ajo district, will develop the property of the Papago M. Co. of Los Angeles. It is a concentrating proposition, low grade and extensive.

The St. Louis Copper Co. is expected to resume work upon the return of A. J. Shotwell.

PINAL COUNTY.

At Kelvin, Supt. R. W. Truman of the Ray Copper Co., Ltd., says he will resume work in the mine and will need first-class machine men and miners; wages $3.50 for first-class miners.

Blade: Supt. Pheby of the Silver King mine shipped last week another car of silver ore, via Desert Wells, Mesa and Tempe to Selby Smelting Works, San Francisco. These cars go out regularly and the work on this mine is doing much for this section of Pinal county. Returns from a small marked shipment of 1720 pounds of crude ore netted $526.92. The King ore is a gray copper and runs from 800 ounces up in silver and from 23% to 30% copper, 10% lead and about $20 in gold.

YAVAPAI COUNTY.

The cave at the United Verde copper mines, at Jerome, occasioned temporary cessation of work at the smelters. An acre of earth surface caved to a depth of 8 feet.

CALIFORNIA.

ALAMEDA COUNTY.

The Cape Nome M. Co. has incorporated at Berkeley; capital stock, $50,000; actually subscribed, $30,020; F. W. Mesow, $10,000; J. C. Jenson, $10,000; D. Keith, $10,000; R. H. Delafield, $10; N. Larsen, $10.

At Oakland is incorporated the Hotchkiss Co., to operate the process of extracting metals from ores. Capital stock, $50,000; subscribed, $25; E. L. Hotchkiss, I. H. Clay, A. G. Stephens, H. I. Clinton, H. A. Moser.

AMADOR COUNTY.

At Sutter Creek the East Eureka M. Co., a new corporation, has brought suit against the Central Eureka M. Co., claiming $120,000 for alleged trespass, claiming that the Central Eureka has sunk an incline shaft near its east side line, which penetrates easterly under plaintiff's ground, and have taken, and are now taking, ore therefrom. The Central Eureka Co. claims that the apex of the lode is on its ground and has a right to follow it.

BUTTE COUNTY.

The Cortez G. M. Co. has a quartz mine at Red Point Hill, on McCabe's creek. There are ten stamps at work, a rock breaker and concentrator. The company is running a tunnel and following the pay ledge to a paying depth. The company has entered into a bond in the sum of $20,000 with the owner, M. Lathlean of Sutter Creek.

CALAVERAS COUNTY.

A 5-stamp mill is to be built on the McLoud mine, on the Licking fork. The mine has been bonded to a company represented by B. Aiken of Jackson.

Near West Point Supt. Congdon has men at work on the Yellow Aster mine.

The Emery G. M. & W. Co. will begin construction of an electric and telephone line between San Andreas and El Dorado.

D. Fricot will build a telephone line between San Andreas and Fricot City.

Mr. Braunton has the contract to build the Lightner chlorination works.

G. H. Lewis is developing the Duchess quartz mine, 2 miles southeast of Vallecito, owned by Emery & Lilly of Indiana. He has completed a wagon road to the mine, dug 4 miles of ditch and is building flumes and laying pipe preparatory to running an air compressor and drilling machines. As soon as water can be obtained, a 3000-foot tunnel will be driven.

EL DORADO COUNTY.

The new mill built by the El Dorado Water & Deep Gravel M. Co., near the mouth of Silver Fork, is completed.

Nugget: The Church mine has been bonded by C. J. Garland of Oakland. It has been closed for two years. The shaft had been sunk to a depth of 1000 feet and the ore extracted was worked in a 10-stamp mill. A wide ledge of low-grade ore had been encountered, and it was found that it would be necessary to have a larger mill and a heavier hoist to work the mine most profitably. The present operators are unwatering the mine and will increase the plant.

KINGS COUNTY.

At Hanford the Mammoth Electric Co. is organized; capital $5,000,000; A. Guthrie president, J. S. Robertson vice-president, E. Kauntze secretary. The idea is to erect a plant for the development of electric power on the San Joaquin river, 180 miles from San Francisco. J. S. Eastwood, engineer San Joaquin Electric Power Co., has been elected civil and hydraulic engineer, O. M. Lacey of Hanford electric engineer.

LASSEN COUNTY.

The Daisy Dean mine in Lassen county is transferred to L. A. McIntosh for the Daisy Dean M. Co., which was recently organized, in which J. H. Roberts and others are interested.

MADERA COUNTY.

J. M. Day will put a small stamp mill on his mine, the Rex, at Grub Gulch.

MARIPOSA COUNTY.

Among the additions of machinery at the Mariposa mine is the hoisting engine of the Whitlock mine.

NAPA COUNTY.

The stockholders of the Golden Jubilee M. Co. have elected J. C. Steele Supt.

NEVADA COUNTY.

The Nevada County mine is bonded. The mine will be unwatered. The shaft is down 300 feet and will be sunk deeper.

ORANGE COUNTY.

Tribune: The past month was the banner month for the Puente Oil Co'.s refinery in Chino—the output in refined products, illuminating oils, gasoline and engine distillate being about 150,000 gallons, or an average of 5000 gallons per day. The biggest day's shipment was on Tuesday of this week, when twenty-two carloads of refined oil were shipped out by rail, besides a large amount by teams.

PLACER COUNTY.

In the Mayflower, the new tunnel on the upper lead is in 1500 feet; pay gravel is expected in 500 feet more.

Herald: Near Forest Hill, at the Sellier claim, H. T. Bell Supt., satisfactory work goes on.——The Horseshoe Bar Co. is ready for the winter's work.——Buckeye mine owners are grading to put in a stamp mill.——The Big Con. Co. has let a contract to drive the main tunnel ahead from Peckham hill.——Work has been resumed at the Grey Eagle, T. G. Durning Supt.——Near Michigan Bluffs, at the Turkey Hill mine, the dam, ditch and pole line are completed. About sixty men are employed; the gravel averages $3 per car. Wm. Muir is Supt. of the company known as the Boston & South Dakota Con.——At the Webster claim A. Dipple is Supt.——The Prairie Flower at Canada Hill is now under the management of Geo. Payne.——The Canada Hill M. Co. is getting ready for a run, R. Jones Supt.——The Blue Lead M. Co. at Dutch Flat has increased its force and is opening the old blue lead channel; Supt. Jordan has charge.

PLUMAS COUNTY.

Supt. Homan of the Star of Plumas hydraulic mine says that during the dry season men are running a tunnel to strike a deposit of gravel lying beyond the present hydraulic workings. The Star of Plumas is on the forks of Bear creek.

SAN BERNARDINO COUNTY.

The Copper Peak group of mines lies east of the Ord mountains; the shipping point is Victor. The ore is red and black oxide, sulphide and carbonate. The deepest shaft is 6x4, 36 feet, in carbonate which yields 18% copper.

SHASTA COUNTY.

H. A. Cohen expects to have the Bully Hill smelter in operation by Dec. 15.

The Northern California G. M. Co. has incorporated at Redding; capital $100,000, subscribed $75,000; J. A. Kahny $37,350, J. G. Burgbacher $37,350, D. G. Reid $100, C. C. Bush Jr. $100, E. F. Kiessling $100; they intend to operate a mine near Keswick and install machinery on it.

SIERRA COUNTY.

Supt. Mather, at the Plumbago mine, had a September output of nearly $40,000. The new mill will soon be ready.

SISKIYOU COUNTY.

Near Etna the McKeene mine, on Boulder creek, has thirty men doing development work. A new roller mill, with cyanide process, is being erected.

TUOLUMNE COUNTY.

Near Carters the Starr King mine is to have a 5-stamp mill.

Work has been resumed at the Worcester.

Supt. Graham, of the Duleek mine, Big Oak Flat, will put in a 10-stamp mill.

Magnet: The Mazeppa G. M. Co. has been reorganized. President, M. Johnson; vice-president, C. R. Bishop; secretary, J. P. Fraser; treasurer, G. L. Bishop. These gentlemen, with J. P. Pryor, constitute the new board of directors. Work will be resumed at this property as soon as fuel and other supplies can be procured. This company resumes operations with means to prosecute work vigorously.

Independent: At the Jubilee mine a shoot of ore has been uncovered showing considerable free gold. The vein where the rick rock is found is 12 inches wide. There is a 5-stamp mill on the property.——Mr. Houghton of Boston has a company which has started up the Starr King mine, southeast of the Providence.——The Shawmut & Eagle Co. will arrange to increase their mill to 100 stamps. One hundred men will soon be at work on the mine. The company is making extensive improvements and has signed a contract for 1,000,000 feet of lumber.

COLORADO.

BOULDER COUNTY.

M. F. Knight says he will put in a $125,000 electrolytic mill at Wall Street.

Ward Miner: A tunnel is projected to start at Salina and will penetrate beneath Gold Hill, cutting the mineral formations of that locality at a depth of from 1600 to 1800 feet, the length of the tunnel to be 3 to 4 miles.——T. Barnesley has in view the construction of a tunnel 3000 feet long to cut the Caribou at greater depth.——The Little Alice mine has been bought by the Cold Springs M. & T. Co.——The property embraces about 100 acres and mill site at Gold Hill. The Cold Springs management is preparing to install a pipe line for running the mill and operating the entire machinery of the mine.

CLEAR CREEK COUNTY.

Near Georgetown two machine drills are at work in the raise at the Doric mine.

L. Bartholomeo has made a shipment of 300-ounce ore from the Bismarck. Barth & Co. had a mill run which gave returns of 180 ounces silver per ton. O'Connell & Co.'s regular shipment to the mill gave returns of 160 ounces silver. Catterello & Co. made a shipment of ten tons, which returned 375 ounces silver per ton.

At the Joe Reynolds mine, at Silver creek, a tunnel is being driven to cut the lode at a greater depth and afford drainage.

The Monarch M., M. & T. Co., operating the Freeland mine at Idaho Springs, will spend $10,000 upon development work in the Freeland and Toledo tunnels. One of the Freeland levels runs 3300 feet; the other tunnel is 2700 feet long. It is proposed to retimber and extend them. Geo. McClelland of Idaho Springs is general manager. This work is independent of running the 5500-foot tunnel from Clear creek and which will open up the Freeland mine at 3300 feet.

EAGLE COUNTY.

Development of copper prospects near McCoy calls for a 40-ton smelter. The mines already opened can supply sixty tons per day of ores running from 3% to 5% copper.

GUNNISON COUNTY.

The Pure Gold mine, 5 miles south of Gunnison, is to be operated again.

E. A. Stewart is now Supt. Midland mine.

HINSDALE COUNTY.

The Hotchkiss Mountain M. Co. at Hinsdale have the Black Crook mine and right of way through the Golden Fleece tunnel.

HUERFANO COUNTY.

Near Walsenburg the sale is reported of the Ojo M. Co.'s property of five patented claims to Kansas men; consideration $32,500, $5000 cash. On the Ojo a shaft has been sunk 200 feet and drifts run.

At Walsenburg Manager McMullen will use the electric mining plant on the Eagle Plume. The company has twenty-five men at work. Mr. McMullen intends putting in a mill next spring.

LAKE COUNTY.

The Chronicle says zinc shipments from Leadville to European points have ceased; all the product is now diverted to Mineral Point, Wis., and Iola, Kan. When the contracts for foreign shipments expired none of them were renewed; agents for the Mineral Point and Iola plants were ready to take all the zinc that Leadville could produce. The price is a little better than the foreign brokers were paying. The daily total zinc output at the present time is about 200 tons. The Iola works make a spelter of the product, but at Mineral Point a considerable quantity of the product is made into paint. The zinc should be free from cadmium, as this would give the paint a yellow instead of a white color. Several trial lots of zinc have been shipped to a smelting plant at Hamilton, Ontario, for treatment, and the results, if understood, are satisfactory. The ore comes from one of the big dumps at the A. Y. and Minnie, and while the Canadian smelter ostensibly takes it for the zinc, paying f. o. b. Leadville, the plant saves not only the zinc but the lead and silver also.

Wood & Mulrooney will put in a pump in the Greenback mine at Leadville; triple expansion, capacity to throw 1000 gallons of water per minute from a depth of 1100 feet. The pumping station at the 1000-foot level will be 18x50 feet in the clear.

SAN JUAN COUNTY.

The Sunnysine Extension mine is reported sold to Boston men, mostly stockholders of the Calumet & Hecla C. M. Co. of Michigan. The same company owns the Smuggler-Union mine at Telluride. The price paid for the property is said to be $300,000.

SUMMIT COUNTY.

Prospecting with diamond drills has disclosed good values in the ground of the Gold Pan. M. Co., on the Blue river, above Breckenridge, where they will begin hydraulicking in the spring.

TELLER COUNTY.

Work has been resumed on the Little Corporal claim on Raven hill.

The Comanche tunnel, Battle mountain, is in 650 feet.

The Moon–Anchor Con. M. Co. will increase its capitalization from $600,000 to $1,500,000.

The Elkton Con. Co. deny the local statement that the company has granted an option in the sum of $7,500,000 or $3 per share to the Venture Corporation of London.

Manager McDonald at the Gold King has the new hoisting works finished. The main shaft of the Gold King is 800 feet deep. About fifty tons per day of good smelting grade are produced.

The Gold Exploration tunnel is into the Mary McKinney vein and going under Anaconda gulch 12 feet per day. A new equipment has been put on, including a tramming engine operated by compressed air.

The Gillett Reduction Works, at Gillett, north of Cripple Creek, has shut down. This plant was the first in the district to treat ore by the chlorination process; newer and larger mills have been built in other places.

The Record hears of a projected consolidation of properties in the vicinity of and adjacent to the Isabella, the idea being to organize a corporation having a capitalization of $5,000,000, probally known as the Isabella Con. Mines Co., to absorb the properties of the Acacia, Arrow, Hart, Isabella, Orphan and probably the Pinnacle, the holdings of the company not to be purchased outright, but the holders of stock in them to have issued to them new scrip in exchange for the shares they held at the time the consolidation went into effect. The present market value of the mines is $3,359,900.

The fine mining plant on the property of the Gold Coin M. & M. Co. at Victor is in operation. The double hoist, capable of lifting from 3000 feet, and all accessory parts, give satisfaction. The compressor plant of thirty drills is also in operation. The management expect that this plant will be raised to sixty drills. The present compressor is run with steam; the second set of drills will be run by electricity. The entire plant all over this mine is convertible from steam to electricity with but small changes in the machinery.

IDAHO.

ADA COUNTY.

The Boise Statesman says the business of the first week of October at the United States assay office was the heaviest of the year, footing up to $90,914.41. The next heaviest week this year was the first in July, when the office handled $72,373.29.

BLAINE COUNTY.

Near Hailey work on the Gold Star mill is being pushed.

LATAH COUNTY.

Supt. Price says of the Hoodoo Hydraulic G. M. Co.'s operations on the Palouse river, 8 miles from its head, that the company has had two giants working from March 10th, night and day, till October 7th, with but five intermissions. The pay gravel is covered by 25 feet of clay. They are now cleaning up to bedrock. The pay gravel is from 1 foot to 9 feet deep. The gold is .941 fine, equal to $19.28 per ounce. The gold is coarse and mixed with quartz.

OWYHEE COUNTY.

A. J. Wiley, engineer in charge, tells the Statesman that by January, 1901, the Trade Dollar mines will be operated by electricity. The plans contemplate the generation of 3000 H. P.

Near Silver City the Trade Dollar mine is being inspected; J. Hutchinson is manager.

SHOSHONE COUNTY.

In 1899 were made in the county 781 quartz and 121 placer locations. In 1900, so far, 1042 quartz and 68 placer locations.

MONTANA.

CASCADE COUNTY.

At Swift Current a 200-foot tunnel has been contracted for on the Tiger property, a 600-foot tunnel on the Josephine, and 300 feet on the Mountain Chief.

The concentrators of the Esler Co. are completed.

FLATHEAD COUNTY.

Inter-Mountain: A. Hill has completed his report on the Snowshoe mine. When received it will be for the present owners to determine whether or not they will put more money in the enterprise, in order to make it a dividend payer, or to put the mine on the market, sell it for what it will bring, and let the purchaser do that part. Conservative mining men do not believe that the Snowshoe, as it is, can ever be profitably worked under the conditions that now exist. If the mine is to be worked, the first thing to be done is to explore the ledge by sinking, and determine the extent of the ore body. To do this, and do it right, will probably require the expenditure of not less than $50,000. If this is done and the showing is of a favorable character, then it will require more money before the mine can ever become a dividend payer. To be worked successfully, and to secure water to run the concentrator the year around, as has been stated before, it will be necessary to operate the mine from the Cherry creek side. Then, of course, new works will have to be built, and if the product is to be handled so that there may be no glut, it will be necessary to build a railroad from Libby to the mine. To do all this will require an expenditure in the neighborhood of $500,000. Will the present owners put up this amount of money? This is a plain statement of the facts and the conditions that affect the Snowshoe mine.

MISSOULA COUNTY.

Missoula reports closing down of the Copper Cliff mine.

NEVADA.

HUMBOLDT COUNTY.

The Nevada Copper Co. is erecting a smelter at its mines in Cottonwood canyon.

LINCOLN COUNTY.

The New Era M. Co. has incorporated; capital stock, $500,000; H. M. Brown, H. A., L. S. and A. G. Perkins, Searchlight.

LYON COUNTY.

The main ledge is cut in the Hulley-Logan mine, Como, in extending the lower tunnel, which connects with the milling plant. The tunnel is 1100 feet long. The property has a 10-stamp mill and a cyanide plant of fifty tons daily capacity. There are seventeen men employed in the mine and mill.

STOREY COUNTY.

The machinery taken out of the Union Con. mine will be placed in the Parrott mine at Butte, Mont.

President Leonard of the Comstock Tunnel Co. wants $20 per day for permitting the power company's wires to run through the tunnel. This is in addition to the amount now paid by the mining companies contributing to the cost of driving the Zadig drift, from which the Comstock Tunnel Co. now receives a daily income of $16.

The test of the Gould & Curry mill machinery is pronounced satisfactory.

WHITE PINE COUNTY.

An 80 H. P. boiler and other machinery for the Robust mill has arrived from Toano.

NEW MEXICO.

SANTA FE COUNTY.

The Santa Fe G. & C. M. Co. expects its new smelter will go into operation next month; capacity 200 tons per day. Nearest railway station, Cerillos, 14 miles away.

SIERRA COUNTY.

The Keystone mine, in the Black Range, shows 5 feet of ore in the south drift in the 135-foot level. The ore will stand wagon transportation of 85 miles and still leave a margin of profit.

SOCORRO COUNTY.

Supt. J. M. Allen of the Grand Ledge M. & M. Co. is putting a carload of machinery on the Cavern mine.

OREGON.

BAKER COUNTY.

The Golden Gate group of properties, near Geiser, is being developed by California men, under the direction of H. S. Sherard; Supt. H. T. Hendryx.

The Eastern Oregon M. Co., owning and operating the North Pole mine at Bourne, proposes to put in a tramway from the mine to the mill, which will be 7700 feet long.

E. J. Hahn, Supt. Inter Mountain, tells the Sumpter Miner he will work the mine all winter.

SOUTH DAKOTA.

PENNINGTON COUNTY.

The Mining Review says the Big Bend M. Co., below Pactola, on Rapid river, "is taking out about $1000 worth of gold per day. Steam elevators, dredgers, shovels and pumps are used and 1000 tons of gravel handled daily. Forty miners are employed."

The cyanide mill at Rapid City is in operation.

UTAH.

JUAB COUNTY.

At Eureka the Ridge & Valley M. Co. has filed suit against the Gemini M. Co. for $100,000 damages on the ground that the workings of the Gemini have been extended into Ridge & Valley territory and ore unlawfully extracted. An underground survey is asked for.

WASHINGTON.

FERRY COUNTY.

The Republic mill is running satisfactorily.

WYOMING.

CARBON COUNTY.

The option for $2,000,000 on the Ferris-Haggerty mine has expired, and the company refuses to grant a further extension of the option as asked for.

FOREIGN.

BRITISH COLUMBIA.

Near Ainsworth the Highland-Kootenay M. Co. is putting in a 200-ton concentrator. The Stevenson tunnel is in 1160 feet. The King Solomon M. Co. has seventy-five men at work on Woodbury creek and is putting in four power drills; D. Wingate manager.

At Phœnix the Knob Hill is working 200 men and shipping 300 tons of ore per day.

Three miles from Nelson the Venus G. M. Co., on Morning mountain, has had its ore analyzed as follows: Silica 68.18, iron and alumina 30.801, uranium 0.31, lime a trace, magnesia a trace, sulphur 0.53, total 99.821%. This is thought to be the first discovery of uranium in the province.

Commercial Paragraphs.

THE Risdon Iron Works, San Francisco, Cal., are building a steel oil tank with 1,500,000 gallons capacity, in the Kern river, Cal., oil field.

THE Westinghouse Air Brake Co. have ordered from the Burt Mfg. Co. of Akron, Ohio, a large Cross oil filter to equip their power house.

PERCY R. STUART, business manager of the California Wire Works of San Francisco, reports that he has sent out a number of millwrights into the country recently to erect tramways, and that several tramways now being put in shipping order are to be installed in the near future. It might be of interest to millwrights familiar with this class of work to correspond with the above-mentioned firm, with a view of taking charge of such outside work.

THE Rand Drill Co. has removed its main office from 100 Broadway, New York, to the fifteenth floor of the new building just erected by the American Exchange National Bank at 128 Broadway, corner Cedar St., New York City, to which place all future correspondence should be addressed. In its new office the company will occupy the entire floor, in conjunction with its allied interests: the Pneumatic Engineering Co., the Rendrock Powder Co. and the Davis Calyx Drill Co.

THE Joshua Hendy Machine Works of San Francisco, through their representative, J. K. Firth, have a contract to furnish mills, tramway and other apparatus for the Bald Mountain and Mammoth mines, near Sumpter, Oregon. The contract calls for, in the case of the Bald Mountain mine, a rock breaker of the gyratory type, four Challenge ore feeders, four 5-stamp batteries, complete, fitted with twenty 850-pound stamps, extra allowance amalgam plates, extra heavy plating of silver, and twelve 6-foot belt concentrators, the plant to be so designed and arranged with water motors that the crusher, battery and concentrators can all be operated independently. The head of water for this purpose is about 700 feet. There will also be installed an electric light plant for the mill and all outbuildings. In connection with the enterprise will be an inclined gravity tramway system leading from the ore bins at the mine directly to the mill, with automatic self-dumping cars. On the Mammoth mine will be put a 5-foot Bryan mill and four 6-foot belt concentrators.

Recently Declared Mining Dividends.

	Payable.
Gwin Mine Development Co., Cal., 10 cents per share, $10,000	Oct. 16
Gold King M. Co., Colorado, 3 cents per share, $28,105	Oct. 20
Centennial-Eureka, Utah, 50 cents a share	Oct. 20
Lightner M. Co., Cal., 5 cents per share	Oct. 29
Alaska-Treadwell M. Co., Alaska, 37½ cents per share, $75,000	Oct. 29
Alaska-Mexican M. Co., Alaska, 10 cents per share, $18,000	Oct. 29
Homestake M. Co., South Dakota, 25 cents per share, $52,500	Oct. 25
Cariboo McKinney G. M. Co., British Columbia, 1½ cents per share, $18,750	Oct. 31
Con. Mercur G. M. Co., Utah, 11 cents per share, $110,000	Nov. 1
Rio Tinto, Spain, 2s 6d per share	Nov. 1
Broken Hill Proprietary, Australia, 1s 6d per share	Nov. 21

Personal.

F. H. GREEN, president Mayflower, Cal., Co., is inspecting the mine.

R. H. CAMPBELL has returned from San Francisco to Ashcroft, B. C.

C. H. LINDLEY has returned from Amador county, Cal., to San Francisco.

J. B. WHEELER, president Plumbago M. Co., Sierra Co., Cal., is at the property.

J. E. BEVERIDGE has returned to Bingham, Utah, from Ecuador, South America.

E. MCCORMICK, Supt. Vulcan M. & S. Co., Siegelton, Nevada, has returned from a professional Eastern trip.

JAS. A. DOUGLAS, president American Institute Mining Engineers, will remain in Europe till next February.

A. P. & J. I. MINEAR are prospecting copper properties at Hall's Bay, Prince of Wales Island, southeastern Alaska.

D. GILLIS has returned to Butte, Montana, and accepted a position with C. W. Clark as superintendent of his mining interests.

R. L. DUNN, formerly of Placer county, Cal., is managing the Golden Fleece gold quartz mine at Johnson's Inlet, Ketchikan, Alaska.

MARK B. KERR of Grass Valley, Cal., is in San Francisco on business connected with the mining company for which he is resident engineer.

HANS C. BEHR, who left San Francisco for South Africa and the Rand, writes that he has got as far as Cape Town, but may have to stay there three months.

W. C. MENDENHALL, E. B. RICHARDSON AND A. L. QUINEAU of the U. S. Geological Survey are in San Francisco, en route to Washington, D. C., from reconnoissance in Alaska.

W. E. THORNE, Supt. Gold Bug M. Co., Georgetown, Cal., goes temporarily to take charge of his company's operations at Fuerte, Estado de Sinaloa, Mexico. He expects to return to Georgetown early in 1901.

C. J. MOORE, back from London to Leadville, tells the Chronicle of the methods by which large mining companies are floated on the London market. The stock is placed through large brokerage concerns, who are enabled by means of an extensive clientele to control large sums of money. The Independence deal, for instance, was brought about in this manner. Several large brokerage firms secured big blocks of the stock, and then notified their customers of the figure at which it could be purchased, asking how much of the stock was wanted. The customers of the brokerage firms are men of wealth who are seeking investments, and who place, as a rule, great reliance in the recommendations of their brokers. A man who receives a notification that such and such a stock is for sale, and that he can get in on the ground floor, usually will subscribe, as in case of a refusal he is dropped from the list, and he doesn't want to miss a good thing. There are about 2500 people holding stock in the Independence, for which they paid $2 5s.

List of U. S. Patents for Pacific Coast Inventors.

REPORTED BY DEWEY, STRONG & CO.,
PIONEER PATENT SOLICITORS
FOR PACIFIC COAST.

FOR THE WEEK ENDING OCT. 9, 1900.

659,598.—FRUIT PITTER—W. Anderson, Scappoose, Or.
659,572.—HOTEL REGISTER—J. Bullock, Manvel, Cal.
659,359.—CARBONATATION VAT—Burr, Stut & Atkinson, S. F.
659,360—LIME TANK—Burr, Stut & Atkinson, S. F.
659,361.—RELEASING MECHANISM—Burr, Stut & Atkinson, S. F.
659,362.—STEP LADDER—J. S. Butler, Palo Alto, Cal.
659,287.—BENCH PLANE—E. O. Carvin, Valley Springs, Cal.
659,581.—MOTOR VEHICLE—A. M. Coburn, Daunt, Cal.
659,437.—PIPE MAKING APPARATUS—A. S. Dixon, Los Angeles, Cal.
659,366.—BATH CABINET—Elliott & Idlor, S. F.
659,298.—COOLER—M. Gratz, Los Angeles, Cal.
659,473.—SCRAPER—J. H. Gregory, Ione, Cal.
659,393.—TOBACCO PIPE—W. R. Hale, Gualala, Cal.
659,396.—INDICATOR—J. S. Hill, Los Angeles, Cal.
659,537.—SEWING MACHINE—F. T. Leilich, S. F.
659,608.—WEED CUTTER—McCorkell & McEachern, Helix, Or.
659,407.—CALCULATOR—C. T. Meredith, San Diego, Cal.
659,408.—TRACK CLEANER—Morck, Krickau & Boehle, Oakland, Cal.
659,376.—DRAG SAW—B. F. Nedrow, Anacortes, Wash.
659,593.—TOOTH BRUSH—C. W. Richards, S. F.
659,350.—METAL PARTITIONS—T. F. Osborn, Oakland, Cal.
659,380.—SOLDERING MACHINE—W. H. Smyth, Berkeley, Cal.
659,381.—SOLDERING MACHINE—W. H. Smyth, Berkeley, Cal.
659,611.—CHECK HOOK—F. G. Snook, Sacramento, Cal.
659,264.—AIR SHIP—C. Stanley, S. F.
659,562.—DINNER PAIL—Mary Welkee, Oakland, Cal.
659,355.—TROLLEY GUARD—H. S. Williams, Pasadena, Cal.
33,333.—DESIGN—L. Valentine, Claquato, Wash.
33,332.—DESIGN—P. J. Nelson, Ben Lomond, Cal.

Latest Market Reports.

SAN FRANCISCO, Oct. 18, 1900.

SILVER—Per oz., Troy: London, 29¼d (standard ounce, 925 fine); New York, bar silver, 63c (1000 fine); San Francisco, 63c; Mexican dollars, 51c.

COPPER.—New York: Lake, 1 to 3 casks, $17.00 cash; carload lots, 16.75; Electrolytic, 1 to 3 casks, 16.87½; carload lots, 16.62½; Casting, 1 to 3 casks, 16.75; carload lots, 16.62½. San Francisco: 18. Mill copper plates, 20c; bars, 22@23c.

LEAD.—New York, $4.35; Salt Lake City, $4.20; St. Louis, $4.25; San Francisco $5.00, carload lots; 5½c 1000 to 4000 lbs.; pipe 6¾, sheet 7½, bar 6c; pig, $4.70 @5.10. London, £17 15s=3.56c per ℔.

SPELTER.—New York, $4.10; St. Louis, $3.95; San Francisco, ton lots, 5½c; 100-lb lots, 5¾c.

ANTIMONY.—New York, Cookson's, 10½c; Hallett's, 9½c; San Francisco, 1000-lb lots, 12c; 300 to 500 lbs., 13@14c; 100-lb lots, 15@18c.

IRON.—Pittsburg, Bessemer pig, $13.50; gray forge, $13.00; San Francisco, bar, per lb., 2.50c in small quantities.

STEEL.—Bessemer billets, Pittsburg, $17.00; sheet bars, $21.75; San Francisco, bar, 7c to 12c per lb.

The Pennsylvania Railroad has bought 150,000 tons steel rails for $26 per ton.

TIN.—New York, pig, $29.50; San Francisco, ton lots, 31c; 1000 ℔s., 31¼c; 500 ℔s., 31½c; less, 32c; bar tin, ⅌ ℔, 34½c.

QUICKSILVER.—New York, $51.00; large lots: London, £9 2s 6d; San Francisco, local, $47.50 ⅌ flask of 76½ ℔s.; Export, $45.

San Francisco Stock Board Sales.

SAN FRANCISCO, Oct. 18, 1900.

100 Chollar	26c	50 Mexican	44c
300 Crown P't.	15c	500 Ophir.	88c
300 G. & C.	80c	400 Savage.	35c
500 Kentuck	04c	600 Silver Hill	37c
400 Mexican	43c	700 Union Con.	27c

Quicksilver

For Sale in Lots to Suit.

REDINGTON & COMPANY, Wholesale Druggists, 23-25-27 Second Street, San Francisco.

SITUATIONS WANTED.

Gentleman with mining and business experience wishes position with reliable mining company as superintendent or first foreman. Speaks and writes English, German, French, and can give best of references from bankers. Will accept position any place in United States, but Mexico preferred. Address E. S. B., 1420 South 15th street, Denver, Colo.

SITUATION WANTED BY MILLMAN. Have had 20 years of practical experience. Understands thoroughly pan or battery amalgamation, concentration, belts and machinery. Able to take charge of a mill or any job in a mill anywhere. Best of recommendations. Address Box 4, Virginia City, Nevada.

GRADUATE MINING ENGINEER, five years field work, surface and underground, familiar with cyaniding, surveying and draughting, desires position after Nov. 1st as Assayer and Chemist or Ass't Supt. A1 references as to ability and character. Salary small object; opportunity to prove ability considered more important. Address B. F., care this office.

SITUATION WANTED by a first-class miner with years of experience; up to date in timbering and working a mine; handles men with skill and economy; understands modern milling and concentrating; with business ability; best of references. Address Superintendent or Foreman, care this office.

MINING ENGINEER (technical training), twenty years' experience as surveyor, assayer, superintendent and manager of mines and mills; business qualifications; linguist; at present general manager mining and milling proposition in Mexico; desires to make a change on account of health; best references. Address S. O., Mining and Scientific Press.

WANTED.

WANTED—A VERY LARGE PRODUCING gold or copper mine—at least two millions. Must be presented in A1 shape; title absolute; ample time required for examination. Address S. M. B., Mining and Scientific Press.

WANTED.—METALLURGIST CAPABLE OF taking charge of 40-ton copper furnace using charcoal fuel, situated in Mexico. State experience and wages wanted; references. Address "Metallurgist," Mining and Scientific Press.

INFORMATION WANTED regarding whereabouts of John R. Williams, about 70 years old. Last heard of as Supt. of a mine in Copper's Hill, Vermont, in 1866. Has an adopted son about 32 years old. Supposed to be placer mining in the West, possibly California. $25.00 reward at Deseret News Office, Salt Lake City, Utah.

WANTED.

Experienced Promoter and Stock Operators

to handle the sale of stock for an oil company. State previous experience.

For particulars, address

C. J. TALLON,

308 Market Street,........San Francisco, Cal.

Experienced Coal Miners

can secure **steady employment** either on **contract** or by **day's work** at the **TESLA COAL MINES, Tesla, Alameda County, California.** Good wages guaranteed, also good board. Good climate, and also good accommodations and houses for families.

For further particulars, please apply to the Superintendent at the Mines, or to the Company at 328 Montgomery St., San Francisco, Cal.

REFRACTORY ORES WANTED.

1000 TONS or more which will assay $75.00 Gold per ton and over, delivered free of charge at San Francisco, Cal. Correspondence solicited.

C. J. TALLON,

308 MARKET STREET, SAN FRANCISCO, CAL.

Quicksilver

—FOR SALE BY—

The Eureka Company,

OF SAN FRANCISCO.

ROOM 1, - - 320 SANSOME STREET,
SAN FRANCISCO.

WE BUY very rich Ores, Dental Scraps, Tellurium Ores, Mill Wastes, Jewelers' Sweeps, Gold Retorts, Old Iron Retorts, Base Amalgam, Quicksilver, Amalgamated Plates, Gold and Silver, Old Slags.

A. M. DONALDSON & CO.,

ASSAYERS AND WASTE PRODUCT SMELTERS,

1661 Larimer St., Denver, Colo.

Donaldson's Assayers' Slag Hammer { 1 lb......$1.10 / 1 lb. 3 oz. $1.25 }

CHAS. F. POTTER & CO., MINES AND STOCKS.

FISCAL AGENTS FOR THE

COPPER CROWN OF ARIZONA MINING CO.

425 First Ave. North,

MINNEAPOLIS, MINN.

References: Hennepin County Savings Bank, Bradstreet's Mercantile Agency, R. G. Dun & Co.

N. B.—Copper Crown of Arizona Mining Co. own a rich property near the Black Diamond, in the Dragoons, Cochise county, Arizona. We will be pleased to send "investors" full information as to ore and assays. A limited amount of $1 shares for sale at $50 per 1000, $500 per 10,000 shares.

The Largest Stamp Mills in the World

Are operated by the Alaska-Treadwell Gold Mining Co. at Douglass Island, Alaska. We have just entered their third order for

Cross Oil Filters.

Most of the large mining plants use the CROSS. We guarantee it to save half your oil.

THE BURT MFG. CO.,

Akron, Ohio, U. S. A.

Largest Mfrs. of Oil Filters in the World.

We also make the BURT EXHAUST HEAD.

FOR SALE.

Two Second-Hand PUNCHING MACHINES,

SUITABLE FOR PIPE MAKING.

FRANCIS SMITH & CO., 46 Fremont St., San Francisco, Cal.

For Sale or Bond---Very High Grade Copper Property Located in Arizona.

JOHN M. VRCHOTA, La Crosse, Wis.

A group of 12 Colorado high-grade gold mines are now offered for sale for the first time. Wide veins of rich, free-milling ore. Plenty of wood and water. Good roads, and near R. R. station. Title U. S. Patents. Capitalists or their special agents only need apply. Buyer and seller brought together for negotiations. Address E. J. FRASER (sole agent for owners), Room 522, Parrott Building, S. F., Cal.

FOR SALE.

Lease and Bond, Eighteen Months, Easy Terms, Copper Property, New Mexico.

High grade ore with good gold values. Accessible. Plenty wood and water. Strong vein. Three shafts. Will pay from start. Adjoins large producing mine. **H. B. RUNKLE, El Paso, Texas**

Hoist on Hand for Immediate Shipment.

A first-class Steam Hoist, double 10x12 cylinders, drums 48″ dia. by 30″. For specifications, price, etc., address Mining and Scientific Press.

FOR SALE.

A JACOBS CONCENTRATOR, been used about four months.

Also a fine O. & S. ENGINE, 25 H. P.

25 H. P. BOILER, used about six months, in good order and condition

Also a 40 H. P. ENGINE, now running and can be seen in motion.

Address E. D. BAKER, YREKA, CAL.

FOR SALE,

Lease or Bond, 6 Months' Time.

80,000 acres of timber lands at La Tesca Municipality, Ahuacatlan, Tepic, with mineral deposits—gold, silver, zinc and lead. Water power close to the mines. Address to

ELIAS GALINDO, Box 26, Tepic, Mexico.

FOR SALE.

ENGINES:

8 h. p. N. Y. Safety; 6x10 Rice Horizontal; 10x16 Hendie & Meyer; and others.

THE S. H. SUPPLY CO.

WRITE FOR CATALOGUE OF MINING MACHINERY AND SUPPLIES.

22nd and Larimer Sts., DENVER, COLO.

FOR SALE.

One 10″x12″ Double Cylinder, Double Drum Mine Hoist.

One 14″x30″ Duplex Air Compressor, Corliss Steam ends.

Two 54″x16′ Return Tubular Boilers.

One No. 6 Llewellyn Feed Water Heater.

One 36″x9′ Air Receiver.

One Duplex Boiler Feed Pump.

All in good working order and nearly new. Also Rock Drills, Sinking and Station Pumps, Air Pipe, Ore Cars, Skips, Wire Rope, Blacksmith and Carpenter Tools. A bargain for anyone wanting an up-to-date mine equipment. Address Box 376, this office.

BENJAMIN T. LLOYD, STOCKS, BONDS AND MINES.

Have immediate customers for well-developed Gold and Copper Properties.

P. O. Box 608, **SALT LAKE CITY, UTAH.**

MILL PLANS.

Cyanide, Concentration, Smelting, Sampling.

F. D. BAKER, Mech. Eng., DENVER.

WEST COAST OF MEXICO.

WÖHLER, BARTNING Suc's, Mazatlan (Sinaloa), Mex.

Bankers, Importers, Exporters and Commission Merchants.

Representatives and Agents of the principal Mining Companies in the State of Sinaloa and the dependencies of the Pacific coast in the States of Durango, Chihuahua, Sonora, Lower California and Jalisco.

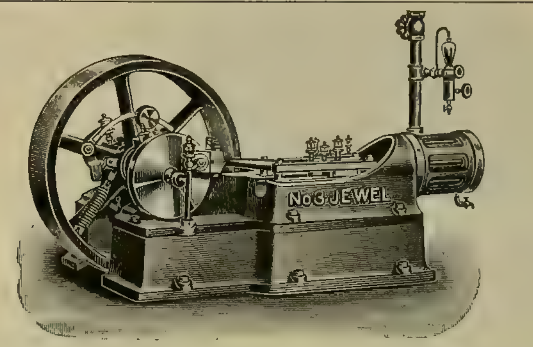
ORE BUYERS AND EXPORTERS. - MINING SUPPLIES.

ERICSSON SWEDISH TELEPHONES

Seem to possess almost human intelligence. They respond to every requirement in a smooth, positive fashion that shows what a perfect telephone can do. Besides this they have unequalled strength and durability. Their reputation as *"STANDARD OF THE WORLD"* is built on merit. Is the best too good for you?

ERICSSON TELEPHONE CO. *296 BROADWAY NEW YORK.*

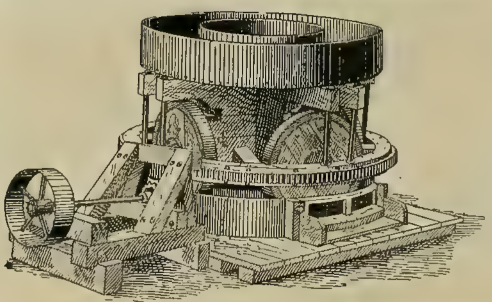
JEWEL ENGINES



A THOROUGHLY RELIABLE, SIMPLE, HIGH CLASS, PERFECTLY GOVERNED AUTOMATIC ENGINE AT A REASONABLE PRICE.

BAKER & HAMILTON,

SAN FRANCISCO, SACRAMENTO, LOS ANGELES.



Lane Slow Speed Roller Mill.

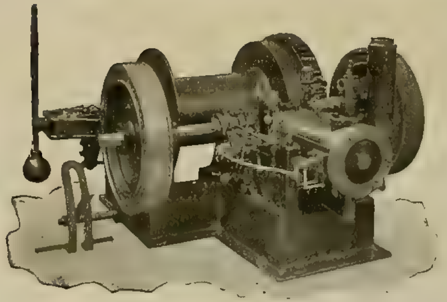
Slow speed gives perfect amalgamation. Extra good mill for saving fine, flour or rusty gold. Cheapest mill on market. Capacity double stamps of same size.

Send for Catalogue.

THOMSON & BOYLE CO.,

310-314 Requena St.,

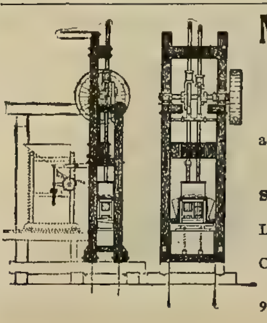
LOS ANGELES, CAL.



John Wigmore & Sons Co.,

MINING SUPPLIES,

117-123 S. Los Angeles St.,
LOS ANGELES, CAL.



MODERN MINING MACHINERY.

QUARTZ MILLS of any capacity,

IN UNITS OF TWO AND FIVE STAMPS.

Acme Amalgamators for CAPE NOME

and other placer mining. Successfully applied to quartz mills in addition to or displacing plates.

SUCCESSFUL GRAVEL MILL RECENTLY IMPROVED.

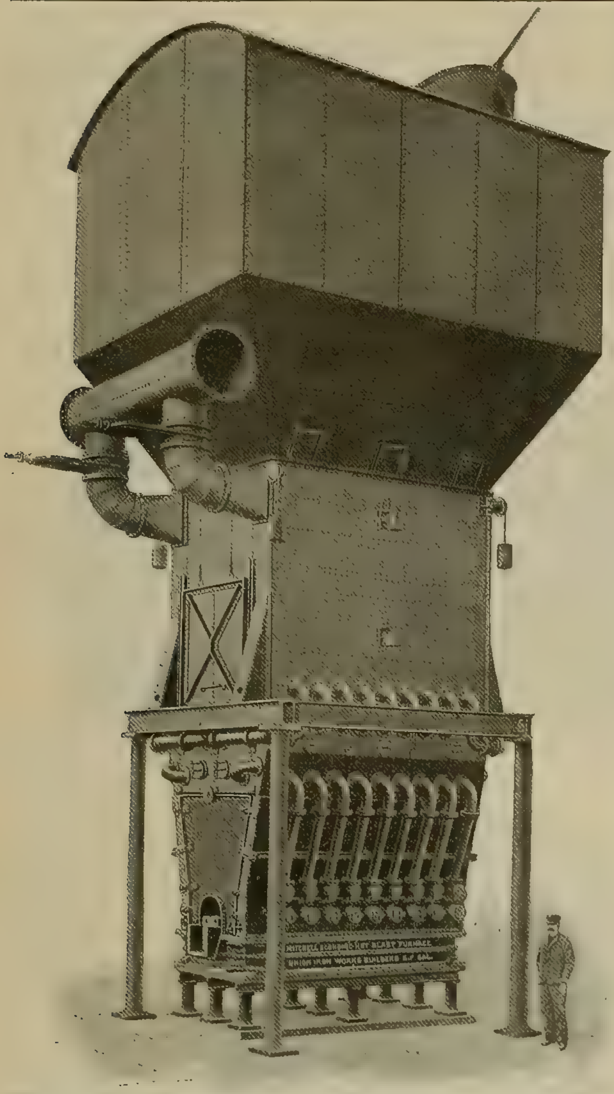
Special Gold Dredging Pumps and Machinery. Concentrators, Feeders, Rock Breakers and Power Plants.

Largest manufacturers of Irrigation and Reclamation Pumps in the United States.

Catalogues: No. 20, Pumps; No. 22, Cape Nome; No. 25, Mining.

KROGH MANUFACTURING CO.,

9-17 Stevenson St. and 134-136 Main St., SAN FRANCISCO, CAL.



UNION IRON WORKS,

222 MARKET ST., SAN FRANCISCO, CAL.

Hot Blast Water Jacket Furnace.

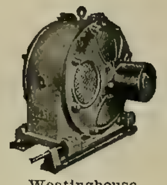
The picture shows the latest type of Economic Hot Blast Water Jacket Mitchell Furnace, built for the Copper Queen Consolidated Mining Company of Arizona. This furnace is adapted to reduce at one operation raw copper sulphide ores to a matte suitable for bessemerizing, without preliminary roasting.

UNION IRON WORKS,

222 MARKET STREET,
SAN FRANCISCO, CAL.

Westinghouse Polyphase Induction Motors

WESTINGHOUSE ELECTRIC
THE NAME WESTINGHOUSE IS A GUARANTEE



Westinghouse A. C. Motor.

No Brushes.
No Sparking.
No Moving Contacts.
No Danger from Fire.
Minimum Cost of Maintenance.
Minimum Attendance.
Highest Efficiency Under Most Varied Conditions.

Westinghouse Electric & Manufacturing Co.

All Principal Cities in U. S. and Canada.

Pittsburg, Pa.

65n

MYSTIC ROTARY QUARTZ CRUSHER.

DRY MILL.

For *sectional* cut of DRY MILL see advertisement in issue dated Oct. 6, 1900.

E. N. TAILLEUR. C. G. TAILLEUR. B. I. TURMAN.

NOVELTY MINING AND MILLING MACHINERY COMPANY,

Telephone Main 1357.

Office, 118 Montgomery St., San Francisco, Cal.

MINING AND MILLING MACHINERY OF ALL DESCRIPTIONS.

Mystic Rotary Quartz Crusher, Rock Breaker and Pulverizer, (COMBINED.)

The Only Mill Capable of Taking Ore Direct from the Mine and Reducing It to Pulp at One Operation. Used for Both Wet and Dry Pulverizing.

RELIABLE. DURABLE. ECONOMICAL.

STANDARD CONCENTRATOR, Best and Cheapest. CELLULAR ASBESTOS STEAM COVERING, Unequaled. OIL WELL TOOLS, from the most complete manufactory on the coast. CYANIDE TANKS, etc.

New Articles Being Added Continually. Send for Circular.

SOUTHERN CALIFORNIA OFFICE FOR MYSTIC ROTARY QUARTZ CRUSHER:

LLEWELLYN IRON WORKS, - LOS ANGELES, CAL.

RISDON IRON WORKS,

SAN FRANCISCO, CALIFORNIA.

Cable: "Risdon's." Code: A. B. C. & Leiber's.

MANUFACTURERS OF

Gold Dredging Machinery

And COMPLETE EQUIPMENT for Placer Mines

OUR SPECIALTY.

We build **GOLD DREDGES COMPLETE IN RUNNING ORDER** to handle 2500 cubic yards per day at a cost of 3 cents per cubic yard.

We excavate 50 feet below water, 20 feet above water and handle boulders up to one ton weight.

Send for Dredging Catalogue No. 17.

—WE ALSO BUILD—

All kinds of Mining, Milling, Concentrating, Pumping, Air Compressing, Hydraulic, Water Wheel and Hoisting Machinery.

EVANS HYDRAULIC GRAVEL ELEVATORS.

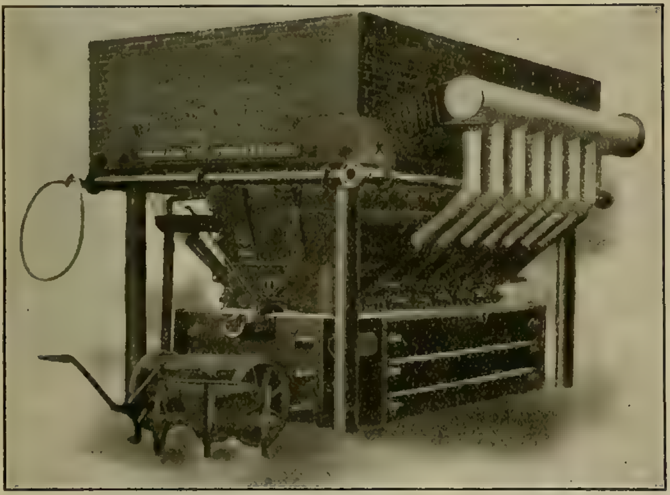
We publish sixteen catalogues. Write for one in the line you are interested in.

THE RISDON HAMMERED SHOES AND DIES.

Manufactured from the best quality of projectile steel—which is stronger and tougher than any heretofore used—the best shoe and die ever made. Will crush more ore per pound of steel than any other. Will not chip or cup and will outcrush any other made. Wear smooth and true with hardly any perceptible decrease in their size, and those who use them say, "We never had shoes and dies wear so long." Send for circulars and dimension blanks to

RISDON IRON WORKS, San Francisco, Cal.

THE COLORADO IRON WORKS COMPANY,



ENGINEERS AND MANUFACTURERS OF

Smelting Furnaces and Equipments.

In this advertisement we show cut of a recent Silver-Lead Cast Iron Water Jacket Furnace. Some metallurgists prefer jackets made of steel plates, and under some conditions plate copper is demanded, although more expensive. Most of the important smelters are using cast-iron jackets now, hence we give prominence to that material. There are absolutely no conditions in blast furnace practice but are as well subserved by properly proportioned cast-iron jackets, as by those of any other material.

Write for our catalogue, showing many different styles of smelters for the treatment of

GOLD, SILVER, LEAD, COPPER AND NICKEL ORES,

also the latest and best method for the economical use of jacket water (a saving of 80% to 90% guaranteed) by our patented

WATER VAPORIZING ATTACHMENT.

We design, manufacture and erect Mills for Concentration and Amalgamation, Milling, Chlorination and Cyanide Processes. In writing for information, give us the analysis or character of the ore to be treated, to enable us to intelligently arrive at the proper method.

Our very complete catalogue of CRUSHING MACHINERY will be sent on application.

THE COLORADO IRON WORKS COMPANY,

ESTABLISHED 1860. DENVER, COLORADO, U. S. A.

CHAS. C. MOORE & CO.,

—ENGINEERS AND DEALERS IN—
MAGNOLIA ANTI-FRICTION METAL,
HAMILTON CORLISS ENGINES, N. Y. SAFETY AUTOMATIC ENGINES,
BABCOCK & WILCOX BOILERS, McINTOSH & SEYMOUR ENGINES,
GREEN'S ECONOMIZERS, HOPPES LIVE STEAM PURIFIERS,
WHEELER CONDENSERS, BARNARD-WHEELER COOLING TOWERS,
EDMISTON FEED WATER FILTERS, BUNDY STEAM TRAPS,
SNOW STEAM PUMPS, QUIMBY SCREW PUMPS,
GOUBERT FEED WATER HEATERS, STRATTON STEAM SEPARATORS,
SPENCER DAMPER REGULATORS, HYATT ROLLER BEARINGS.

Contracts for Installation of Power Plants, Any Capacity.

SEND FOR CATALOGUES AND FULL INFORMATION.

32 FIRST STREET, SAN FRANCISCO, CAL.

SEATTLE BRANCH..............313 FIRST AVE. SOUTH.
LOS ANGELES BRANCH.......103 SOUTH BROADWAY.

DEWEY, STRONG & CO., Patent Agents, 330 Market St., S. F., Cal.

SELBY SMELTING AND LEAD CO.,

REFINERS OF GOLD AND SILVER BARS, GOLD DUST, ETC.

Buyers of Gold, Silver, Lead and Copper Ores, Gold Concentrates, Lead Bullion, Cyanide Product, Etc.

ORE AND BULLION ASSAYERS.

Works at VALLEJO JUNCTION, CAL. Office, 416 MONTGOMERY ST., SAN FRANCISCO, CAL.

GEO. E. DOW PUMPING ENGINE CO.

(Successors to DOW STEAM PUMP WORKS.)

COR. FIRST AND NATOMA STS., - - SAN FRANCISCO, CAL.

——MANUFACTURERS OF——

DOW PUMPS

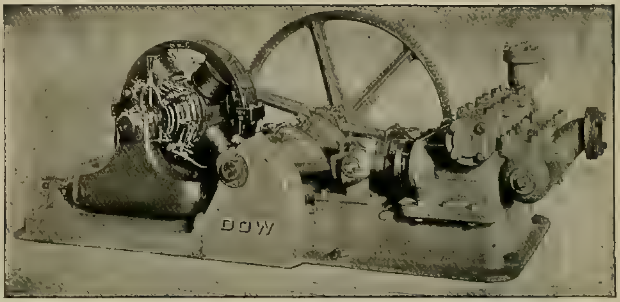
FOR MINING PURPOSES,

Operated by STEAM, AIR, ELECTRIC or WATER POWER.

VERTICAL SINKING PUMPS, BUCKET OR DOUBLE PLUNGER PATTERN.

DEEP MINE STATION PUMPS.

PUMPING MACHINERY FOR EVERY POSSIBLE DUTY.



HOR. TRIPLEX MINE STATION PUMP WITH ELECTRIC MOTOR.

Finlayson {Patent Aerial} {WIRE ROPE} TRAMWAY

FOR TRANSPORTATION OF ORE, COAL, DIRT, TIMBER, ETC.

Perfect Grip Clip,
Absolutely Safe,
Loads Automatically,
Unloads Automatically,
Operated by One Man,
Cost of Maintenance Low,
Capacity Largest Obtainable.

ALSO SOLE MANUFACTURERS
PATENT FLATTENED STRAND

[TRADE MARK REGISTERED.]
—AND—

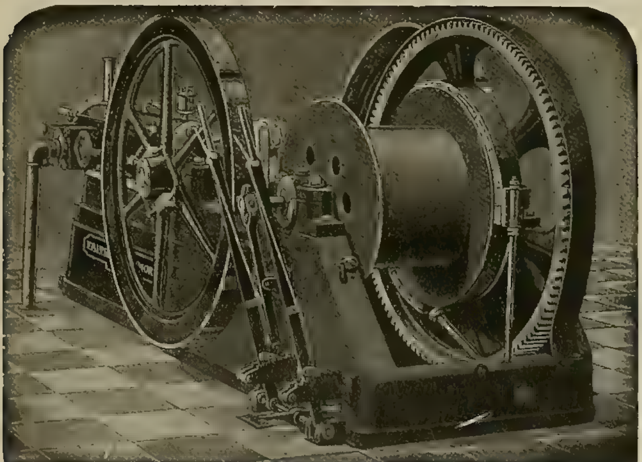
Wire Rope

OF EVERY DESCRIPTION.

MANILLA, SISAL, BLOCKS, ETC.

A. LESCHEN & SONS ROPE CO.,

Home Office: 920-922 North Main St., ST. LOUIS, MO. Branch Office: 47-49 South Canal St., CHICAGO, ILL.



FAIRBANKS-MORSE GASOLINE-DISTILLATE GEARED HOISTER.

An efficient and reliable combination of a Fairbanks-Morse Gasoline-Distillate Engine on the same base with a Friction Hoist. Modern and up to date. We publish a special catalogue describing our Hoister which we gladly mail prospective purchasers.

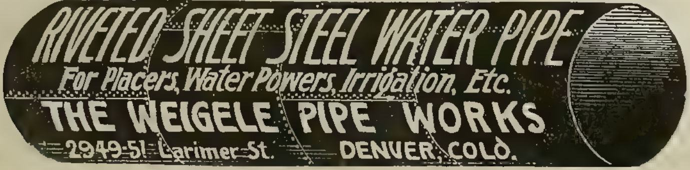
FAIRBANKS-MORSE GASOLINE-DISTILLATE ENGINES.

ALL SIZES UP TO AND INCLUDING 54 HORSE POWER.
For Pumping, Milling, Lighting, Air Compressors, Etc.

FOR CATALOGUES AND FULL INFORMATION, ADDRESS

FAIRBANKS, MORSE & CO.,

310 MARKET ST., SAN FRANCISCO, CAL.
201 N. LOS ANGELES ST., LOS ANGELES, CAL.
FIRST AND STARK STS. PORTLAND, OGN.
1600 SEVENTEENTH ST., DENVER, COL.
FRANKLIN AND MONROE STS., CHICAGO, ILL.

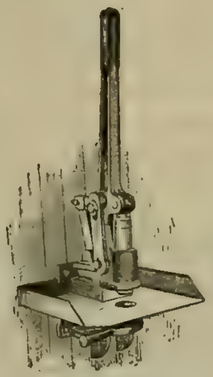


RIVETED SHEET STEEL WATER PIPE
For Placers, Water Powers, Irrigation, Etc.
THE WEIGELE PIPE WORKS
2949-51 Larimer St. DENVER, COLO.

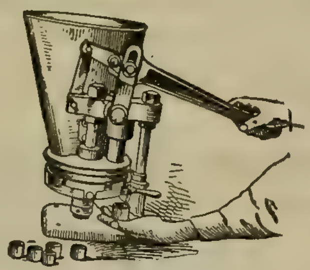
TELEPHONE MAIN 5303
Union PHOTO-ENGRAVING Co.
DESIGNING HALF-TONES ZINC ETCHING
523 MARKET ST.
SAN FRANCISCO, CAL.

ONE OF OUR MANY SPECIALTIES FOR ASSAYERS.

The Calkins Cupel Machine.



WALL PATTERN.
In position for filling mold.



THE AUTOMATIC.
Showing finished cupel being expelled.

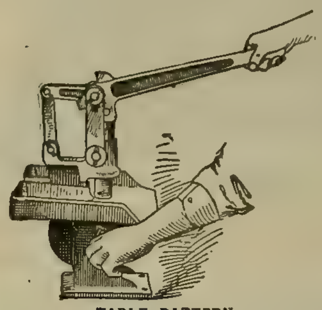


TABLE PATTERN.
Showing position of lever when greatest compression is obtained.

To Assayers:

With these machines perfect cupels can be made by anyone with great ease and rapidity.
They are the greatest labor-saving machine of the Assayer that can be had.
Compact, easily operated, can't get out of order, everlasting.

WRITE FOR OUR NEW, DESCRIPTIVE PAMPHLET IN WHICH ALL OUR SPECIALTIES ARE FULLY DESCRIBED.

F. W. BRAUN & CO.,
Manufacturers of Modern Appliances for Assayers,
LOS ANGELES, CAL.

ADAMANTINE SHOES AND DIES.

◆◆◆◆◆CHROME CAST STEEL.◆◆◆◆◆

CANDA Improved Self-Locking CAMS.

TAPPETS, BOSSES, ROLL SHELLS AND CRUSHER PLATES.

These castings are extensively used in all the mining States and Territories of North and South America. Guaranteed to prove better and cheaper than any others. Orders solicited subject to the above conditions. When ordering, send sketch with exact dimensions. Send for Illustrated Circular.

Manufactured by **CHROME STEEL WORKS,** Brooklyn, N. Y.

H. D. & H. W. MORRIS,
AGENTS,
Room 194 Crocker Building, San Francisco, Cal.

Canda Cam.

OUR 24-INCH WRENCH IS ESPECIALLY ADAPTED FOR MINE WORK.

The Johnston Patented Pipe Wrench.

A Strictly High-Grade Tool---Drop-Forged---Warranted.

THE STRONGEST, SIMPLEST AND BEST.
Never Jams, Self-Adjusting, Self-Releasing.

MADE IN 3 SIZES:

	10 in.	16 in.	24 in.
Pipe	⅛ to 1 in.	¼ to 1½ in.	½ to 2½ in.
List	$2.25	$3.00	$6.00

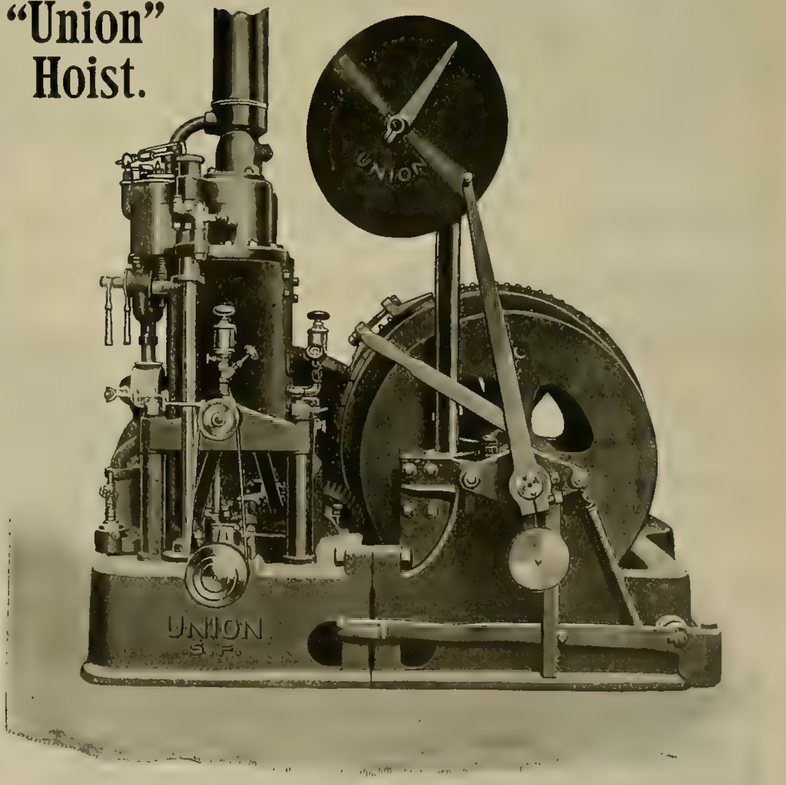
WM. B. VOLGER,
SOLE MANUFACTURER,
88 Chambers St., NEW YORK.

Agencies: THE MINE & SMELTER SUPPLY CO., Denver and Salt Lake City.

Centrifugal Roller Quartz Mill.

F. A. HUNTINGTON,
—Manufacturer of—
CENTRIFUGAL
Roller Quartz Mills.
CONCENTRATORS and ORE CRUSHERS.
Mining Machinery of Every Description.
Steam Engines, Shingle Machines.
Room 1, 3d Floor, Mills Building,
SAN FRANCISCO, CAL.

"Union" Hoist.



The above illustrates the 25 H. P. double cylinder, single drum "Union" hoist, with all the latest improvements.

THE UNION GAS ENGINE CO.
—BUILD THE—
"Union" Gas Engines,
Which use either MANUFACTURED or NATURAL GAS, ORDINARY STOVE GASOLINE (NAPHTHA or BENZINE), DISTILLATE or KEROSENE.
STATIONARY ENGINES for All Kinds of Work in Sizes from 3 to 300 h. p. in actual use.
"UNION" COMBINED HOISTS in Sizes from 2 to 130 h. p. in actual use.
"UNION" COMBINED COMPRESSORS—20, 30, 40 h. p.
HOISTS and COMPRESSORS Can Be Built in Larger Sizes to Order.
"UNION" MARINE ENGINES, 4 to 200 h. p., of Single, Double and Four-Cylinder Types.
FIFTEEN YEARS' EXPERIENCE Building Gas and Oil Engines.
"UNION" ENGINES Are In Use All Over the United States.
"UNION" ENGINES Are Simple, Durable and Economical.
Office, 248 First Street. Works, Corner First and Clementina Streets. SAN FRANCISCO, CAL.

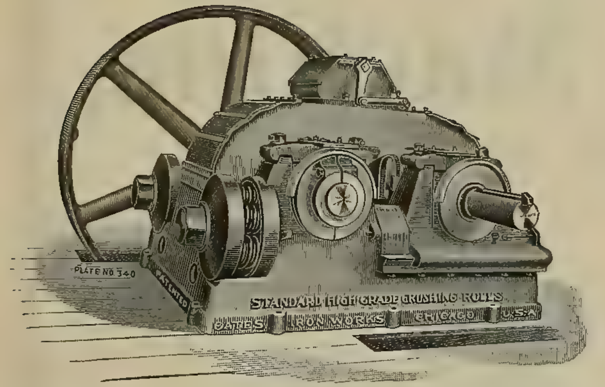


PLATE NO 340
STANDARD HIGH GRADE CRUSHING ROLLS
GATES IRON WORKS CHICAGO U.S.A.

GATES IRON WORKS.

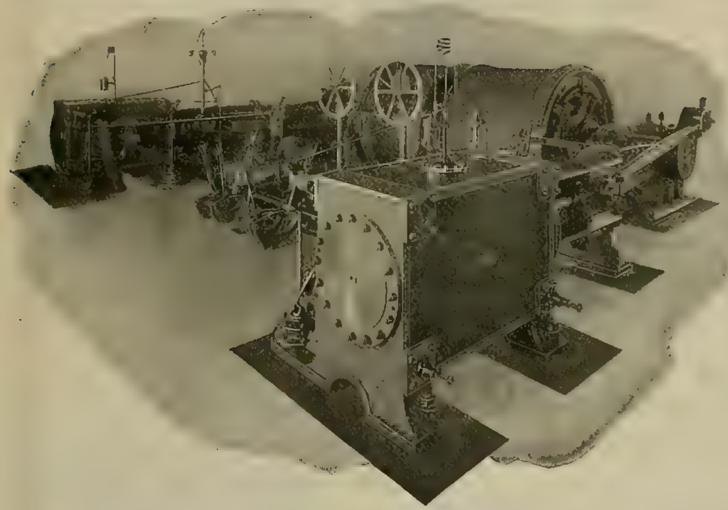
HIGH GRADE CRUSHING ROLLS.

UNEQUALED IN ECONOMY FOR CRUSHING ORES DRY.

Extensively used in connection with Gates Rock and Ore Breakers, Ball Mills and Tube Mills in Cement Plants for very fine pulverizing. : : : : : : : :

BUILDERS OF ROCK AND ORE CRUSHING MACHINERY.

SEND FOR CATALOGUE NO. 5. **Address Dept. UU, 650 ELSTON AVE., CHICAGO.**



HIGH CLASS FIRST MOTION

HOISTING ENGINES

Especially Designed

For Heavy Duty and Deep Mine Work.

Built with **CORLISS OR SLIDE VALVE ENGINES**
and for either **ROUND OR FLAT ROPE.**

Our line of Hoisting Machinery is the most complete carried by any one concern in the United States. Write us of your wants.

THE HENDRIE & BOLTHOFF M'F'G & SUPPLY CO.,

No. 35. DENVER, - - - - - - COLORADO.

THE MINE AND SMELTER SUPPLY CO.,

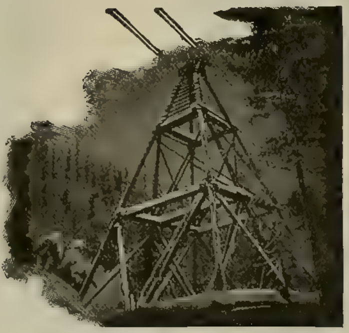
DENVER, - - COLORADO.

Mining and Milling Machinery and Supplies.

We beg to call your attention to

THE FINLAYSON PATENT WIRE ROPE TRAMWAY—

**the latest and best system of double-rope automatic aerial tramway in the market.
If interested in the most economical system of transporting ores from mine to mill and to shipping stations, send for our special tramway catalogue.**



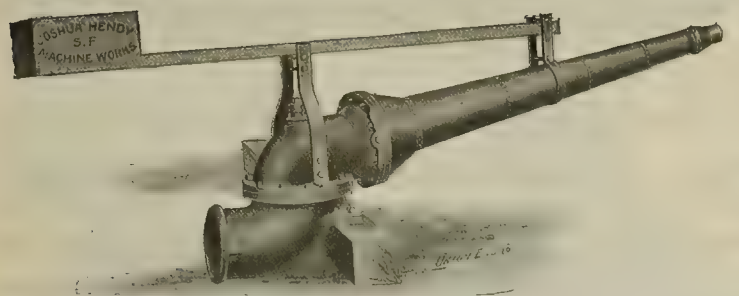
We carry a complete stock of Machinery and Supplies for immediate delivery.

Send for our special catalogues on Mining Machinery, Milling Machinery, Wilfley Concentrators, Tramways, Power Transmission Machinery, Machine Tools, Etc.

THE MINE AND SMELTER SUPPLY CO.,....................Denver, Colorado
THE MINE AND SMELTER SUPPLY CO.,................Salt Lake City, Utah.
THE MEXICO MINE AND SMELTER SUPPLY CO.,
No. 16 San Francisco St., City of Mexico.

BOILERS, ENGINES, STEAM HOISTERS, ELECTRIC HOISTERS, ROLLS, CRUSHERS, WILFLEY TABLES, CARS, CAGES, ORE BUCKETS, RAIL, PIPE, FITTINGS, BELTING, ETC., ETC.

Double-Jointed Ball-Bearing Hydraulic Giants.


JOSHUA HENDY S.F MACHINE WORKS

The above presents an improved **Double-Jointed Ball-Bearing Hydraulic Giant** which we build. The improvement consists of the introduction of a **Ball Bearing** by which the pressure of the water is reduced to a minimum and the direction of the nozzle changed at will with ease.

Catalogues and prices of our specialties of HYDRAULIC MINING MACHINERY furnished upon application. **JOSHUA HENDY MACHINE WORKS, 38 to 44 Fremont St., San Francisco, Cal.**

TELL US WHERE YOU'RE AT.

4 Cents Per Ton Per Mile

**Is what it costs to transport Ore with our systems of Aerial Wire Rope Tramways.
We'd like to send you our book telling you all about it, but we can't do it unless you write us**

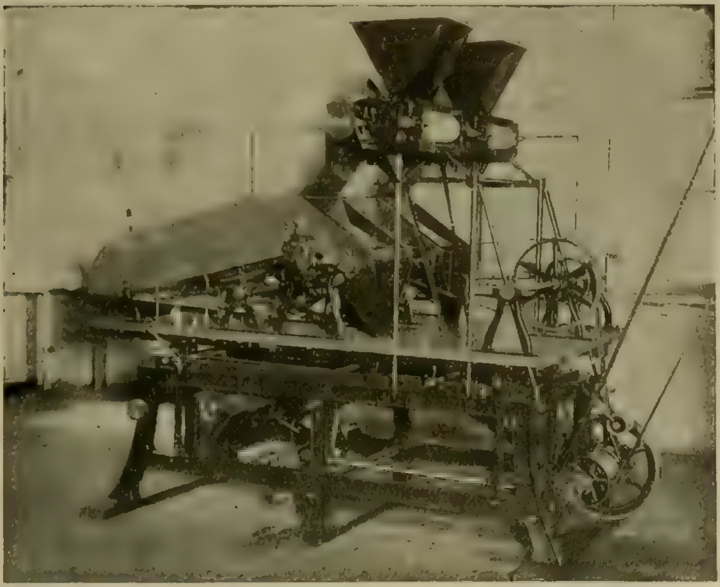
WHERE YOU'RE AT.

THE J. H. MONTGOMERY MACHINERY CO.,
DENVER, COLO., U. S. A.

CROWN GOLD MILLING CO.

Manufacturers of the "CROWN" CONCENTRATOR and CROWN ORE SIZER. A dry process of sizing and concentrating ore, sand or gravel. Designed to accord fully with the laws of specific gravity, and especially adapted to refractory ore or localities where there is no water.

The chief claims for the Crown Concentrator are that it occupies less floor space and has nearly four times the capacity of any wet concentrator; that it will concentrate ores containing base and refractory metals that ordinarily slime and carry off values; that it effects a saving of values far above the ordinary methods of concentration.



We have, now in operation, a complete plant for crushing, sizing and concentrating ores by the

Crown Dry Milling Process.

Mine owners desiring tests made can forward us, freight prepaid, not less than 1000 lbs. nor more than 4000 lbs. of sample, for which a charge of $20 will be made. (This amount includes assaying, etc.)

Ores for which this process is adapted and of which consignments are solicited are any concentratable ores, pulps, tailings, or sands, carrying sufficient values, whether they have heretofore been profitably concentrated or not.

* * * *

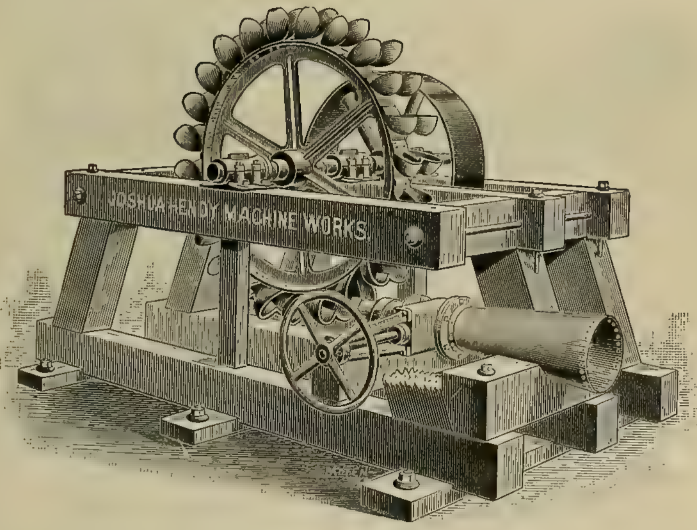
Office,............................230 Post St.
Works,................23 Stevenson St.
SAN FRANCISCO, CAL.

Joshua Hendy Machine Works,

San Francisco, Cal.

Office and Salesroom....................................38 to 44 Fremont Street.
Works.................................Cors. Bay, Kearny and Francisco Streets.

MINING AND MILLING MACHINERY.


JOSHUA HENDY MACHINE WORKS.

WATER WHEELS.

Stamp Mills!

- "Hercules" Ore Crushers;
- "Challenge" Ore Feeders;
- "Triumph" Ore Concentrators;
- "Hendy-Norbom" Ore Concentrators;
- Boilers, Engines and Pumps;
- "Triple Discharge" Two Stamp Mills;
- Hydraulic Mining Machinery;
- Hoisting, Pumping and Irrigating Plants;
- Tangential Impact Water Wheels.

SCREENING MACHINERY FOR ALL PURPOSES.

VIBRATORY, SHAKING, REVOLVING, STATIONARY AND MECHANICAL HAND SCREENS FOR ALL MATERIALS.

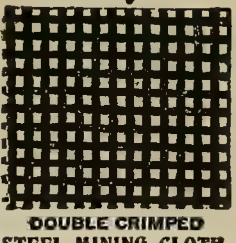
SCREENS SPECIALLY ....ADAPTED FOR.......... MINING PURPOSES.

COMPLETE PLANTS ERECTED.

SEND FOR DESCRIPTIVE MATTER.

WESTERN MACHINERY & SUPPLY CO., Engineers and General Machinists,
161 La Salle Street, CHICAGO.

"The Perfect"



DOUBLE CRIMPED STEEL MINING CLOTH

USE "THE PERFECT"

Double Crimped Mining Cloth,

MANUFACTURED BY

THE LUDLOW-SAYLOR WIRE CO.,
Fourth and Elm Sts., ST. LOUIS, MO.

* * * *

MINERS' STEEL CANDLESTICKS.

Trommel Screens
THE ROBERT AITCHISON PERFORATED METAL CO.
303 to 305 DEARBORN ST. CHICAGO, ILL.

CARY SPRING WORKS,

240 & 242 WEST 29th STREET, NEW YORK, U. S. A.

Telephone, 3346—38th St.

WIRE SPRINGS OF EVERY DESCRIPTION.

MANUFACTURERS OF All kinds of ROUND AND FLAT WIRE, TEMPERED AND UNTEMPERED.

SPRINGS For Machinery, Rolling Shutters, Motors, Etc.

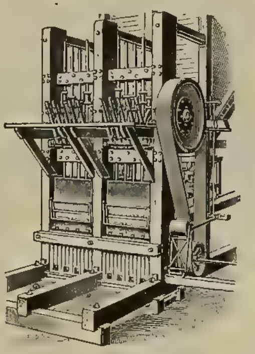
MUSIC BOX AND FINE SPRINGS OUR SPECIALTY.

THE EDWARD P. ALLIS COMPANY,

MILWAUKEE, WIS.

MANUFACTURERS OF

MINING,
SMELTING,
MILLING
PLANTS.



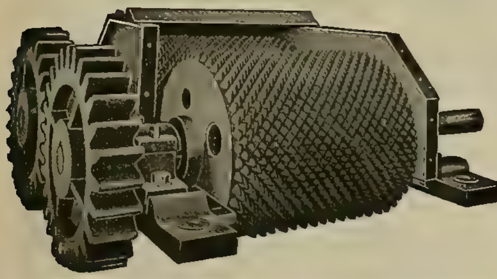
LEYNER DRILLS,
AIR COMPRESSORS,
CONCENTRATORS,
ORE FEEDERS,
REFINING FURNACES.

MINE PUMPS AND HOISTING ENGINES.

REYNOLDS CORLISS ENGINES.

WE SELL EVERYTHING USED IN CONNECTION WITH MINING AND MILLING.

LINK-BELT ELEVATORS —AND— CONVEYORS.



BREAKER ROLLS,
PICKING TABLES,
MALLEABLE IRON BUCKETS,
SHAFTING, PULLEYS,
GEARING, CLUTCHES, Etc.

Catalogue Upon Application.

LINK-BELT MACHINERY CO.,
Engineers, Founders, Machinists,
CHICAGO, U. S. A.
DENVER, 1328 17th St.,
A. E. LINDROOTH, Manager.

PICKING BELTS
are now supplanting
SORTING TABLES
of wood and iron.

Fully Described in Our New Catalogue.

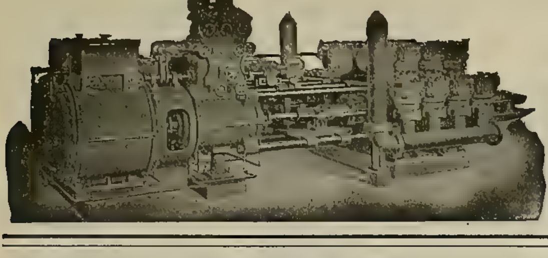
ROBINS CONVEYING BELT CO.,
Park Row Building, NEW YORK.

The Best MINE PUMPS in the World.

COMPOUND CONDENSING AND TRIPLE EXPANSION STATION PUMPS.

We carry in our Denver store a stock of Improved Pattern Sinkers and Duplex Station Pumps, with duplicate parts for repairs.

Write for Catalogue and Estimates.



Jeanesville Iron Works Co.,
JEANESVILLE, PA.

Western Office,
Columbia Hotel Building,
1328 17th St.
Denver, Colo.
Telephone 2298 A.
A. MIDDLEBROOK, Manager.

SMOOTH-ON
TRADE MARK
CASTINGS.

An iron cement for repairing leaks or fractures in steam or hydraulic work. When hard it will withstand a red heat, steam, water or oil, and expands and contracts with heat and cold the same as iron, insuring a tight joint at all temperatures. Difficult flange connections can easily be made with Smooth-On, as it adapts itself to the flanged faces whether parallel or not. Connections are easily taken apart. Unequaled for boiler patching, and repairing blemishes in iron castings. Write for catalogue and prices. Sole proprietors and manufacturers: Smooth-On Mfg. Co., Jersey City, N. J., U. S. A.

MESSRS. MADISON, BRUCE & SELLERS,
34-36 STEUART ST., SAN FRANCISCO, CAL........................AGENTS FOR PACIFIC COAST.

The "Stop for Repairs" to Mining Machinery,

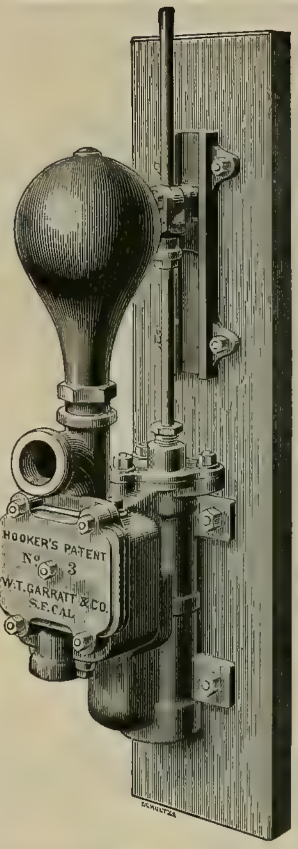
Especially if it is a conveying plant, is a considerable item of expense. Many of these expensive pauses are made to repair or adjust faulty belting. To economize in this respect, use the

LEVIATHAN
CONVEYOR BELT.

It is not only adapted to the heaviest service, but will run under any conditions in underground, drippings, extreme heat or cold.

IT WILL OUTLIVE ANY OTHER BELTING.

MAIN BELTING COMPANY,
1225-41 Carpenter Street, Philadelphia.
55-57 Market St., Chicago. 120 Pearl St., Boston.
SEND FOR PRICE LISTS AND SAMPLE.


HOOKER'S PATENT
No 3
W.T.GARRATT & CO.
S.F.CAL.

A GOOD MINING PUMP.

The Hooker Double Acting Pump.
Well Built, Simple, Durable, Efficient.
All Working Parts Easy of Access.
Duplicate Parts in Stock.
We furnish these pumps with suction pipes, hose and strainers complete. Estimates on application.
Can furnish up to number three with double brake for hand power.
Just the pump for a small mine.
Larger sizes, larger capacities.
Send for our catalogue on pumps.

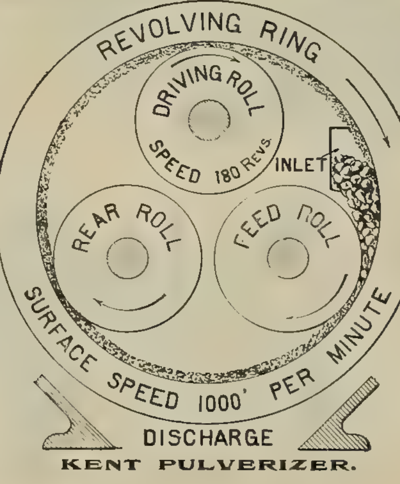
W. T. GARRATT & CO.,
Cor. Fremont and Natoma Sts.,
SAN FRANCISCO, CAL.

THE LATEST, BEST AND CHEAPEST
PIPE WRENCH.

No Threads to Strip. No Nuts to Jam.
Made of Special Wrench Steel, and Drop Forged.

Quick, effective and positive in adjustment. Cannot slip, crush or lock on the pipe. Made in four sizes: 10, 18, 24 and 36 inches. Price no higher than other pipe wrenches. For sale by hardware, plumbing and oil well supply dealers.

ATLAS PIPE WRENCH CO.,
Flood Building, San Francisco.
NEW YORK OFFICE, 121 LIBERTY ST. WORKS, NEW HAVEN, CONN.



KENT PULVERIZER.

A Dry Pulverizer

FOR ORES, CEMENT and HARD SUBSTANCES.

Equals a 50-ton stamp mill. Grinds to any mesh under 8.

No slimes, no choking. Takes any fineness of feed under 1 in.

No special foundation. No quartered belts.

No internal screens. Outside separation gives 100 per cent product most uniform and granular.

No oil in product. No stoppages for oiling or adjusting.

Can be used wet. Can be moved on a truck.

Guaranteed for one year. Free new for worn out parts.

Little wear, no duplicate parts, no breakdowns.

Cost ¼ to 1-10 of any installation of same capacity.

Takes only one-half the horse power. Is automatic.

For Particulars and Catalogue

KENT MILL CO., 5 Beekman St., NEW YORK.

Fraser & Chalmers,

CHICAGO, ILL., U. S. A.

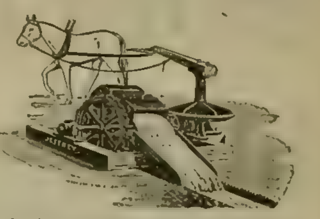
The accompanying cut shows curb and jackets of our Standard 36″ Steel Water Jacketed Blast Furnace of the Round Type for Lead Ores.

We make also Copper Matting, and every description of approved smelting and roasting furnace plant.

Our Catalogue No. 3 gives particulars, and we will be glad to have you write us for estimates.

FRASER & CHALMERS,
CHICAGO, ILL.

WATER ELEVATORS.



Submit Specifications for Our Prices.

Plans and Estimates Cheerfully Furnished.

We manufacture: Chains (All Styles), Elevator Buckets, Sprocket Wheels, Spiral Conveyors, Dredges, Sand Handling Machinery, Water Elevators, Dump Cars, Skip Cars, Clay Screens, Columbian Separators (for Treating Cement, Cement Clinkers, Marble, Quartz, Ores, etc.), Coal Screens, Coal and Coke Crushers, Coal Washers, Cable Conveyors.

For Catalogue, Address

THE JEFFREY MFG. CO., Columbus, Ohio
Western Branch, Equitable Bdg., Denver, Colo

12 H.P. $500

C.O. Bartlett & Co.

CLEVELAND,
OHIO.

CABLE
HOIST CONVEYORS.

Cable Hoist Conveyor at St. Paul, Minn.

Laurent=Cherry Patent System,

requiring no Fall Rope Carriers;

and others.

MANUFACTURED BY

THE TRENTON IRON CO.,

TRENTON, N. J.

Engineers and Contractors and Sole Licensees in North America for the Bleichert System of Wire Rope Tramways. Also, Wire Rope Equipments for Surface and Underground Haulage, etc.

NEW YORK OFFICE—Cooper, Hewitt & Co., 17 Burling Slip.
CHICAGO OFFICE—1114 Monadnock Building.

For Particulars, Address NEWTON M. BELL, Agent, 308 Market St., San Francisco.

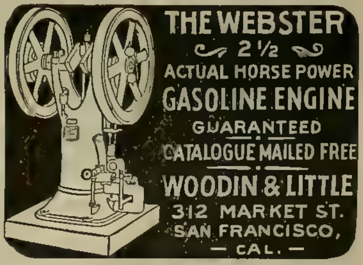
A full stock of the Trenton Iron Co.'s Wire Ropes, made from "SPECIAL" Crucible and Plough Steel, carried in San Francisco.

Hoskins' Patent Hydro-Carbon Blow-Pipe and Assay Furnaces.

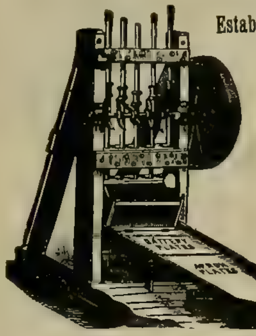
No dust. No ashes. Cheap, effective, economical, portable and automatic.

SEND FOR PRICE LIST TO

W. HOSKINS, 81 South Clark St., Room 55, CHICAGO, ILL.



THE WEBSTER
2 ½
ACTUAL HORSE POWER
GASOLINE ENGINE
GUARANTEED
CATALOGUE MAILED FREE
WOODIN & LITTLE
312 MARKET ST.
SAN FRANCISCO,
— CAL. —



Established 1865. NOTICE TO GOLD MINERS. Incorporated 1890.

Silver-Plated Copper Amalgamated Plates

FOR SAVING GOLD

IN QUARTZ, GRAVEL OR BEACH MINING. MADE OF BEST SOFT LAKE SUPERIOR COPPER.

AT REDUCED PRICES.

Our Plates are guaranteed, and by actual experience are proved, the best in weight of Silver and durability. Old Mining plates replated, bought, or gold separated. THOUSANDS OF ORDERS FILLED.

SAN FRANCISCO NOVELTY AND PLATING WORKS,

☞SEND FOR CIRCULARS. Telephone Main 976. 68, 70, 72, 74 and 76 FIRST STREET, COR. MISSION, SAN FRANCISCO, CAL.

COLORADO'S GOLD

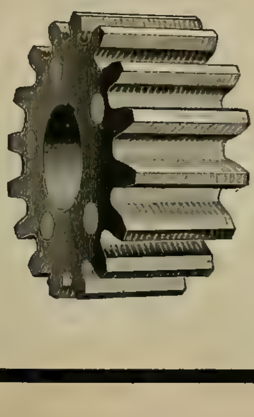
Output for 1899 is unequaled by any State in the Union. Cripple Creek, Leadville, and all the important mining towns are reached by

THE COLORADO & SOUTHERN RY...

For copies of our publications on the Swandyke and Pine Creek Gold Districts, or our pamphlet "Hints to Prospectors," address

T. E. FISHER, GEN. PASS. AGT.,
DENVER, COLO.

STOP THAT NOISE!



New Process Raw Hide

PINIONS

are Noiseless and Durable. We make Spur, Bevel and Friction Gears for use on Hoists, Pumps, Air Compressors, Motors, Drills, and all kinds of geared machinery.

—THE—

New Process Raw Hide Co.,

Patentees and Sole Manufacturers, SYRACUSE, N. Y.

THE BUCYRUS COMPANY,

DESIGNERS AND BUILDERS OF

DREDGES, STEAM SHOVELS, EXCAVATING MACHINERY, WRECKING CARS, LOCOMOTIVE CRANES, PILE DRIVERS, CENTRIFUGAL PUMPS, WITH SIMPLE, COMPOUND OR TRIPLE EXPANSION ENGINES,

MACHINERY FOR PLACER MINING.

SOUTH MILWAUKEE, WISCONSIN.

OUR CARS HAVE BEEN IN USE FOR NINE YEARS.

TRUAX

CARS ALWAYS IN STOCK TO FILL RUSH ORDERS.

ORE CARS

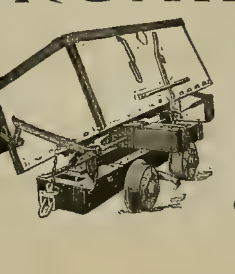
CUT REPRESENTS OUR SIDE DUMP CARS.

SEND FOR PAMPHLET.

TRUAX MFG. CO.

CARS MADE FOR ALL KINDS OF WORK.

69 Stevenson St., S.F.



BULLOCK DIAMOND DRILLS

If you are interested in prospecting send for our new Diamond Drill Catalogue (No. 33).

BULLOCK MINING MACHINERY

PORTABLE HOISTS—Send for our new Catalogue (No. 40). CHAMPION MINE VENTILATORS—Send for our new Catalogue (No. 35).
HOISTING AND HAULAGE PLANTS, ORE CARS, SKIPS, CAGES, ETC., ETC.

PARKE & LACY CO., Agent,
21 & 23 Fremont St., San Francisco, Cal.

M. C. BULLOCK MFG. CO.,
1172 West Lake St., Chicago, Ill., U. S. A.

THE RAND DRILL COMPANY,

PIONEERS IN ROCK DRILLING AND AIR COMPRESSING MACHINERY,

128 BROADWAY, NEW YORK.
223 FIRST ST., SAN FRANCISCO, CAL.
1328 MONADNOCK BLK., CHICAGO, ILL.

Has been awarded

THREE GOLD MEDALS

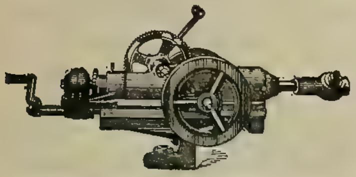
at the

PARIS EXPOSITION

for

AIR COMPRESSORS and ROCK DRILLS.

THE JACKSON HAND POWER ROCK DRILL.



Works in Any Rock, in Any Position.

Write for Circulars and References.

THE JACKSON DRILL & M'F'G CO.,
1756 Larimer Street, DENVER, COLO.

Sole Licensees for all Foreign Countries and Eastern United States: THORNTON N. MOTLEY COMPANY (INC.), 43 John St., New York.

AGENTS: CHAS. B. BOOTHE & CO., 126 SO. LOS ANGELES ST., LOS ANGELES, CAL.

FIRTH'S DRILL STEEL.

USE THE BEST.

Has no equal in Hard Rock Drilling.

ABNER DOBLE COMPANY, GEN. AGTS.,
FREMONT AND HOWARD STS., SAN FRANCISCO.

Sold by Seattle Hardware Co., Seattle, Wash.

THEODOR LEXOW, 14 JOHN STREET, N. Y.
......Importer of......

CARBONS
(BLACK DIAMONDS)

For DIAMOND DRILLS and all Mechanical Purposes.

HENRY DEMMERT.

Established 1837.

I. C. Yawger,

Successor to VICTOR BISHOP & CO.

IMPORTER OF CARBONS FOR DIAMOND DRILLS.

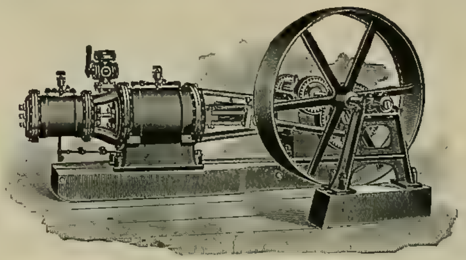
21 Maiden Lane, - NEW YORK.

DIAMOND DRILLS
FOR PROSPECTING.
AMERICAN DIAMOND ROCK DRILL CO.
120 LIBERTY ST N.Y.

MACHINERY BARGAINS.

I have some splendid Air Compressors, Hoisting Engines, Rock Drills, Rock Crushers, Channeling Machines, Steam Pumps, Boilers, Steam Shovels, Locomotives and Relaying Rails, all in splendid condition. Send for printed list and specify your requirements. I can save you money. WILLIS SHAW, 627 New York Life Building, CHICAGO.

WHY NOT have our catalogues, specifications and prices before you purchase AIR DRILLS OR COMPRESSORS?



Our guarantees are strong; our customers are satisfied. We can satisfy YOU.

J. Geo. Leyner,
729 Seventeenth St.,
DENVER, COLO.

SULLIVAN

Diamond Core Drills
FOR PROSPECTING. Catalogue 29.

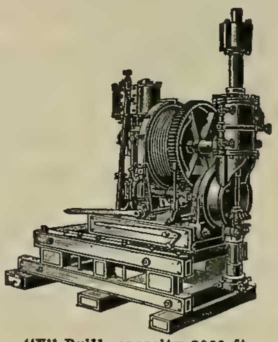
The most extensive line of sizes and styles ever offered.

CONTRACTORS FOR PROSPECTING WITH DIAMOND DRILL.

ROCK DRILLS
FOR MINING. Catalogue 30.

Superior valve and ratchet motions. The highest possible grade.

Send for Our New Catalogues.



"N" Drill, capacity 2000 ft.
Cable Address, Diamond, Chicago.
Codes: A. B. C., 4th Edition. Postal Directory. Western Union. Liebers.

Sullivan Machinery Co.,
New York. Pittsburg. Claremont, N. H.

Main Office, CHICAGO..........ROOMS 1220-1221, 135 ADAMS ST.
Western Office, DENVER................332 SEVENTEENTH ST.
Pacific Agency, SAN FRANCISCO, HENSHAW, BULKLEY & CO.
Northwest Office, SPOKANE, WASH.........101 S. HOWARD ST.

CANTON TOOL STEEL. CANTON PICK STEEL.

CANTON EXTRA DRILL STEEL,

WARRANTED.

Equal to Jessop's or Firth's in hard rock work.

Our 1900 Steel List, containing useful information, will be sent free upon application. : : :

CANTON STEEL COMPANY,
Branch Warehouse: DENVER, COLO. Works: CANTON, OHIO.

TO SECURE GOOD RESULTS BUY

JESSOP'S STEEL
FOR TOOLS, MINING DRILLS, ETC.

Chief American Office,
91 John St., New York, N. Y.

Wm. Jessop & Sons, Ltd.
Manufactory, Sheffield, England.

I. WILLARD BEAM, Agent,
29 MAIN STREET,
SAN FRANCISCO, CAL.

PIPE BARGAINS.

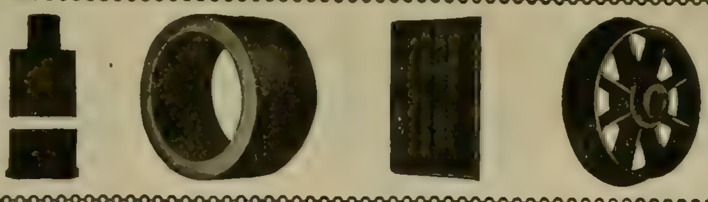
Suitable for Water Mains, Mining, Irrigation, Air, Oil, etc., etc. New Spiral Welded Asphalted Steel Pipe with any style coupling desired.

460 ft. 6-in. 3,480 ft. 10-in. 1,828 ft. 14-in. 1,077 ft. 18-in.
50,000 " 8 " 2,428 " 12 " 520 " 16 " 1,623 " 24 "

All Sizes Wrought Pipe, Well Casing and Straight Riveted Pipe in Stock. Equipment of All Kinds for Mine, Railroad and Contractors' Outfits. Write for Prices and Particulars.

BOWES & CO., 23 Lake St., Chicago, Ill.

DEWEY, STRONG & CO., Patent Solicitors, 330 Market St., San Francisco, Cal.



HARD TOUGH

TAYLOR IRON AND STEEL COMPANY,

HIGH BRIDGE, NEW JERSEY, U. S. A.

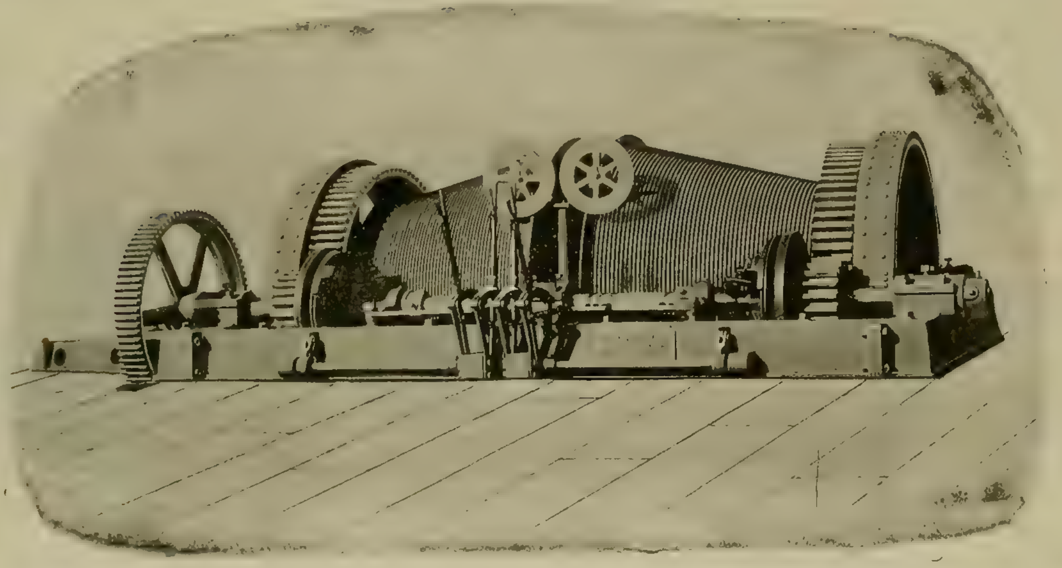
Sole Licensees in America under the HADFIELD System and Patents for MANGANESE STEEL,

Best Metal Known for Roll Shells, Stamp Shoes and Dies, Crusher Plates and Side Liners, Toggles and Toggle Bearings, Gyratory Cones and Concaves, or Liners, Mine Car Wheels, Coal Crushing Rolls, Etc.

PACIFIC COAST PARTIES INTERESTED PLEASE ADDRESS PARKE & LACY CO., SAN FRANCISCO, CAL.

WRITE FOR INFORMATION AND PRICES.

MODERN ELECTRIC HOISTS IN SUCCESSFUL OPERATION.
Send for Bulletin No. 1003.

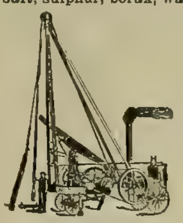


200 H. P. DOUBLE DRUM ELECTRIC HOIST, OPERATED BY 60-CYCLE, 3-PHASE INDUCTION MOTOR.
Three of These Built for the British-American Corporation, Ltd., Rossland, B. C.

DENVER ENGINEERING WORKS,—SHEPARD & SEARING,—DENVER, COLO., U. S. A.

A BORE HOLE

is the cheapest, quickest, most direct, and most effective way to test lands for minerals, oil, gas, salt, sulphur, borax, water, etc.



THE STAR DRILLING MACHINES

excel for these uses. They will drill a hole through anything to any depth from 250 to 2500 feet. The only machines made that are absolutely without annoying springs. They are simple, powerful and efficient. Easy to handle at work or on the road. Used in every State and Territory and in many foreign countries.

We also make full line of drill tool-bits, reamers, sand pumps, spuds, etc., etc. Write for illustrated free catalogue.

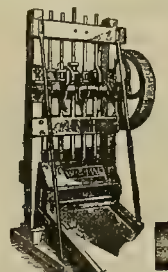
Star Drilling Machine Co.,
Akron, Ohio.

THE MINES OF
Eastern Oregon

Which are now attracting so much attention are reached only by the lines of the

OREGON RAILROAD & NAVIGATION CO.

For Descriptive Pamphlets, Through Rates, Etc., Address
E. C. WARD, Gen. Agt.,
630 Market Street, San Francisco.



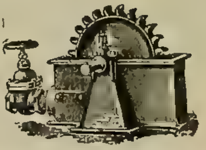
HYDRAULIC, MINING AND DREDGING MACHINERY, RIVETED STEEL PIPE,

Write for Prices and Estimates

AMERICAN IMPULSE WATER WHEELS, ETC.

WOLFF & ZWICKER IRON WORKS

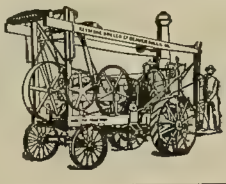
PORTLAND OREGON



MINING HOISTS.

Engines, Boilers,
Saw Mills, Hoe Saws,
Mill Supplies.

TATUM & BOWEN,
34-36 Fremont Street, San Francisco, Cal. 29-35 First Street, Portland, Or.



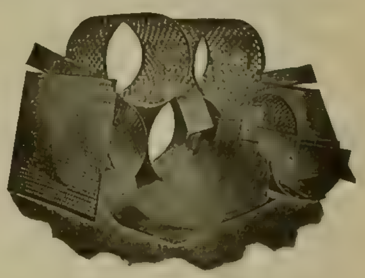
Prospecting Machinery.

Multitudes in use for testing for minerals. Sizes and equipments to suit any and all conditions. Unexcelled for Placer Testing, Oil Wells, Water Wells, testing for Lead and Zinc, Iron and Coal; goes through anything; brings up everything. Large sizes drill as much as 1500 feet. In use all over the world. Every purchaser pleased. Used on boats for testing river and lake beds. Water no hindrance. No skilled labor required.

KEYSTONE DRILLER CO., Beaver Falls, Pa., U. S. A.

FOWLER'S AIR SPACE
and Asbestos Sectional Covering.
As a Non-Conductor, Unequaled.
Special Rates for Steam Boilers and Drums.
G. C. Fowler, 656-58 Howard St., S. F.

For Best Satisfaction and Lowest Prices
— IN —
PERFORATED METALS
— AND —

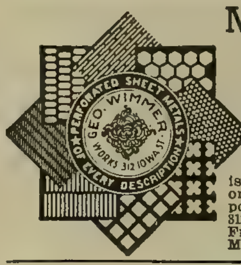


MINING SCREENS

PLACE YOUR ORDERS WITH

Fraser & Chalmers,
CHICAGO, ILL., U. S. A.

SEND FOR SAMPLES, MENTIONING THIS PAPER.


PERFORATED SHEET METALS OF EVERY DESCRIPTION
GEO. WIMMER
WORKS 312 IOWA ST.

Mining Screens
A SPECIALTY.

Diagonal Slot,
Straight "
Burred "
Round Holes.

In American planished or Russian iron or steel for all purposes. GEO. WIMMER, 312 Iowa Street, San Francisco. Telephone Mint 1332.

QUARTZ SCREENS
A specialty. Round, slot or burred slot holes. Genuine Russia Iron, Homogeneous Steel, Cast Steel or American planished Iron, Zinc, Copper or Brass Screens for all purposes. CALIFORNIA PERFORATING SCREEN CO., 145 and 147 Beale St., S. F

—EASTERN PRICES BEATEN.—

SAN FRANCISCO
Pioneer Screen Works,
JOHN W. QUICK, Prop.

Improved Facilities! Finest Work! Lowest Prices!

Perforated Sheet Metals, Steel, Russia Iron, American Planish, Zinc, Copper and Brass Screens for All Uses.

MINING SCREENS A SPECIALTY.

221 and 223 First Street, San Francisco, Cal.

DENVER & RIO GRANDE R.R.
SCENIC LINE OF THE WORLD

The ∴ Mining Man's Favorite Route

BETWEEN

Denver, Colorado Springs, Pueblo and Florence, Cripple Creek, Leadville, Glenwood Springs, Aspen, Gunnison, Lake City, Creede, Durango, Silverton, Telluride and Ouray,

Reaching all the Mining, Milling, Cyaniding, Chlorinating and Smelting centers in Colorado and Utah, and all mining points in California, British Columbia and the Pacific Northwest by close connections and a perfect system of through car service.

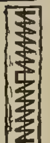
Pullman Palace and Tourist Sleeping Cars between Denver and San Francisco and Los Angeles, and Pullman Palace and Tourist Sleeping Cars and Free Reclining Chair Cars between Denver and Portland. : : A Perfect Dining Car Service on All Through Trains. : :

For Illustrated Pamphlet, address

W. J. SHOTWELL, G. A. D. & R. G. R. R., 126 California St., San Francisco, Cal.

S. K. HOOPER, G. P. & T. A., Denver, Colo.

Notice the Shape of
GLOBE BOX---THE BEST BABBITT.



J. M. HAYDEN & CO.
GLOBE BOX METAL
GRAND RAPIDS MICH.
THE BEST BABBITT

Send for trial order, Ladle free.

The Globe wire lace makes the smoothest joint, runs the stillest and lasts the longest of any lacing. Sent on approval. Write us for booklet with instructions, etc. J. M. HAYDEN & Co., 58 Pearl St., Grand Rapids, Mich.

PROFESSIONAL CARDS.

R. H. POSTLETHWAITE, M.I.E.E.
Hydraulic Mining Engineer.
River Dredging for Gold a Specialty.
1315 Leavenworth St……..San Francisco, Cal.

THEO. F. VAN WAGENEN, E. M.
Consulting Mining and Hydraulic Engineer.
1508 Fillmore St., DENVER, COLO.

D. B. HUNTLEY,
Mining Engineer and Metallurgist,
De Lamar, Owyhee Co., Idaho.

BERNARD MACDONALD,
Consulting Mining Engineer.
General Manager British America Corporation, Ltd., Rossland, B. C.

J. BELL,
MINES AND MINING,
630 Market St., opp. Palace Hotel,
San Francisco, Cal.

Established 1879.
CHAS. B. GIBSON,
Chemist, Metallurgist and Mining Engineer,
81 CLARK ST., CHICAGO, ILL.

W. C. WYNKOOP, M. E.
Woodbury (Cochiti District),
New Mexico.
Economic Geology and Mine Examinations.

WM. VAN SLOOTEN,
Consulting Mining Engineer and Metallurgist.
Cable address: "Yadoplata."
35 WALL STREET………. ….NEW YORK, N. Y.

E. H. BENJAMIN, Mining Engineer.
A. M. HUNT, Mechanical & Hydraulic Engineer.
WYNN MEREDITH, Electrical Engineer.
C. L. CORY, Electrical & Mechanical Engineer.
EXPERT EXAMINATIONS. ADVISORY REPORTS.
CONSTRUCTION SUPERVISION.
331 Pine Street,……….San Francisco, Cal.
Telephone Main 1870. Cable Address "Edben."

DANIEL G. JEWETT,
METALLURGIST AND ASSAYER.
Specialty: The Mining and Smelting of Copper or Lead Ores.
General Manager of Boston G. M. & M. Co., Venture G. M. & M. Co., The Boston Tunnel.
P. O. BOX 5, GUFFEY, PARK CO., COLO.

ABBOT A. HANKS,
CHEMIST AND ASSAYER.
Successor to Henry G. Hanks, est. 1866. The supervision of sampling of ores shipped to San Francisco a specialty.
—531—
California Street,
San Francisco.

RICHARD A. PEREZ, E. M.
Assayer and Analytical Chemist,
120 North Main St., - Los Angeles, Cal.

S. W. TYLER,
Mining and Metallurgical Engineer,
6 Windsor Hotel Block.
Cable: Retyl, Denver. DENVER, COLORADO.

The SPOKANE BUREAU OF MINING,
N. E. LINSLEY, Manager.
SPOKANE, : : WASHINGTON.
Consulting Mining and Milling Engineer.
Will Examine and Report on Mines.

FRANK C. MANDELL,
MINING ENGINEER,
U. S. Deputy Mineral Surveyor for Idaho and Oregon.
Mine Examinations, Surveys and Reports.
HAILEY, IDAHO.

CLARENCE HERSEY,
Assayer and Chemist,
(Established 1879.) LEADVILLE, COLO.
Gold, Silver and Lead……………..$1.00.
Any two of above 75c; any one of above 50c.
Copper analysis………………………..$1.00.
Platinum, Nickel or Tin, each………….$5.00.
Twenty-one years successful experience in the mining metropolis of Colorado.
Write for mailing envelopes and price list.

ALMARIN B. PAUL, M. E.,
ROOM 27, CROCKER BUILDING, SAN FRANCISCO.
Will act as AGENT for the sale of RELIABLE Mining Property. SPECIAL AGENT FOR
MacArthur-Forrest Cyanide Process
for California north of and including Mono, Madera and Merced counties; also for State of Nevada. Will act as agent for Eastern parties owning mining interests in California.

F. H. HARVEY,
GALT, CAL.,
Mining and Metallurgical Work in All Branches.
Assays, Chemical Analysis of Ores and experiments on rebellious ores for treatment by cyanide or other processes. Surveys and reports upon mining properties.

Simonds & Wainwright,
Mining Engineers,
Assayers and Chemists,
159 Front Street,
NEW YORK.

HUDSON H. NICHOLSON,
Consulting Mining Engineer,
Rooms 216 and 217, Boston Building,
DENVER, COLO., U. S. A.
Cable address: Aichen, Denver.
Expert examinations of and advisory reports on mining propositions.
Specialty: The chemical treatment of ores.

WM. A. AKERS,
Consulting Mining Engineer,
521 Dooly Block, SALT LAKE CITY, UTAH.

DAVIDGE & DAVIDGE, Attorneys and Counsellors at Law, Corcoran Building, Washington, D. C. Practice in the Supreme Court of the United States, the Court of Claims, the Courts of the District of Columbia, and the General Land Office. Western Union Code.

R. J. WALTER,
1452 Blake St., DENVER, COLO.
Mining Engineer and Metallurgist.
Reports on mining properties.
Assay office and chemical laboratory. Established in Colorado 1879.

W. J. ADAMS, E. M.,
Mining Engineer and Metallurgist.
Graduate of Columbia School of Mines.
Author of "Hints on Amalgamation," etc., etc.
ROOM 14, 434 CALIFORNIA STREET,
SAN FRANCISCO, CAL.

FRANK READE,
MINING and CONSULTING ENGINEER,
401 California Street,
SAN FRANCISCO.
EXPERT WITNESS IN MINING SUITS.

EDWARD L. HAFF,
MINING ENGINEER,
U. S. DEPUTY MINERAL SURVEYOR.
Mine Examinations and Reports.
National Annex Block,
P. O. Box 21. CRIPPLE CREEK, COLO.

RALPH E. STEVENS,
ATTORNEY AND COUNSELOR,
43-44 Jacobson Building, DENVER, COLO.
Special attention to examination of titles. Corporation, commercial, mining law. Collections receive prompt attention. Notary in office. Refers to Denver representative of Mining and Scientific Press.

ERNEST H. SIMONDS,
Late Instructor in Assaying, University of California.
ASSAYS AND ANALYSES.
LABORATORY TESTS OF ORES.
Special Attention Given to the Instruction of Students.
521 Sacramento St., Cor. Leidesdorff. S. F., Cal.

SAM'L A. RANK,
MINING ENGINEER,
U. S. DEPUTY MINERAL SURVEYOR.
Mine Examinations and Reports.
514 Cooper Building,
DENVER……………………COLORADO.

School of Practical Mining, Civil,
Mechanical and Electrical Engineering.
Surveying, Architecture, Drawing, Assaying, Cyanide Process and Metallurgy.
933 Market St., S. F., Cal. OPEN ALL YEAR.
A. VAN DER NAILLEN, President
Assaying of Ores, $25; Bullion and Chlorination Assay, $25; Blowpipe Assay, $10. Full course of Assaying, $50. Established 1864.
☞ Send for Circular.

LOUIS FALKENAU,
STATE ASSAY OFFICE,
538 Sacramento St., below Montgomery.
Analysis of Ores, Metals, Soils, Waters, Industrial Products, Foods, Medicines, etc., etc.
Court Experting in all branches of Chemical Technology. Working Tests of Ores and Investigation of Metallurgical and Manufacturing Processes. Consultations on all questions of applied chemistry. Instructions given in assaying and all branches of chemistry.

Samples by Mail or Express Will Receive Prompt Attention.
ALBERT I. GOODELL,
ASSAYER AND CHEMIST,
1430 Stout Street……………DENVER, COLO.

HOWARD E. BURTON,
ASSAYER and CHEMIST,
111 E. Fourth St., LEADVILLE, COLO.
Specimen prices: Gold, 50c; Gold and Silver, 75c; Gold, Silver and Lead, $1.00; Silver or Lead, 35c; Copper or Zinc, $1.00.
Mailing envelopes sent to any address.

T. D. KYLE & CO,
Assayers and Chemists.
Mill Tests of all kinds. Cyanide, Amalgamation and Concentration a specialty. Mail orders given prompt attention.
106 E. Fifth St., **Leadville, Colo.**

LETSON BALLIET,
Mining and Civil Engineer,
Chemist and Metallurgist,
508 California St., San Francisco, Cal.
Special attention to treatment of low grade and refractory ores by all chemical and mechanical processes.

MINERS' ASSAY OFFICE.
(JNO. HARRIGAN)
10 Stevenson Street, - San Francisco, Cal.
Telephone Clay 972.
Assaying, Analyses, Sampling, Grinding and Pulverizing of all kinds.
Practical Working Tests of Ore by all Processes. Mining Machinery Bought and Sold. Check Assays. Instructions given in Assaying. All Work Guaranteed. **Mines Examined, Sampled and Reported on by M. P. BOAG, M. E. and Cyanide Expert.**

J. W. RICHARDS,
(Late of Aspen, Colo.)
ASSAYER AND CHEMIST. 1754 Champa Street, DENVER, COLO.
Ore Shippers' Agent. Write for Terms.

JAMES ANGUS SNEDAKER,
Mining Engineer,
721-722 Equitable Building, Denver, Colo., U. S. A.

RELIABLE ASSAYS.

Gold……………	$ .50	Gold and Silver….	$ .75
Lead ………….	.50	Gold, silver, copper	1.50

Samples by mail receive prompt attention.
Rich Ores and Bullion Bought.
OGDEN ASSAY CO.,
1429-16th St., Denver, Colo.

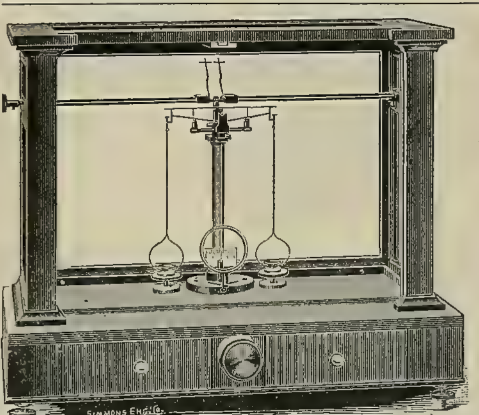
Independent Assay Office.
ESTABLISHED 1888.
D. W. Reckhart, E. M., Proprietor.
Agent for Ore Shippers.
Assays and Chemical Analysis.
Mines Examined and Reported Upon.
BULLION WORK A SPECIALTY.
P. O. Box 88. Office and Laboratory:
Cor. SAN FRANCISCO & CHIHUAHUA Sts.
EL PASO, TEXAS.

HERMANN J. VAN DIEREN,
Assayer and Metallurgist,
1407 Seventeenth St., DENVER, COLO.
Stamp Mill and Reduction Works: 19th St. and Platte River.
Buyer of every description of Ores and Precious Stones. Rights for sale for process of treating refractory gold ores; also process for treating low grade copper ores. Write for particulars.

CHAS. BUTTERS & CO., Limited.
E. S. LEAVER, Manager.
Ore Testing Works,
Chemical and Metallurgical Laboratory,
Assay Office,
DOOLY BLOCK, - SALT LAKE CITY, UTAH.

Telephone, MAIN 5104. ESTABLISHED 1869. A. H. WARD.
Cable Address, LUCKWARD.
C. A. LUCKHARDT CO.,
NEVADA METALLURGICAL WORKS,
71 & 73 STEVENSON STREET, - - - - SAN FRANCISCO, CAL.
Assaying, Analyses, Sampling.
PRACTICAL WORKING TESTS OF ORE BY ALL PROCESSES.
STAMP MILL AND CONCENTRATOR IN OPERATION ON PREMISES.

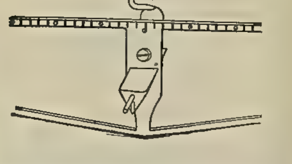
Thomas Price & Son,
Assay Office, Sampling Works
And Chemical Laboratory.
526 Sacramento Street, San Francisco, Cal.


SIMMONS ENG. CO.

No. 1 Special Button Balance with 5-inch beam. Sensibility 1-200 Milligramme. Made for particularly accurate and rapid work and is guaranteed to be the finest balance on the market. It is the balance used by Prof. Forsythe of the Lawrence Scientific School, Harvard University, for scientific research. Send for Catalogue A, illustrating and describing a full line of assay and analytical balances, to

All of our latest improvements are embodied in this instrument and it is the result of our 18 years' experience in building balances.

Among the noteworthy features in the make-up of this balance is the improved adjusting device, herewith shown.



The adjusting device will appeal to the assayer as the simplest and most convenient means of checking the beam, and consists of a star wheel on a threaded arbor, mounted on the center edge back of the beam.

By turning this wheel backward or forward, it is moved along the arbor and so adjusts the beam to equilibrium.

Wm. Ainsworth & Sons,
(Successors to WM. AINSWORTH.) DENVER, COLO., U. S. A.
F. W. Braun & Co., Los Angeles, Cal., Agents for balances and the Brunton Patent Pocket Transit.
John Taylor & Co., San Francisco, Cal., Agents for balances and the Brunton Patent Pocket Transit.
H. S. Crocker Co., San Francisco, Cal., Agents for the Brunton Patent Pocket Transit.
Pacific Optical Co., Los Angeles, Cal., Agents for the Brunton Patent Pocket Transit.

Ammonia Process.

The practical success of this process is well known and is demonstrated chemically, technically and mechanically in every detail on a large scale. Refractory ores and tailings containing gold, silver, copper and zinc are extracted successful and profitable. Mail average sample and $10 and receive full report about the extraction.

Pocketbook, Ammonia Process, full description, $1.

Instructions in Chemistry and all successful and practical Lixiviation Processes.

Office and Laboratories:

334 KEARNY STREET, SAN FRANCISCO, CAL.

H. HIRSCHING,
Mining Engineer and Chemist.

HENRY E. WOOD,
ASSAYER,

1734 Arapahoe St., DENVER, COLO.

Ore Tested in Carload Lots.

Write for Circular.

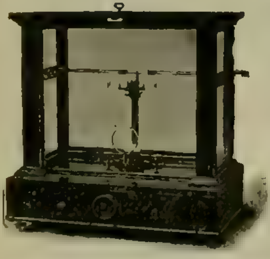
ALVIN PHILLIPS & CO.,

Chemists, Mining and Metallurgical Engineers,

1761 MARKET STREET,

DENVER, - COLO.

Complete Ore-Testing Works — capacity ten pounds to two tons. Modern Methods of Lixiviation, Cyanide and Chlorination. Concentration on Bartlett Table. Assaying and Bullion Refining. Chemical Analyses of Oils, Coal, Water, and all solutions. WRITE FOR PRICES.



SMITH & THOMPSON,

Manufacturers of Fine

ASSAY BALANCES.

Write for Catalogue.

2219 Stout St.,
Denver, Colo.

HEALD'S

BUSINESS COLLEGE.

24 Post Street, - - - San Francisco.

MINING AND CIVIL ENGINEERING DEPARTMENT: Mathematics, Draughting, Strength of Material, Chemistry, Assaying, Blow-Pipe Analysis, Geology, Mineralogy, Surveying, etc., under the direction of Prof. O. H. Packer, an engineer of national reputation.

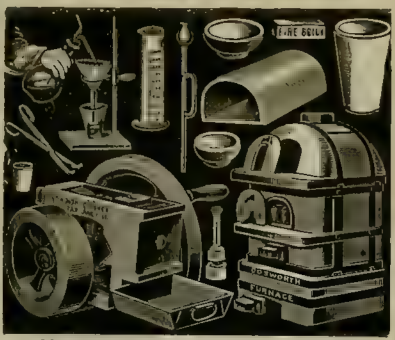
ELECTRICAL DEPARTMENT: Theory and Practice; Construction.

BUSINESS: Bookkeeping, Shorthand, Typing, Modern Languages, etc.

Twenty teachers; individual instruction; can enter at any time; Catalogue and Journal free.

THE DENVER FIRE CLAY CO.,

1742 to 1746 Champa St., DENVER, COLO.



Manufacturers, Importers and Dealers in
Chemicals, Apparatus and Assayers' Supplies, Fire Brick and Tile.
Sole Agents for the "AINSWORTH BALANCES."
WRITE FOR CATALOGUES.

THE ROESSLER & HASSLACHER CHEMICAL CO.,
100 William Street, New York.

THE ROESSLER & HASSLACHER CHEMICAL COMPANY · NEW YORK · CHEMISTS

CYANIDE

Peroxide of Sodium

Hyposulphite of Soda

Chloride of Lime

Sulphide of Iron

And Other Chemicals for Mining Purposes.

ESTABLISHED 1856.

Controls AND Check Assays

(A SPECIALTY.)

MARINER & HOSKINS,

ASSAYERS AND CHEMISTS,
Mining Engineers and Metallurgists.

81 South Clark Street.
Rooms 51-55,
CHICAGO, ILLINOIS.

SEND SAMPLES BY MAIL OR EXPRESS.
MAILING SACKS ON APPLICATION. : :

Globe Engineering Company,

(INCORPORATED.)

STIRLING WATER-TUBE BOILERS.

Unequaled for Mines and Mills.
Easily Transported. Quickly Cleaned.

EXETER HOISTING ENGINES; CORLISS, SLIDE VALVE AND AUTOMATIC CUT-OFF ENGINES; BOILERS; STEAM PUMPS; SINKING PUMPS; HIGH DUTY PUMPING ENGINES; AIR COMPRESSORS; FEED WATER HEATERS AND PURIFIERS; JET AND SURFACE CONDENSERS; WALKER'S METALLIC PISTON ROD PACKING; LOCKE DAMPER REGULATORS; REFRIGERATING MACHINERY.

STEEL MILLS, ROCK AND SHAFT HOUSES.
OTTO AERIAL ROPEWAYS.

COMPLETE DESIGNS for STEAM PLANTS for MINES and MILLS.

GLOBE ENGINEERING COMPANY,
Mechanical, Civil and Mining Engineers, 509 Mission St., San Francisco, Cal.

TANKS!

LUMBER AND HOUSE FINISH.
TANKS FOR WATER, WINE OR OIL.

Jig Frames, Jig Screens, Zinc Boxes,

and Tanks of Every Description for Mining Purposes.

WRITE FOR ESTIMATES ON YOUR WANTS.

C. A. HOOPER & CO., Agents,
204 Front Street, San Francisco, Cal.

THE EXCELSIOR REDWOOD CO.,
FOURTH AND CHANNEL STREETS,
SAN FRANCISCO, CAL.

Keep Your Boilers Clean While They Are New. You Know What to Use;

IF NOT, WRITE TO

DEARBORN DRUG & CHEMICAL WORKS,

Offices and Laboratories:

29, 30, 31, 32 and 33 Rialto Bldg. - - - CHICAGO, ILL.

IMPROVED BONE ASH.

It is 100% better than Bone Ash now being used; will absorb more lead, will never crack or split in the Muffle, can be dropped before or after using without breaking. Cupels can be made and used at once; no drying required. Excessive heat has no effect on them. Will stand shipping any distance. It takes up none of the precious metals in cupeling. Cupels much quicker. Once used always used. Sold under a positive guarantee or money refunded. Now being used by all smelters and assayers who have tried it.

Correspondence solicited.
Samples given if required.

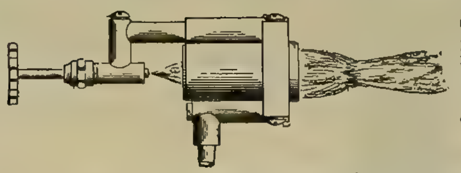
J. J. CUMMINGS & CO., Sole Mfrs.,

Telephone Clay 972. 10 STEVENSON ST., SAN FRANCISCO, CAL.

For Sale also by Justinian Caire Co., Dealers in Assay Goods and Mining Supplies, 521-523 Market St.

Taylor's Coal Oil and Gasoline Burner

(PATENTED)



A new heating burner for Assayers and Chemists, or for brazing, in which coal oil at 33 deg. to 45 deg., Beaume and 150 deg. fire test, or gasoline at 74 deg. test can be used for fuel. Adapted to crucible, muffle and brazing work. **Price $6.** For sale by

JOHN TAYLOR & CO.,

63 FIRST STREET,
SAN FRANCISCO, CAL.

MINE AND MILL SUPPLIES.

Importers and Manufacturers of Assayers' Materials, Chemicals and Acids, Etc.

CATALOGUE ON APPLICATION.

TRADE MARK.

(M'ARTHUR-FORREST PROCESS.)

CYANIDE PROCESS.

The MacArthur-Forrest Cyanide Process is the Best

For the Treatment of Refractory and Low Grade Gold and Silver Ores and Tailings. We are the Originators of the Cyanide Treatment, and have kept up with the times in all Improvements in Cyanide Methods.

Successful Plants in Operation in all Western Mining States.

Samples Assayed and Fully Reported Upon. Properties Examined. Designs Furnished. For Terms and Particulars, Address

The Gold and Silver Extraction Co. of America, Ltd.

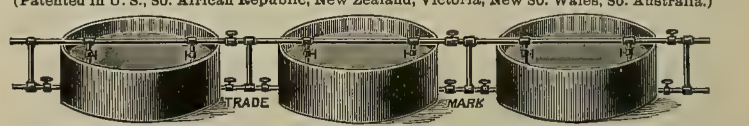
GEO. A. ANDERSON, General Manager,

Testing Works: 1716 Blake Street, Denver, Colo. 208-210 McPhee Building, Denver, Colo.

ALMARIN B. PAUL, Agent, 27 Crocker Building, San Francisco, Cal.

"PNEUMATIC" CYANIDE PROCESS.

(Patented in U. S., So. African Republic, New Zealand, Victoria, New So. Wales, So. Australia.)



WILL DO IN 7 HOURS WHAT REQUIRES FROM 2 TO 6 DAYS BY OLDER METHODS.

SEND FOR PAMPHLET.

THE PNEUMATIC CYANIDE PROCESS CO., 306 Boston Bldg., Denver, Colo.

New Process of Copper Extraction.

CHEAP, CLEAN AND EFFECTIVE.

THE GARDINER LEACHING PROCESS

FOR COPPER ORES.

TESTS MADE ON ANY QUANTITY OF ORES AT REASONABLE RATES.
FULL PARTICULARS ON APPLICATION.

THE AMERICAN COPPER MINING & EXTRACTION CO., DENVER, COLO.

SAINT LOUIS SAMPLING AND TESTING WORKS 1886

ST. LOUIS SAMPLING & TESTING WORKS,

1225 and 1227 Spruce St.,

ST. LOUIS, MO.

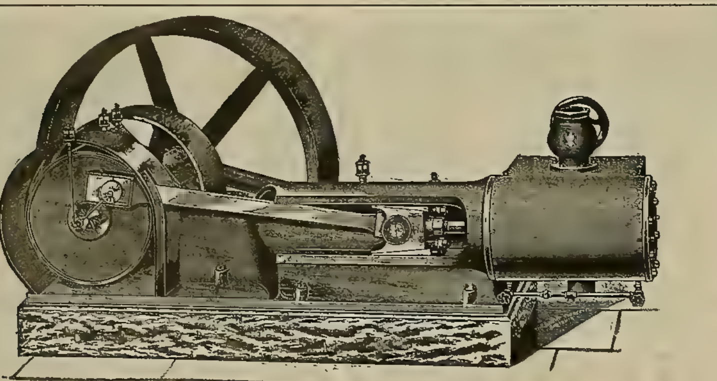
The Largest and Most Complete Ore Testing Works in Existence for Making all Kinds of Practical Working Tests of Ore, etc., to Determine the Most Suitable Method of Treatment.

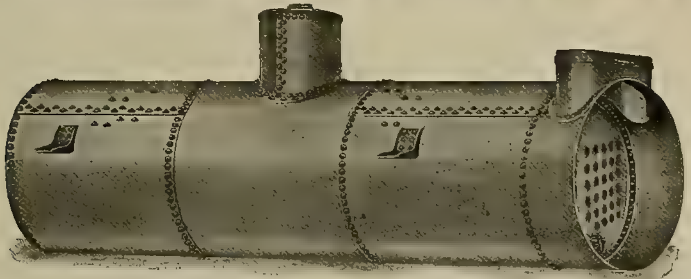
PLANT FOR COAL WASHING, COKING AND STEAMING TESTS OF FUELS. ASSAYS, ANALYSES, CHEMICAL AND PHYSICAL INVESTIGATIONS OF ALL KINDS. MINERAL PROPERTIES, MINES AND METALLURGICAL PROCESSES EXAMINED AND REPORTED UPON. CORRESPONDENCE SOLICITED.

Are You Confronted With a Difficult Ore-Separating Problem?

THE WETHERILL MAGNETIC SEPARATING PROCESS

may prove the solution. **Apply to Wetherill Separating Company, 52 Broadway, N. Y.**



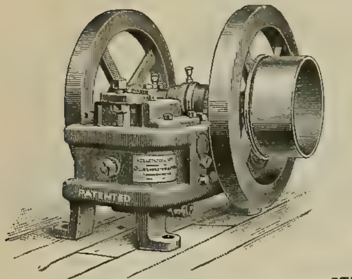


ENGINES, BOILERS,
UP-TO-DATE MACHINERY.
WRITE US FOR PARTICULARS.
THE COMPRESSED AIR MACHINERY CO., 11-13 First St., San Francisco, Cal.

SHOES and DIES
of SUPERIOR quality and at prices 20 to 30% lower than any other maker.
FURNISHED BY
ARTHUR KOPPEL,
66 Broad St., N. Y. City.
Write for Particulars.

MINING CARS of every description.
PORTABLE RAILWAYS,
Rolling Stock, Railway Outfits for Mines of every description.
Export Work a specialty.
ARTHUR KOPPEL,
66 Broad St., N. Y. City.
Send for Catalogue and Estimates.

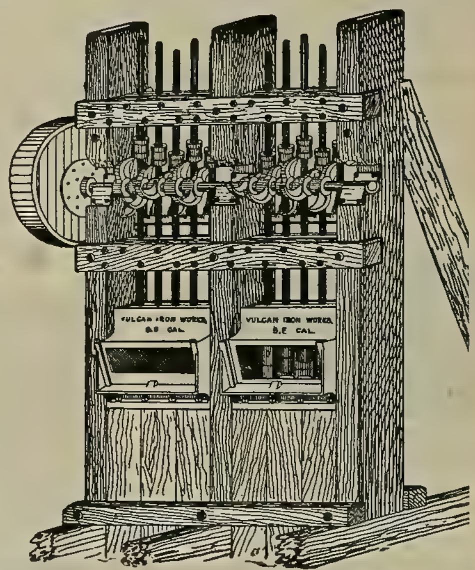
Pacific Coast Agents, BAKER & HAMILTON, SAN FRANCISCO and SACRAMENTO.



Crushes Large Rock to 1/4 inch.
Send for cir.
Roll Jaw Crusher.
STURTEVANT MILL CO., 113 Clayton St., Boston, Mass.

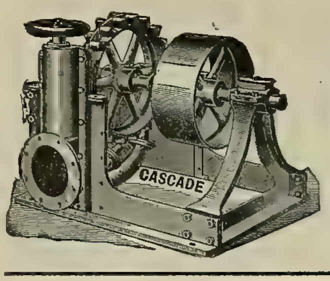
FOR CYANIDE PLANTS OR MINING-TANKS OF ANY DESCRIPTION.
Write to
PACIFIC TANK CO.,
348 E. 2nd Street, Los Angeles.
35 Beale Street, San Francisco.
Illustrated Catalogue Mailed Free.

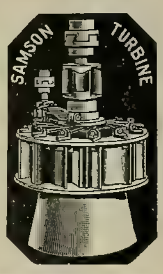
THE CAL. ANTI-CALORIC COMPANY,
Tel. Main 5752. Office, 217-219 Mission St., San Francisco, Cal.
Sole Manufacturers of CAL. ANTI-CALORIC SECTIONAL COVERINGS AND BLOCKS FOR BOILERS. PLASTIC (dry) for Steam Domes, Etc. Sole Agents for the Boston Asbestos Paper Co. Asbestos Goods of All Kinds. Send for Information. Factory, Potrero.


VULCAN IRON WORKS S.F. CAL.
VULCAN IRON WORKS S.F. CAL.

Mining Machinery.
Stamp Mills
Of the Latest Improved Design for
Gold Milling.
VULCAN
WIRE ROPEWAYS
For Conveying Ore, Etc.
Vulcan Iron Works,
Office: 505 Mission Street, San Francisco, Cal.

THE
Pelton Water Wheel Company
Gives exclusive attention to the development and utilization of water powers by the most modern, economic and improved methods. An experience of more than fifteen years, involving both the theory and practice of hydraulic engineering as relates to power development in its widest range of application, is at the service of its customers.
Nine Thousand Wheels Now Running,
Averaging some 700,000 H. P.
ELECTRIC POWER TRANSMISSION.
Pelton wheels afford the most reliable and efficient power for such service and are running the majority of stations of this character in the United States, as well as most foreign countries. Highest efficiency and absolute regulation guaranteed under the most extreme variations of load.
The Pelton Water Wheel Company,
121 & 123 MAIN STREET, SAN FRANCISCO, CAL.

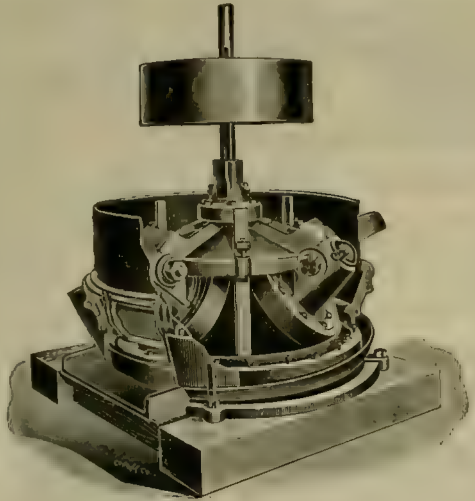




TURBINE AND CASCADE WATER WHEEL
Adapted to all Heads from
3 Feet to 2000 Feet.
Our experience of 38 YEARS building Water Wheels enables us to suit every requirement of Water Power Plants. We guarantee satisfaction.
State your Head and requirements. Send for pamphlet.
JAMES LEFFEL & CO.
SPRINGFIELD, OHIO, U. S. A.

THE HUG WATER WHEEL
has a guaranteed EFFICIENCY OF 86%, as shown by Test Curves from Cornell University.
Most Economical Wheel on the Market.
No Loose Buckets Possible.
Manufactured by D. HUG,
Denver, Colo., U. S. A.

GENERAL PHOTO-ENGRAVING CO.
[SUCCESSORS TO DEWEY ENGRAVING CO.]
FINE ZINCOGRAPHS, HALF-TONES, AND DESIGNING.
ENGRAVINGS OF MACHINERY OUR SPECIALTY.
SEND FOR SAMPLES AND PRICES.
TELEPHONE BLACK 1466.
NO. 536 CLAY STREET, SAN FRANCISCO, CAL



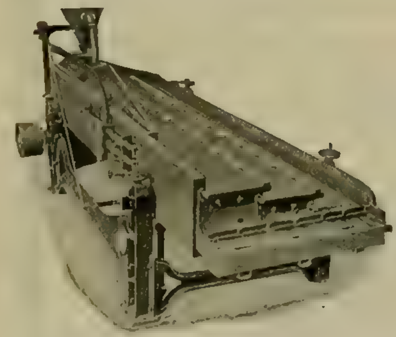
THE GRIFFIN
THREE ROLLER
ORE MILL.

The Griffin Three Roller Ore Mill is a simply constructed Mill, suitable for working all kinds of ores that require uniformly fine crushing by the wet process. This Mill is a modification of the well-known Chilian Mill, but the rollers run upon a crushing ring or die, which is inclined inwardly at an angle of about 30 degrees, the rollers themselves also being inclined to the central shaft of the Mill, thus utilizing the centrifugal force, as well as the weight of the rollers themselves as a crushing agent. The Griffin Three Roller Ore Mill is therefore a Mill of great strength, and has few wearing parts. We construct these Mills with extreme care, using only the best of raw materials, which are most carefully worked by men who are specialists as mill builders. We sell the Griffin Ore Mill on its determined merits, and will gladly supply full information regarding it to any one.

SEND FOR FREE ILLUSTRATED AND DESCRIPTIVE CATALOGUE TO

Bradley Pulverizer Co., Boston, Mass.

THE IMPROVED BARTLETT CONCENTRATING TABLE.

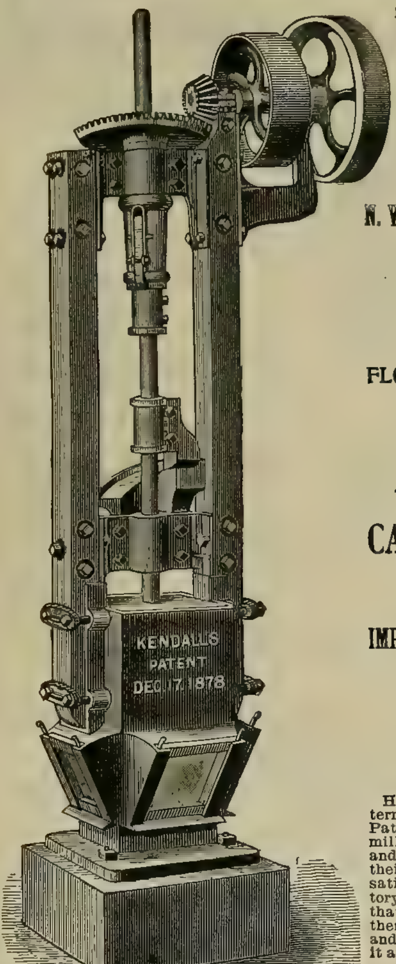


The BARTLETT CONCENTRATING TABLE has been GREATLY IMPROVED recently by the substitution of iron in place of wood wherever possible. It is now built with SOLID IRON TOP, PLANED TO A TRUE SURFACE AND POLISHED; all parts are made by template and EACH PART BEING INTERCHANGEABLE. As now constructed, the table has no special wearing parts and will last for many years. It has a CAPACITY OF FROM FIFTEEN TO FORTY-FIVE TONS IN TWENTY-FOUR HOURS, according to the class of ore worked. It is the only table in the world which will take the place of jigs and do away with all costly and complicated machinery.

It is Especially Designed for Separating Zinc from Lead.

Send for our illustrated catalogue, containing all the latest information on the concentration of ores.

THE COLORADO IRON WORKS CO.,
Established 1860. **DENVER, COLO., U. S. A.**



L. C. MARSHUTZ. T. G. CANTRELL.

NATIONAL
IRON WORKS,
N. W. Cor. Main & Howard Sts., San Francisco.

MANUFACTURERS OF
STATIONARY AND COMPOUND
ENGINES,
FLOUR, SUGAR, AND QUARTZ MILL
MACHINERY.

AMALGAMATING MACHINES.

CASTINGS AND FORGINGS
OF EVERY DESCRIPTION.
All work tested and guaranteed.

IMPROVED PORTABLE HOISTING ENGINES

Sole Manufacturers of
Kendall's Patent Quartz Mills.

Having renewed our contract on more advantageous terms with Mr. S. Kendall for the manufacture of his Patent Quartz Mill, we are enabled to offer these mills at **Greatly Reduced Prices.** Having made and sold these mills for the past 16 years, we know their merits, and know that they have given perfect satisfaction to purchasers, as numbers of commendatory testimonials prove. We feel confident, therefore, that at the prices we are now prepared to offer them, there is placed within the reach of all a light, cheap and durable mill that will do all that is claimed for it and give entire satisfaction.

MARSHUTZ & CANTRELL

Send for Circulars and Price List.

JOHN A. ROEBLING'S SONS Co
IRON & STEEL
WIRE ROPE
TELEGRAPH WIRE
COPPER WIRE
Works at Trenton, N.J.
WAREHOUSES,
117 LIBERTY ST., NEW YORK.
25 FREMONT ST., SAN FRANCISCO.
173 LAKE ST., CHICAGO, ILL.
INSULATED MAGNET WIRE & ELECTRIC WIRES.

THE MARION STEAM SHOVEL CO.,

Steam Shovels
Dredges and
Traction Dredges

Suitable for all kinds of **Excavating Work,** making a specialty of

PLACER MINING MACHINES,

separate or self-contained, either as a **dry land** excavator or **floating dredge.**

The Marion Steam Shovel Co.
MARION, OHIO.

GEO. W. BARNHART, No. 4 Sutter St., San Francisco, Cal.

California Vigorit Powder Co.
—Manufacturers of—
Dynamite High Explosives and "Vigorit Low" Blasting Powder.

OFFICE: 208 CALIFORNIA STREET, SAN FRANCISCO, CAL.
WORKS: POINT ISABEL, CONTRA COSTA CO., CAL.

DEWEY, STRONG & CO., Patent Solicitors, 330 Market St., San Francisco, Cal.

Founded by Mathew Carey, 1785.

HENRY CAREY BAIRD & CO.,

INDUSTRIAL PUBLISHERS, BOOKSELLERS & IMPORTERS,

810 Walnut St., Philadelphia, Pa., U. S. A.

☞ *Our New and Revised Catalogue of Practical and Scientific Books, 92 pages, 8vo; a Catalogue of Books on Steam and the Steam Engine, Machinery, etc.; a Catalogue of Books on Sanitary Science, Gas Fitting, Plumbing, etc., and our other Catalogues and Circulars, the whole covering every branch of Science applied to the Arts, sent free and free of postage to any one in any part of the world who will furnish his address.*

ASSESSMENT NOTICES.

MARINA MARSICANO GOLD MINING COMpany. — Location of principal place of business, San Francisco, California; location of works, Sunny Hill, Shasta County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 15th day of September, 1900, an assessment (No. 24) of 2 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, 217 Sacramento street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 23d day of October, 1900, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 12th day of November, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

CHAS. BOVONE, Secretary.

Office—217 Sacramento street, San Francisco, California.

CALIFORNIA BORAX COMPANY. — Location of principal place of business, San Francisco, California; location of works, San Bernardino County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 10th day of October, 1900, an assessment (No. 4) of seventy-five (75) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, No. 310 Pine street, Room 36, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 19th day of November, 1900, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 10th day of December, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

J. W. PEW, Secretary.

Office—No. 310 Pine street, Room 36, San Francisco, California.

SIERRA NEVADA SILVER MINING COMPANY. —Location of principal place of business, San Francisco, California; location of works, Virginia Mining District, Storey County, State of Nevada.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 16th day of October, 1900, an assessment (No. 120) of fifteen (15) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, room 14 Nevada block, No. 309 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on Tuesday, the 20th day of November, 1900, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 10th day of December, 1900, to pay the delinquent assessment, together with costs of advertising and expenses of sale.

By order of the Board of Directors.

E. L. PARKER, Secretary.

Office—Room 14 Nevada block, No. 309 Montgomery street, San Francisco, California.

CONSOLIDATED CALIFORNIA & VIRGINIA Mining Company.—Location of principal place of business, San Francisco, California; location of works, Virginia Mining District, Storey County, Nevada.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 15th day of October, 1900, an assessment (No. 16) of twenty-five cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, room No. 29 Nevada block, No. 309 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 19th day of November, 1900, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 10th day of December, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

A. W. HAVENS, Secretary.

Office—Room 29 Nevada block, No. 309 Montgomery street, San Francisco, California.

OSCEOLA CONSOLIDATED MINING COMPANY. —Location of principal place of business, San Francisco, California; location of works, Plymouth, Amador County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 16th day of October, 1900, an assessment (No. 10) of one (1) cent per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 307 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 19th day of November, 1900, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 10th day of December, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

HOLLAND SMITH, Secretary.

Office—307 Montgomery street, San Francisco, California.

DELINQUENT SALE NOTICE.

MAMMOTH GARFIELD GOLD MINING COMpany.—Location of principal place of business, San Francisco, California; location of works, Shasta County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment levied on the 5th day of June, 1900, the several amounts set opposite the names of the respective shareholders, as follows:

Name.	No. Cert.	No. Shares.	Amt.
Andrew Corbin	13	20,000	$3500 00
Philip Corbin	14	20,000	3500 00
Charles Glover	16	1,750	306 25
Jos. S. Silver	5	5	87
J. M. Spring	15	2,000	350 00

And in accordance with law, and an order from the Board of Directors, made on the 5th day of June, 1900, so many shares of each parcel of such stock as may be necessary, will be sold at public auction, at the office of the company, Rooms 54 and 59, No. 120 Sutter street, San Francisco, California, on TUESDAY, the 2nd day of October, 1900, at the hour of 2 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

SAM W. CHEYNEY, Secretary.

Office—Rooms 54 and 59, No. 120 Sutter street, San Francisco, California.

POSTPONEMENT.

The date of sale of the above described delinquent stock has been postponed to THURSDAY, the 1st day of November, 1900, at the hour of 2 o'clock P. M. of said day. By order of the Board of Directors.

SAM W. CHEYNEY, Secretary.

Office—Rooms 54 and 59, No. 120 Sutter street, San Francisco, California.

DELINQUENT SALE NOTICE.

AMERICAN OIL AND REFINERY COMPANY.—Location of principal place of business, San Francisco, California; location of works, Contra Costa County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment levied on the 21st day of August, 1900, the several amounts set opposite the names of the respective shareholders, as follows:

Name.	No. Cert.	No. Shares.	Amt.
Abbott, William	720	50	$5 00
Abbott, William	721	50	5 00
Abbott, William	722	50	5 00
Abbott, William	723	25	2 50
Abbott, William	724	25	2 50
Arnoldy, Marie	379	1	10
Berry, Jos. M	189	1	10
Burger, John	105	15	1 50
Christy, Miss Helen	322	2	20
Cochran, J. H	393	4	40
Corbiere, C. C	564	250	25 00
Corbiere, C. C	565	5	50
Cowsert, J. W	384	10	1 00
Crane, Roxie E	140	5	50
Ehrlich, Henry	438	100	10 00
Ehrlich, Henry	461	25	2 50
Ehrlich, Dr. Henry	743	75	7 50
Fenger, H. M	472	10	1 00
Fenger, H. M	473	5	50
Fenger, H. M	474	5	50
Fenger, H. M	475	3	30
Fenger, H. M	476	3	30
Fenger, H. M	477	2	20
Fenger, H. M	478	2	20
Folger, A., Jr	222	1	10
Gibson, Miss Nellie I	376	3	30
Goodenough, S	514	480	48 00
Grey, Martin	255	5	50
Haraszthy, Mrs. Natalia	192	100	10 00
Haraszthy, A. F	621	935	93 50
Haraszthy, A. F	738	219	21 90
Heald, G. W	261	1	10
Holbrook, W. E., Trustee (no certificate issued)	...	15,800	1580 00
Jacobsen, Miss Lillian H	239	10	1 00
Jones, A. K	293	1	10
Keifer, Elizabeth B.	69	1	10
Lederer, Mrs. A. G	601	2	20
Lord, Leona E	327	2,000	200 00
Maxwell, Claude John	168	1	10
Maloney, John	161	2	20
Metz, Walter N	145	5	50
Morse, Dr. Chas	703	9	90
Odle, Mrs. John	218	1	10
Opman, John	294	25	2 50
Parker, M. W	765	10	1 00
Reed, Elmer	352	3	30
Rose, Jesse J	331	5	50
Slayback, Mrs. Deborah	36	25	2 50
Snydam, F. A	182	5	50
Stover, W. M	515	500	50 00
Truett, J. F	241	2	20
Union Cons. Oil & Transportation Co. (no certificate issued)	...	5,000	500 00
Walser, Mark (no certificate issued)	...	32,184	3218 40

And in accordance with law, and an order from the Board of Directors, made on the 21st day of August, 1900, so many shares of each parcel of such stock as may be necessary, will be sold at public auction at the office of said corporation, in Rooms 322–323 Parrott building, San Francisco, California, on MONDAY, the 29th day of October, 1900, at the hour of 1 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

J. C. ANTHONY, Secretary.

Office—Rooms 322–323 Parrott building, San Francisco, California.

INVENTORS, Take Notice!

L. PETERSON, MODEL MAKER,

544A MISSION STREET, bet. First and Second Sts., SAN FRANCISCO. Experimental machinery and all kinds of models. Tin and brasswork. All communications *strictly confidential.*

DEWEY, STRONG & CO.,

PATENT AGENTS, 330 Market St., S. F., Cal.

THE DAVIDSEN PATENT TUBEMILL.

FOR FINE GRINDING,

Uniformity of Output, Effectiveness, Simplicity, or Economy of Operation and Maintenance, "THE DAVIDSEN" HAS NO EQUAL.

ENORMOUS GRINDING SURFACE. ❧ SLOW SPEED. ❧ ANY DEGREE OF FINENESS.

WRITE FOR CATALOGS.

F·L·SMIDTH & CO

ENGINEERS

66 MAIDEN LANE, NEW YORK

COPENHAGEN, VESTERGADE 29.K. LONDON. 9 BRIDGE ST., S.W.

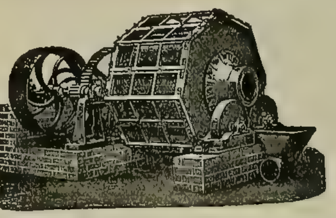
THE SMIDTH BALLMILL

Crushes, Grinds and Sifts in One Operation, Working Continuously.

AMONG ITS SPECIAL FEATURES OF MERIT ARE:

Maximum Output, Slow Speed, Low Horse Power, Absolute Uniformity, Ease of Access, Slight Cost of Repairs.

OUR AUTOMATIC FEEDER INSURES REGULARITY AND EFFECTIVENESS.

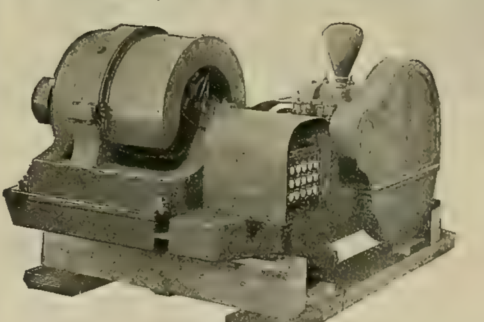


THE SMIDTH BALLMILL. BEST. CHEAPEST. MOST SIMPLE.

GENERAL ELECTRIC COMPANY'S

Electric Pumps

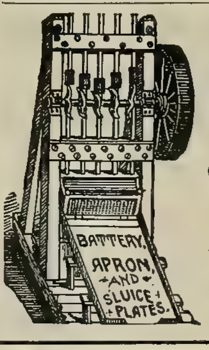
can be readily shifted to any part of the mine without expense or delay, and can be controlled by an operator placed in the most advantageous position.



Horizontal Triplex Portable Pump Driven by 10 H. P. Direct Current Motor.

General Office: Schenectady, N. Y.

San Francisco Office: Claus Spreckels Bldg. Denver Office: Kittredge Building.


BATTERY, APRON, AND SLUICE PLATES.

To Gold Miners!

Silver Plated Copper Amalgamating Plates

For Saving Gold in Quartz and Placer Mining.

ONLY BEST COPPER AND REFINED SILVER USED. OLD MINING PLATES BOUGHT OR TAKEN IN EXCHANGE FOR NEW PLATES. GOLD EXTRACTED FROM OLD PLATES AT A MODERATE COST. OLD PLATES REPLATED. GOLD, SILVER, NICKEL, COPPER AND BRASS PLATING.

Denniston San Francisco Plating Works,

652 Mission Street, Cor. Annie, San Francisco, Cal.

E. G. DENNISTON, ... Proprietor.

——:Send for Circular.:——

T.P. G.W.P. J.P. E.P.
PENNINGTON
TRADE MARK
SAN FRANCISCO, CAL.

OUR SPECIALTIES ARE:

Hammered Steel Shoes and Dies, Cam, Crank and Steamboat Shafts, Rock-Breaker Plates, Connecting Rods, Well-Boring Tools, General Blacksmithing.

Correspondence Solicited, and Circulars Mailed Upon Request.

GEO. W. PENNINGTON & SONS,

218 and 220 Folsom St., ...San Francisco, Cal.

The only roofing without a fault

P & B Ready Roofing

Paraffine Paint Co

116 Battery Street—San Francisco

The best builders in America use P & B Ready Roofing

Shingles may warp, slate may chip, tin may sweat, tar may run, or iron expand, but P & B will stand any climatic condition — the weather of the west requires it

Demand it of your dealer

Thousands of engineers can testify to their efficiency. We want your endorsement also. Buy a Lubricator from your jobber. We guarantee it to give perfect service or money refunded. Jobbers on Pacific coast sell them.

The Wm. Powell Co.,
Cincinnati, Ohio.

D. Campbell Davies & Co.,
REPRESENTING THE LARGEST
EUROPEAN and AMERICAN
MANUFACTURERS
— OF —
Mills, Mine and Smelting
Machinery Supplies.

EXPORT TRADE A SPECIALTY.

Apartado No. 83,
DURANGO, - - - MEXICO.

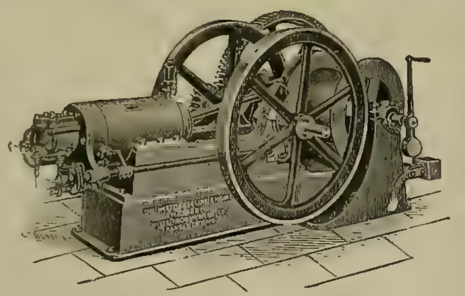
WITTE GASOLINE HOISTS
ARE MONEY EARNERS.

Made for use in places far from factory. Are built in parts and in duplicate. Renewals easy and quick to get. Strong, substantial and reliable.

Operate on GAS, GASOLINE or DISTILLATE.

There Are Others, but None as SAFE AND RELIABLE.

Write for Illustrated Catalogue G.



WITTE IRON WORKS CO.,
515 WEST 5th ST.,
KANSAS CITY, MO., U. S. A.

Hendrie & Bolthoff Mfg. & S. Co., Denver, Colo.
C. B. Boothe & Co., Los Angeles, Cal.
Tracy Engineering Co., San Francisco, Cal.

RIVETED IRON AND STEEL PIPE

FOR HYDRAULIC MINES, IRRIGATION AND POWER PLANTS. Manufactured from the best grades of IRON or STEEL by MODERN MACHINERY.

AGENTS FOR THE Celebrated CANTON STEEL.

Schaw, Ingram, Batcher & Co.,
539 Mission St., SAN FRANCISCO.
211 to 219 J St., SACRAMENTO.

THE WM. HAMILTON MANUFACTURING CO.,
LIMITED,
MINING MACHINERY,
PETERBOROUGH, ONTARIO,
CANADA.

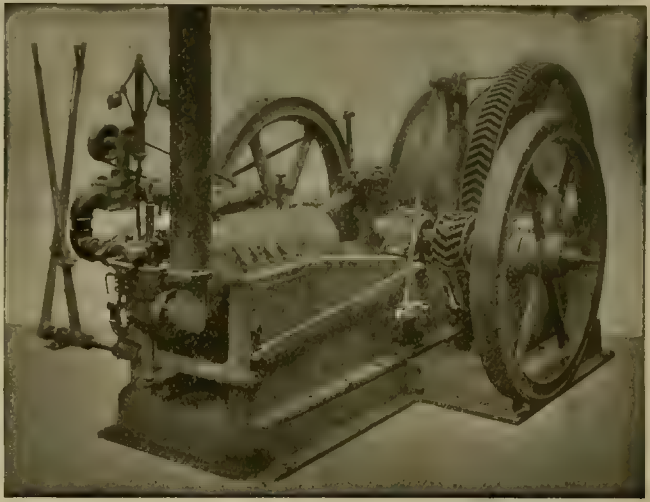
McFARLANE & CO.,
1734 FIFTEENTH ST., DENVER, COLO.
Mining and Milling Machinery.
STAMP AND CONCENTRATING MILLS BUILT AND ERECTED.

STEAM AND ELECTRIC HOISTS, CRUSHERS, ROLLS, REVOLVING SCREENS, JIGS. ORE CARS, CYANIDE TANKS, CORNISH PUMPS, CORLISS ENGINES.

SULPHURIC ACID
MANUFACTURED BY
THE WESTERN CHEMICAL CO
DENVER, COLO.

For Chlorination, Refining and other processes. Also Muriatic and Nitric Acids, Blue Vitriol, Copperas Commercial and C. P. Our chemically pure Acids and Ammonia are guaranteed perfect.

HERCULES HOISTS Are Sold the World Over.



Hercules Gasoline Hoist--Speed 385 Ft.; Load 2500 Lbs.
HERCULES GAS ENGINE WORKS,............141-143 FIRST STREET, SAN FRANCISCO, CAL.

A MONEY-SAVING "HOIST"
is the Weber Gasoline or Oil Hoist. Made right from right materials, in sizes from 6 to 150 H. P., with Single or Double Drum, for Gasoline, Gas or Distillate. Especially useful in mining, quarry, or ship use—good anywhere. State size wanted and for what purpose.

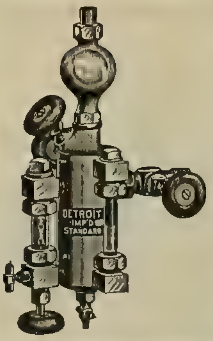
WEBER GAS & GASOLINE ENGINE CO.,
P. O. Box 1132-I,
Kansas City, Mo.
See our PUMPING PLANTS.

The Lunkenheimer Regrinding Valves

made of gun metal, are unsurpassed where thorough, reliable service is the first requirement. In screw and flange ends for medium (175 lbs.) and extra heavy (350 lbs.) working pressures, ⅛ to 4 inches. A trial order demonstrates their fitness and invariably results in their adoption. Have you need for such valves? If so, specify them.

Our catalog will acquaint you with our entire line of superior brass and iron specialties for Steam, Water, Oils, Gas, Air, etc. Write for one. "Lunkenheimer" specialties are carried in stock by dealers everywhere.

THE LUNKENHEIMER CO.
General Offices and Factories:
CINCINNATI, - - - U. S. A.
BRANCHES:
NEW YORK........................26 Cortlandt Street
PHILADELPHIA........................Bourse Building
LONDON, S. E........................35 Gt. Dover Street
MEXICO CITY........................Puente de San Francisco No. 6

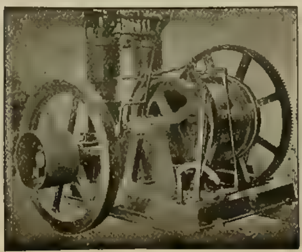


ALL ABOUT
Sight Feed Lubricators.

Our new catalogue for 1900 is ready for distribution. It explains in detail the principles governing the operation of Sight Feed Lubricators, using sectional view to show the internal construction, and containing cuts of the different styles in parts before being assembled into the complete lubricators, thus enabling every one to understand their construction and operation thoroughly.

In addition it shows our full line of Glass Oilers, Oil Pumps, Oiling Devices, Multiple Oilers, Valves, Etc. It will be sent to any address on application.

DETROIT LUBRICATOR CO., DETROIT, MICH.



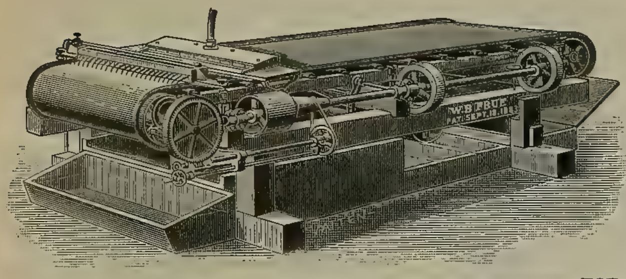
Mining Hoist.
THE GOLDEN GATE GAS ENGINE
Will raise more ore than any other AT LESS COST.
MANY IN USE, Giving Satisfaction.
Built for any Capacity and for any Purpose.
Pumping Water, Propelling Boats, Hoisting Ore, Machine Shop Power, Etc.
Send for Particulars and Catalogue.
ADAM SCHILLING & SONS,
213 & 215 Main St., San Francisco, Cal.

CALIFORNIA STATE LIBRARY

This Paper not to be taken from the Library. ++++

FOUR and SIX-FOOT FRUE VANNERS

With Brownell "Patent Lip" Flange Belts.



STANDARD MACHINE OF THE WORLD.

When a Concentrator like the Frue Vanner has been on the market nearly two decades, and the sales have constantly increased, it is safe to say it is the "Standard Machine of the World." More Frue Vanners have been sold during the last twelve months than for the same period at any time during the history of the machine. Practical mining men in all parts of the world where mining is carried on will testify as to its merits. It is the "standard" which all competitors are trying to imitate.

The results obtained by this machine are the "acme" of concentration, and several cheap and untried machines that have lately come on the market compare by it. The manufacturers will tell you that they are "just as good, and cheaper," etc. The facts are that no other concentrator made has an equal capacity, or will yield as clean a concentrate with as small loss in the tailings as the Frue Vanner. The amount saved from the lower first cost of an inferior machine counts little in the year's results, when compared with the increased output from a Frue. This machine not only gives better results at both ends of the belt (i. e., clean product and poor tailings), but is operated at less expense and requires less attention than any other machine on the market. At the Alaska-Treadwell mine, where they have ordered over 350 Frue Vanners, one man attends 48 machines for 12-hour shift.

FOR DESCRIPTIVE PAMPHLETS, ADDRESS

J. S. BROWNELL, Western Agent FRUE VANNING MACHINE CO.,
132 MARKET STREET, (Successor to Adams & Carter.) SAN FRANCISCO, CAL.

The Copper King, Limited.

Pacific Coast Smelting and Refining Works.

Works:
Seal Bluff Landing,
Cal.

Mines:
Fresno County,
Cal.

Purchasers, Samplers and Smelters

of

Gold, Silver and Copper Ores, and Furnace Products.

Offices:

222 Sansome St.,
San Francisco, California.

Basildon House, 7-11 Moorgate St.,
London, E. C., England.

THE HALLIDIE ROPEWAY

For Transporting Ore, Fuel, Earth, Sugar Cane, etc., by Wire Ropes.

SIMPLE, ECONOMICAL, PRACTICAL, DURABLE.

LOADS MECHANICALLY. DUMPS AUTOMATICALLY.

WIRE TRAMWAYS (Single and Double Rope Systems),

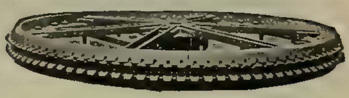
Cableways, Transmission by Wire Ropes,
Incline Planes, Cable Grips,
Logging by Cables, Automatic Loaders,

PLOWING, SCRAPING AND TRANSPORTING by Wire Ropes,

DESIGNED, SUPPLIED AND ERECTED. Estimates Furnished.

Improved GRIP PULLEY

Patents Nos. 483,442; 610,353.



EFFECTIVE, SIMPLE, AUTOMATIC.

Saves Wear on Wire Rope and Cable.

Send for Illustrated Pamphlet.

Correspondence Solicited.

CALIFORNIA WIRE WORKS, - 9 Fremont St., San Francisco, Cal

The Knowles Improved Steam Pumps.

Hoisting and Pumping Machinery.

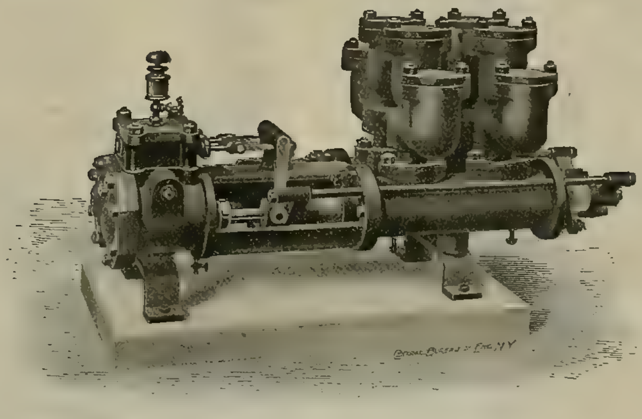
Mining Pumps,

Irrigation Pumps,

Artesian Well Engines,

Independent Air Pump and Condenser

For Stationary Engines or Steam Pumps.



KNOWLES SPECIAL DUPLEX PUMP. Outside Packed Plunger Pattern.

Power Pumping Machinery,

Speed Governors,

Balance Valves and Pressure Regulators

For Steam Pumps.

The Ingersoll-Sergeant Air Compressors and Rock Drills,
Bullock Diamond Drills.

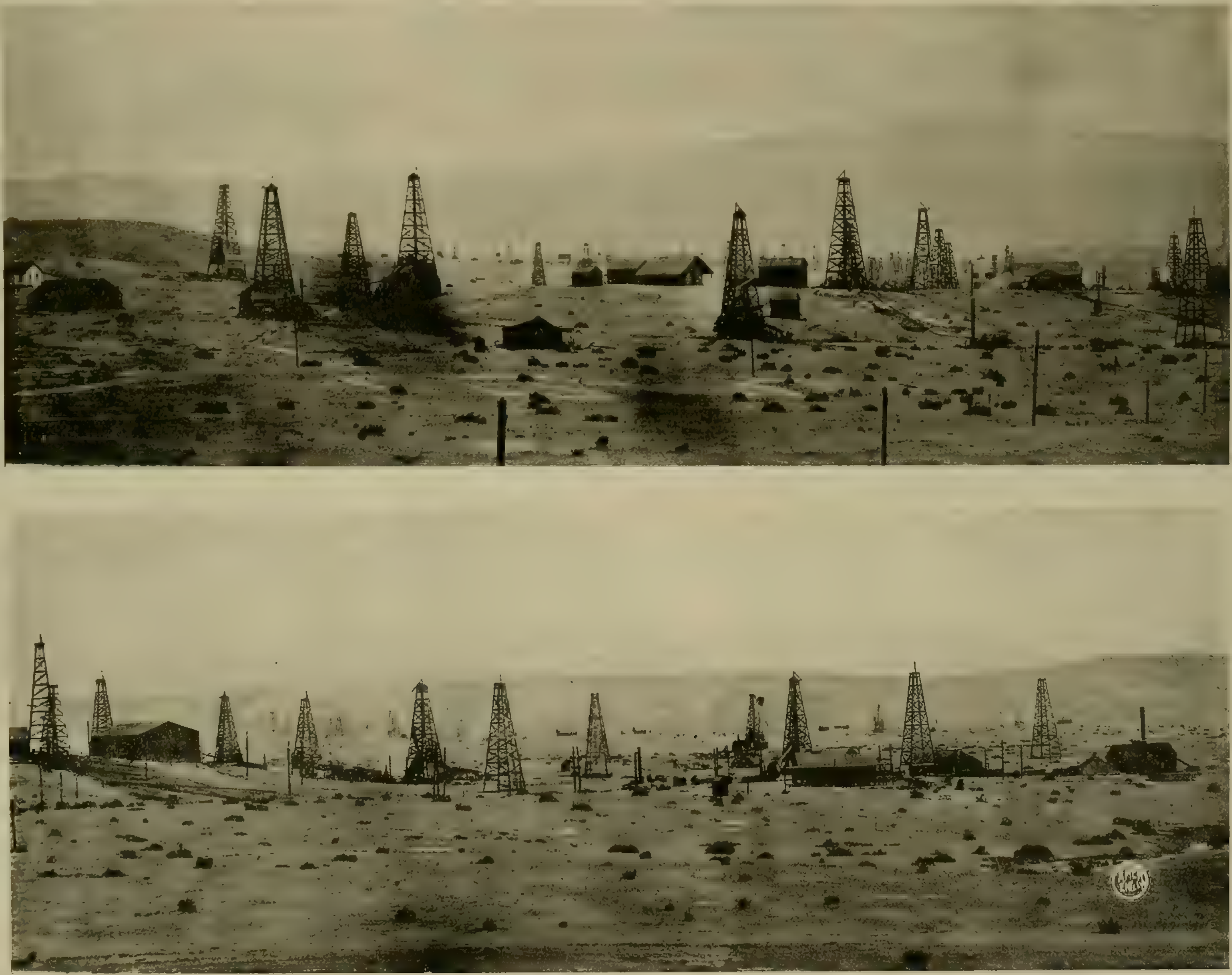
PARKE & LACY CO., 21 & 23 FREMONT ST., SAN FRANCISCO, CAL.

This Paper not

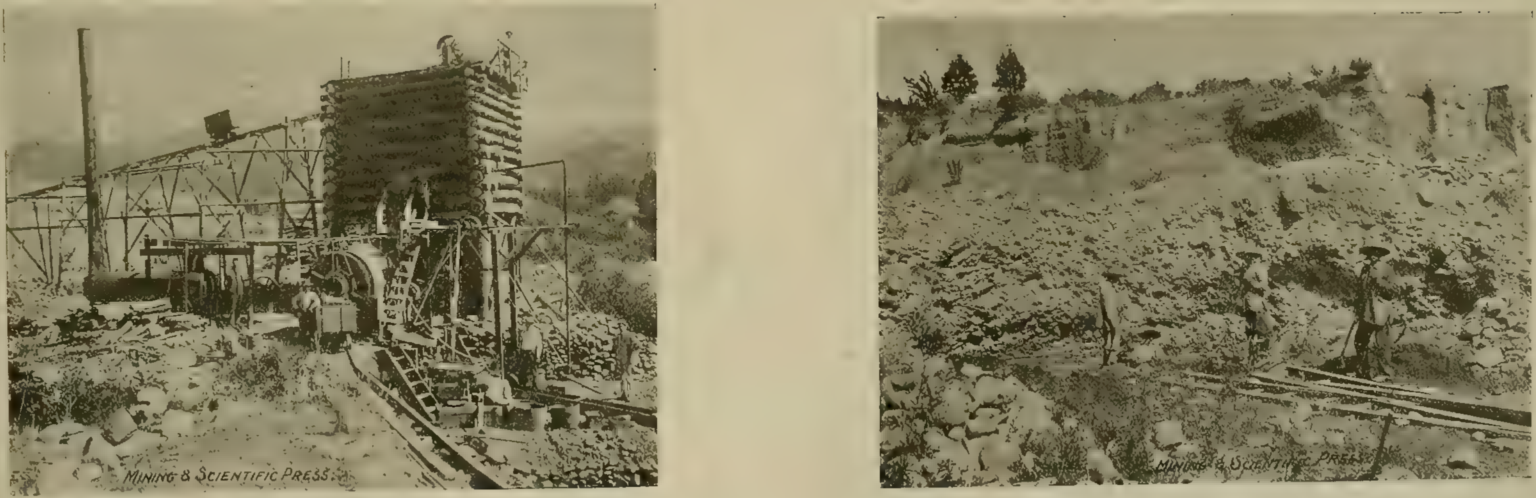
MINING AND SCIENTIFIC PRESS

AND PACIFIC ELECTRICAL REVIEW.

Whole No. 2101.—VOLUME LXXXI. Number 17. SAN FRANCISCO, SATURDAY, OCTOBER 27, 1900. THREE DOLLARS PER ANNUM. Single Copies. Ten Cents.



Panoramic Views of the Kern River, Cal., Oil Field. (See Page 492.)



Adele Cement Mill in Operation.

Blue Cement Underlying Hydraulic Gravel.

Working Gold Cement Gravel in Trinity County Cal. (See Page 494.)

MINING AND SCIENTIFIC PRESS.

ESTABLISHED 1860.

Published Every Saturday at 330 Market St., San Francisco, Cal.

ANNUAL SUBSCRIPTION:
United States, Mexico and Canada....................$3 00
All Other Countries in the Postal Union.................. 4 00

Entered at the S. F. Postoffice as second-class mail matter.

J. F. HALLORAN..................Publisher.

Special Representatives:
EASTERN.
E. H. HAVEN..................150 Nassau St., New York City.
MIDDLE WEST.
CHAS. D. SPALDING..................153 La Salle St., Chicago, Ill.
INTER-MOUNTAIN.
W. A. SCOTT..................43 Jacobson Building, Denver, Colo.
SOUTHERN CALIFORNIA.
W. D. CURTIS..................223 W. Second St., Los Angeles, Cal.

San Francisco, October 27, 1900.

TABLE OF CONTENTS.

ILLUSTRATIONS.—Panoramic Views of the Kern River, Cal., Oil Field; Working Gold Cement Gravel in Trinity County, Cal — Adele Cement Mill in Operation; Blue Cement Underlying Hydraulic Gravel, 489. Robins Belt Conveyor, 493. Mining and Metallurgical Patents, 495. "Giant" Rock Drill Chuck; The Cummings Drill; The Firth Drill, 496. Elevator in Position at Station; Section Showing How Moving Platform Ends; The Gleeson Device, 497.

EDITORIAL.—Buying Mining Stock; Further Consolidation; An Unearned Award; Miscellaneous, 490.

MINING SUMMARY.—498–499–500.

LATEST MARKET REPORTS.—501.

MISCELLANEOUS.—Concentrates, 491. The Oil Fields of Kern County, Cal , 492. Tests of Concrete; Robins Belt Conveyor, 493. Successful Working of Cement Gravels; Pumping Oil in Colorado; Age of Big Trees; Interior Department Ruling; Electrical Machinery in South Africa; Inventor of the "V" Flume, 494. Mining and Metallurgical Patents, 495. Machine Mine Rock Drills on the Pacific Coast, 496. Poisons—Their Nature and Effect; An Electric Staircase, 497. Personal; List of U. S. Patents for Pacific Coast Inventors; Notices of Recent Patents; Catalogues Received; Books Received; Recently Declared Mining Dividends; Commercial Paragraphs, 500–501.

Buying Mining Stock.

From general newspaper discussion it is manifest that the fact is now well recognized that a stock company is a preferred way to get money for mine development, but there still seems to be considerable discussion in and out of the newspapers as to whether the stock so issued and sold shall be assessable or non-assessable.

In California there is no option, all mining stock being there subject to assessment, but in other States there is nothing in the law to prevent organization upon either an assessable or non-assessable stock basis. The latter plan is often adopted by those organizing a mining stock corporation, in the belief that such stock can be more easily disposed of; this belief being based upon a sort of sub-belief that those likely to buy the stock might shy at the assessable clause, fearing that they might be frozen out by unwise or unwarranted assessment.

As between assessable and non-assessable stock, the former is the better. Where one buys stock in an undeveloped mining property he presumably buys it for profit, one possibility of such profit being through having the property developed into a paying mine. This latter result is more often secured by assessable than by non-assessable stock companies. Although what might appear to be sufficient mining stock is set apart and sold for development purposes, it is, from the very nature of the case, usually sold so cheap that the money raised is not enough to develop the mine to a point where it will begin to pay dividends, so that when the money so raised is exhausted there is ordinarily no way to raise any more, the mine may be abandoned, all that has been invested lost and the stock useful only for wall-papering purposes.

Of course, this is not invariable, but it is not an overdrawn statement of a common result. Where the stock is assessable and it becomes necessary to raise enough funds to go ahead a small assessment permits of such progress. Where a stockholder feels it a hardship to pay out any more money, he has the option of selling a part of his stock to pay the assessment on the remainder, or can decline to pay any and quit, selling his stock for what he can get for it, in the latter event being no worse off than were he to have stock in a non-assessable company that would result the same way.

The great trouble with non-assessable stock corporations is that there is no way to assure continuance of work. It requires a constant unanimity of opinion and intent to go ahead, and whenever any of the stockholders become tired or discouraged or financially embarrassed, the load on the others, who are desirous of going ahead, is all the more onerous. Of course, all this opens up a very wide discussion; this whole matter of investing in mining stock has had so much said about it that it is probably unnecessary to be taken up here in detail. It is not here recommended that mining stock, assessable or non-assessable, be bought without careful consideration of all attendant circumstances; it is simply asserted that as between the two systems the assessable is the better.

Further Consolidation.

Consolidation being the order of the day, it is not surprising to learn of the contemplated amalgamation of the Gold & Silver Extraction Co. of America, Ltd., and the Cassel Gold Extracting Co., Ltd., to be known as the Allied Cyanide Companies of America, Ltd., with a capital of £110,000, divided into 110,000 shares, £1 each, 35,000 of which are to be preferred shares. The directors are to be Wm. Forrest of the MacArthur–Forrest Process, J. R. De Lamar of Colorado, Utah and California and Henry A. Jones, managing director of the Cassel Extracting Co., Ltd., of Glasgow, Scotland.

The proposition is to buy and work under British management with a local advisory board in Denver, the MacArthur–Forrest cyanide patent business of the Gold & Silver Extraction Co. of America, Ltd., and the zinc dust precipitation patents of J. R. De Lamar, the Denver advisory board to consist of Hugh Butler, Wm. H. James, Phillip Argall and Geo. A. Anderson, the latter to be general manager. An option has been secured on the Kendal patents.

The directors are advised by patent counsel that the patent which expires soonest should, under a recent change in the U. S. patent law, endure for six years, which would put the MacArthur–Forrest patent over to 1908. It is intended that the businesses be taken over November 1, 1900. It is also understood that, inasmuch as the development of the contemplated consolidated company's business would naturally affect the consumption and sale of cyanide in the United States, it is contemplated that a combination with cyanide manufacturers would be of further mutual advantage. It is further contemplated that properties susceptible of profit by being worked by the cyanide process could be acquired. It is understood that since 1893 the gross income of the Gold & Silver Co. of America, Ltd., has been in the neighborhood of $300,000, of which about 90% was from royalties.

An Unearned Award.

An editorial paragraph in the issue of the 6th inst., regarding the Paris Exposition, said that the wholesale granting of gold medals and honors brought the whole matter of awards into contempt. A manufacturer who himself rightly received the deserved award of a gold medal writes, questioning the fairness or accuracy of the statement. The assertion referred to was made advisedly and direct proof is available. An instance is to hand in California where notice was received by one gentleman from the Exposition authorities in Paris that a gold medal had been awarded to him for an exhibit made by him in Paris. The gentleman was naturally surprised, inasmuch as he had made no exhibition of anything, directly or indirectly, at the Paris Exposition. Upon inquiring about it from one member of the California Paris Commission, he learned that in the judgment of that member if he had not received a gold medal he deserved one anyhow, on general principles; that such award had been recommended by that commissioner, and that it was because of the latter's recommendation that the gold medal had been "awarded" to him. This is perhaps sufficiently indicative of the manner of award, and is doubtless equally indicative of the value of any prize capable of being so "awarded." If every one in California and the other forty-four States of the Union who might, could, would or should have secured a gold medal, had he or she exhibited anything at the Paris Fair worth exhibiting, but who did not exhibit anything, were awarded a gold medal, the demand for that precious metal might cause a rise in its price; but, from our standpoint, it is believed that, as in the case cited, the whole business has what seems a dishonest flavor. It is not only dishonest, per se, but is unfair and dishonest to the really deserving who won medals by merit and who are justly entitled to them. It makes ridiculous the whole affair, and it is because of this fact that the paragraph in the issue of the 6th was written, very mildly, but none the less truthful. It is fair to assume that since what we have cited above was done in the case of the California man, it could have been done, and was done, in sundry other cases. In all there were 34,852 medals "awarded." If each one of the 34,852 has to pay, say $12 or $15 apiece, to get his medal, the total ought to be quite a nice little sum for some one.

We would not detract from nor decry the value of any gold medal honestly earned by merit and exhibition, at Paris or anywhere else, but under the circumstances are inclined to the opinion that the announcement of such "award" is not universally entitled to the prominence in so many instances given by the local press.

Millions of dollars have been spent in mining machinery this year. (The readers of this paper have paid out $100,000,000 for mining machinery in the last ten years.) The makers and vendors of this machinery, which is the finest of its kind, do not consider mining to be the "gamble" that some people claim it to be. They consider the business of mining to be tangible, solid and legitimate as any other class of industry that calls for fine up-to-date machinery and pays for it. The sale of mining machinery at good cash prices kept many a manufacturing concern afloat through the latter nineties, and is the mainstay of many a large establishment now. For whatever other industries may do in the credit line, "jawbone" cuts no figure in securing mining machinery. If one wants it he must pay for it. That is one part of the business of mining, from which the "gamble" is thoroughly eliminated. To the clear-headed men who make the machinery the mining world is largely indebted for the progress that their ingenuity has made possible. Confident in being able to secure cash demand for their product, they have at vast expense built up large factories and produced devices that for applied power and efficient adaptability are not excelled in any department of manufacture.

Colorado's State Supreme Court has strengthened the rights of minority stockholders in a mining corporation by a decision this week that will deter subsequent attempts at "freezing out." The case was on appeal. The Ibex M. Co. had a majority of the stock of the Glengarry Co. and assumed control of the latter company in its interest. It arranged a lease and bond to itself of the Glengarry property in a way unsatisfactory to protesting minority stockholders in that corporation. There was no question of fraud raised, the point being, could the Ibex Co., controlling a majority share in the Glengarry, make disposition of the latter property contrary to the wishes of minority stockholders therein. The Colorado court holds that the Ibex Co. was virtually trustee of the interests of all the Glengarry stockholders, and, as such trustee, could not act in a manner contrary thereto, and that the Ibex Co. in acting as it did, tried to coerce the Glengarry stockholders into a disposition of their property at variance with true trusteeship, saying in effect that corporation property must be administered by its managers in a way that shall tend to the use and benefit of all its stockholders.

Notable in the history of mining was the introduction last Saturday of electric power on the Comstock, Nevada, not in any sense in the installation itself, for electricity in mining has been in use a dozen years, but as exemplifying what many consider a new era in the life of that famous lode, which has produced $400,000,000, and from which dividends aggregating $120,000,000 have been paid. The history of the enterprise has been so completely given in these columns from the time that this journal urged the move, to the present, that all necessary to now chronicle is that on the 20th inst. the electric current was turned on, starting the milling machinery. It is figured that power can be thus delivered at an exceedingly low rate. This, coupled with other economies and modern mining and milling methods, in connection with unwatering of the lower levels and deeper workings should insure new life to the great lode that made and unmade so many fortunes.

Concentrates.

A "BUSHEL OF CHARCOAL" in California has 2200 cubic inches.

STEAM is separable into oxygen and hydrogen between 2200 and 4500° F.

NEW ZEALAND has a tariff of 5% ad valorem on all kinds of mining machinery.

SHEETS of clear mica 4x4 inches are worth about $6 per pound in New York City.

AT the Homestake mine mill, South Dakota, 640 stamps are in present operation.

THE only magnetic substance in liquid form is liquid oxygen, at a temperature of about — 300° F.

BUT sixty-five days remain to do the necessary $100 of assessment work on unpatented mining claims for 1900.

CHLORIDE OF LIME (bleaching powder) was quoted in New York City on the 15th inst. at $10 per drum of 500 pounds.

A CUBIC INCH of aluminum weighs .0926 pound; of cast copper, .3179 pound; cast steel, .2823; cast zinc, .2482; cast iron, .2607.

REROLLED rails are in use on nearly every railway in the country. Rails originally 67 lbs. to the yard are rerolled to a 60-lb. section.

FOR purifying and regenerating air in mines or anywhere else, bioxide of sodium is recommended. It absorbs acid and liberates oxygen.

THERE is a U. S. import duty of 6 cents per pound on quicksilver, and that is just the difference between its price in New York and London.

THE present monthly copper output of the Anaconda is about 8,000,000, Boston & Montana 6,000,000, and Montana O. P. Co. 4,000,000 pounds.

CHLORINE, as used in the extraction of gold from iron pyrites, is prepared by the action of sulphuric acid upon sodium chloride and manganese dioxide.

COKE has been made from Utah coal which, when tested at Salt Lake City, was pronounced satisfactory in every respect, compact and free from sulphur.

THE Calumet & Hecla, at Houghton, Mich., saves about seventy pounds copper per ton in the mills; about six pounds per ton crushed goes in the tailings.

THERE is no chemical antidote in cases of poisoning by swallowing salts of lead or copper. A mixture of fresh milk and magnesium hydrate is recommended.

MUNTZ METAL is a brass composition of 3 parts copper to 2 of zinc. (Ordinary brass is 2 parts copper, 1 of zinc.) Muntz metal can be rolled or forged when hot.

ON the Rand, South Africa, at the cessation of active mining the average duty per stamp per day was 4½ tons. The average working expenses were about $6 per ton.

THE total cost of the Boer war to the British Government is £60,000,000, which will be charged to the resources of the Transvaal, particularly the gold mines of the Rand.

THE specific gravity of petroleum spirit for an automobile should be about 0.680 at a temperature of 60° F. A depression of 30° F. causes an additional 15° to the specific gravity.

THE highest price ever paid for gold by the Melbourne, Australia, mint was last September to the Cassilis G. M. Co., Cassilis, Victoria—£4 4s 7½d per ounce, equivalent to $20.581.

A 20-INCH cast iron water main subject to a pressure of 150 pounds per square inch should have a thickness of .9757 inch; a 40-inch pipe in the same conditions should be 1.6313 inches thick.

AN explosion is a rapid chemical change taking place with the liberation of a great amount of heat. Almost any explosive becomes comparatively harmless if mixed with some neutral solvent.

A "KNOT" is 6086 feet. The indicated rate of 18.54 knots per hour made by the battleship Wisconsin, in Santa Barbara, Cal., channel on the 11th inst., was at the rate of 112,834.44 feet, or 21.37 miles, per hour.

TO FIND the weight of castings by the weight of pine patterns, multiply the weight of the pattern by 12 for cast iron, 13 for brass, 19 for lead, 12.2 for tin, 14.4 for zinc; the product in each case will be the weight of the casting.

THE latest advance information as to who is going to put in new mining machinery, or is likely to be in the market for mining or metallurgical devices of any kind, is always to be found in the pages of "Mining Summary" in each issue.

THE weight by which diamonds and precious stones are calculated is: 4 grains = 1 carat; 157½ carats = 1 ounce troy. A fine diamond, perfectly white and pure, weighing 1 carat is worth $100; 2 carats, $400; 4 carats, $1100; 5 carats, $1750.

IN the hands of an expert a blowpipe is of great value in analysis, but for a prospector in the field its use or value is limited. The services of a competent assayer, even though at a distance and with attendant expense, would be usually more satisfactory.

A BOILER horse power represents the evaporation of thirty pounds of water per hour from feed water at 100° F. into dry steam under a pressure of seventy pounds by the gauge. So that a 35 H. P. boiler is one capable of evaporating 1050 pounds of water per hour from a temperature feed of 100° F. into steam at seventy pounds gauge pressure.

CAST IRON after solidifying in the moulds contracts while cooling about ⅛ inch per foot of length. To allow for this contraction pattern makers use a special rule, called a shrink rule, for measuring patterns. It is ⅛ inch per foot longer than the standard rule.

OCEAN CABLEGRAMS are not received as ordinary telegraphic dispatches. They are written on a strip of paper in motion by a siphon recorder, a stream of ink which flows from the fine tip of a glass tube moved to and fro by a coil of wire in accordance with signals.

FOREIGN mining companies operating in Russia must employ a Russian mining engineer to direct the work, with full power to employ and discharge all subordinates. The general tendency of all Russian regulations and requirements is to discourage foreign mining investments.

IF a silver property will yield an average of fifty ounces per ton, that at going rates is $32, and at the ordinary mining and reduction charges that ought to pay well; pay better in these days of economic appliances and improved processes than in the old days when it was $1 per ounce.

WHEN an invention becomes abandoned to the public it is no longer patentable. Abandonment, however, may not be presumed. It is only where the fact is made clear, either by the testimony of witnesses or the action of the party himself, that can be set up to defeat the inventor's claim to a patent.

A MOVEMENT originated some time ago in the Dawson Board of Trade to reduce commercial gold dust from $16 to $15 per ounce; but one of the leading companies withdrew from the agreement, and dust still continues to be received at $16 in payment of all bills in Dawson, except when otherwise specified.

MAGNESITE is largely used in making medical salts, carbonic acid gas, and as a filling for wallpaper. Much of the magnesite used in this country is mined in Greece at a cost of about $3.50 per ton and brought to the Atlantic ports for about $1.50 per ton more, selling in Philadelphia and New York for about $7 per ton.

MALLEABLE CASTINGS are made by putting a gray iron casting in a suitable box and covering it with powdered red hematite, which is an oxide of iron, and keeping it in a furnace at a bright red heat for from three to thirty-six hours, dependent upon the size of the casting. Malleable castings can be worked like wrought iron, but will not weld.

TO DRILL a hole in case-hardened iron or steel, heat the steel or iron to a red heat, and while it is in the fire drop a lump of sulphur on it just where the hole is to be drilled. Take it out of the fire and let it cool off itself. After the hole is drilled put it back into the fire, heat to a red heat, sprinkle sal-ammoniac over it and plunge in water to harden.

"THE California Dustless Roads Co. of Los Angeles" contracts to sprinkle with oil and keep in repair roads in southern California. They have oiled 32 miles of roads in Kern county, Cal.; cost per mile, $250. There is about 40% asphaltum in the oil. The effect on the roads is somewhat similar to that when paved with asphalt, becoming smooth and bearing heavy travel.

BABBITT METAL is a soft, white metal used largely for lining shaft bearings. Its usual composition is: Copper 4 parts, antimony 8, tin 24, melted together, and, before using, the alloy is melted with an addition of twice its weight of tin and applied to the bearings while molten. So that the real composition of the lining is copper 4, antimony 8, tin 96.

"HARVEYIZED" steel plate for battleship armor is made by the introduction of carbon by cementation into the face of an ordinary low-carbon steel plate, subsequently it is water-hardened similar to an ordinary tool. After this treatment it presents a hard-faced surface, to the depth of about 1 inch, designed to stop and break up projectiles before serious penetration takes place.

"EVERYBODY is wiser than anybody," and whenever anyone, anywhere, in any mining or metallurgical work, knows of anything that he thinks would be of interest, this paper would be pleased to publish the particulars, and if accompanied by a photo or sketch, the latter to be suitably engraved to illustrate the matter. In no better or more practical way can mining and scientific progress be advanced, and it is the men who do things who are best qualified to write about what they have done, thus adding to the stock of general information.

IN its pure state lead is unacted upon by pure water. If air be present in the liquid or its surface be freely exposed to the atmosphere, lead oxidizes, the latter uniting with water and carbonic acid therein and becoming dissolved. Chloride of any kind in the water increases such action; sulphates or phosphates in the water check the tendency to act on the lead. In case of poisoning by acetate of lead, the stomach should be immediately emptied by an emetic of sulphate of zinc, and then large quantities of milk swallowed in which is considerable white of egg. A good chemical antidote for such lead poisoning is sulphuric acid in the form of a solution of magnesium and sodium sulphate. Either of these salts would decompose the lead compound, with the formation of insoluble and inert lead sulphate. Alkaline sulphide would give rise to the insoluble sulphide of lead. These salts, however, are in themselves poisonous, in large doses, and their use should be only with great care and under the guidance of a physician.

STEEL is made from wrought iron by adding a little carbon, or from cast iron by extracting some of its carbon. There are three ways of doing this—the Bessemer, Siemens-Martin and the cementation processes. Bessemer steel is made by pouring melted cast iron into a converter through which a blast of air is forced. In this way the carbon in the cast iron is burned out, leaving almost pure iron. To this is added a certain quantity of spiegeleisen, which is a compound of iron, carbon and manganese, and then the molten metal is cast into steel ingots. Siemens-Martin steel is made by melting wrought iron and cast iron, or cast iron and certain kinds of iron ore, together on the hearth of a reverberatory gas-furnace. The cementation process consists of imbedding bars of wrought iron in powdered charcoal in a fire-clay trough and placed in a furnace for several days at a high temperature. The iron combines with portions of the carbon and forms blister-steel—so called from the blisters found on its surface. Bars of blister-steel about 18 inches long are then bound together by strong steel wire and heated to a welding heat; then hammered and rolled into bars called shear-steel.

A DIRECT-ACTING steam pump is one in which there is no rotary motion, the piston being reversed by an impulse derived from itself at or near the end of each stroke. There is but one steam cylinder for one water cylinder, the valve motion of the steam cylinder being controlled by the action of the steam in that cylinder. The peculiarity of the duplex pump is that there are two steam cylinders and two water cylinders. The piston of one of these cylinders works the valve of the other cylinder, and vice versa; either can work alone. A direct-acting steam pump does not work steam expansively, from the fact that there would be danger of sticking upon the centers in most cases if there was lap and expansion, and to overcome this difficulty a small supplementary piston is actuated by the main piston in several different ways: First, the main piston strikes the tappet of the small valve, which opens an exhaust passage in one end of the cylinder containing the supplementary piston, and having live steam pressing upon both ends of the supplementary piston. Second, by the main piston striking a rod passing through the cylinder head and moving a lever which controls the motion part of the main valve, to which is attached the valves which move the supplementary piston. Third, the main piston rod carries a tappet arm which twists the stem of the supplementary piston, thus uncovering the posts, which causes its motion. Fourth, a projection upon the main piston rod engages the steam and operates the valve which moves the supplementary piston, and is controlled by steam. The kind of valves that are generally used on steam pumps are the hinge, poppet and ball. The hinge valve will let comparatively large bodies pass through it. The advantage of the poppet valve is capability of being adjusted as to lift, quickness of closing, and of being constructed of almost any kind of material. The ball valve can be worked very hard with little injury to itself or to its seat.

THE "Swinburne process" of treating zinc in complex sulphide ores consists of stirring the crude ore into a bath of molten zinc chloride contained in a cauldron heated from beneath. A small quantity of molten lead in the bottom of the cauldron alloys with and entirely removes the silver and gold from the ore, dissolving a small portion of the lead as chloride in its place. The rich lead is then withdrawn and the mixture of sulphides and chlorides of lead and zinc is subjected to the action of an electric current. The lead is first deposited as molten metal, and collects in the bottom of the cauldron. No chloride is given off from the fused mass, but sulphur, in the form of vapor, escapes. The action of the current is continued until all the lead chloride is decomposed and the zinc chloride begins to be acted upon. By interrupting the process at this stage the lead may be withdrawn. If electrolysis is continued further the zinc is then deposited, also in a molten state, and collected in a similar manner. The gangue and decomposed matter, remaining after all the zinc sulphide has been decomposed by the electric current, is raked out, and this residue is heated in a retort, which drives off the whole of the zinc chloride remaining, leaving nothing behind but worthless residue. The zinc chloride so distilled is allowed to run in a molten state back into the electrolyzing cell. For convenience of working, the process is preferably divided into three operations. It is much cheaper to deposit lead electrolytically than it is to deposit zinc electrolytically; therefore, should the composition of any class of ore render it desirable, it will be possible to stop the process short of the recovery of the zinc. The cost of operating the process in Australia, it is said, did not exceed $9.50 per ton of ore for complete recovery of the lead and zinc, or $6.25 per ton, omitting the recovery of zinc. This process differs from others, inasmuch as it extracts the precious metals first, and then the lead, and finally the zinc. It directly splits sulphides into sulphur and metal without any intermediate oxidation of the ore. The electrolytic process applied to the recovery of lead is a comparatively simple matter, the same electrical energy required to deposit one ton of zinc being capable of depositing upwards of three tons of lead. Moreover, in electrolyzing fused chlorides very high current densities are possible, so that the apparatus employed becomes small in comparison with that which is required for depositing metals in the wet way.

The Oil Fields of Kern County, Cal.*

Written for the MINING AND SCIENTIFIC PRESS by H. G. PARSONS.

KERN RIVER DISTRICT.—After visiting the Kern River oil district and obtaining ocular and olfactory proof of the deposit of petroleum which underlies this region, one marvels that these vast oil-bearing strata should have furnished so little surface evidence of their existence. At several points in the south San Joaquin valley are visible within one acre more signs of oil deposits than could be found in the entire 20 square miles embraced in the present area of the demonstrated field along Kern river. At McKittrick, Sunset and other places crude oil oozes from the hillsides, while asphaltum deposits and mineral springs betoken the proximity of petroleum. At Kern river, however, the surface indications, aside from general geologic formations common to oil districts, seem to have been confined to a small patch of oil-saturated sandstone on the north bank of the river—where the discovery of oil was afterwards made—and to a gas well on the Barker ranch, 5 miles east of the surface croppings. These are the only specific indications of oil in this locality that are alluded to in a publication of the State Mining Bureau devoted to this subject issued in 1894. Five years after this the persistence of a small coterie of unscientific laborers exposed the existence of a petroleum formation, which, by its uniqueness and extent, is attracting present attention. From the point of discovery, on Section 3, Township 29 S, Range 28 E., M. D. B. & M., the demonstrated field has lengthened and broadened, until now twenty or more sections of land are embraced in what is locally called the "sure" territory, and every few days a new well in one direction or another proves the extended scope of this deposit. Seemingly, the oil-bearing formations do not lie in the apexes of main or lateral anticlines, which are to be traced with scientific exactness by geologic structure.

The richest stratum of oil-bearing sand—in which most of the wells now stop—is struck at a depth varying from 700 to 800 feet. This depth depends upon the altitude of the surface location. At present so clearly defined is this rich stratum that an experienced driller can from his logbook foretell within 6 or 8 feet the point at which he will strike oil. Some of the earlier wells were stopped at a depth of 500 or 600 feet in oil-bearing sand of less richness and thickness than the stratum now selected. The lower stratum is over 100 feet in thickness, separated from a stratum above by a thin streak of clay. Undoubtedly, many of the first wells will after their productiveness diminishes be sunk into lower strata and thus be given new life. There seems to be a slight northwesterly dip to the formation, corresponding to the trend of the belt, so that the wells in the northwestern end of the field are sunk deeper than those to the southeast. Within an area of 6 miles in length by 3 miles in width there has yet to be recorded a failure in striking oil, if the well has been pushed down to a maximum depth of 1000 feet. Beyond the area mentioned several wells have been sunk below the depth named without getting into oil sand, demonstrating that the field terminates or that the sand lies very deep.

There are now in the Kern River district at least 200 producing wells, with fully 200 wells in process of drilling. As a well is completed within six weeks or two months, it will be seen that the number will increase at a rapid rate, even with the 200 rigs now in the field. In addition to this, new rigs are constantly being constructed. The output, as estimated from railroad shipments and the consumption in the field, is 5000 barrels per day. It is expected that this output will be increased as soon as greater tankage facilities are provided, or as soon as projected railroad spurs have been completed. At present there are many wells which are capped, waiting these desiderata. All of this development of oil resources has taken place within the last fifteen months. Considerable has been said about the Standard Oil Co. entering the Kern river field for the purpose of constructing tanks and ultimately handling the product of the district. The producers are not waiting for the Standard Co. They have formed an association looking to the more systematic disposal of their output, and they will co-operate on this line. In the meantime three steel tanks, of capacities ranging from 20,000 to 36,000 barrels, are completed, and one company—the Aztec—has finished a cement cistern of 30,000 barrels capacity, from which a pipe line will run to the spur railroad track. The cement cistern will obviate much of the evaporation which inheres to the open-tank method of storing oil.

The possible wealth of the Kern River district may be judged from the following sentence from another article written by Prof. Cooper, where he says: "A cubic foot of sand will hold 1½ gallons of petroleum oil. A volume of sand equal in area to one acre, and 100 feet in thickness, will hold in round numbers 6,600,000 gallons of oil, or 167,000 barrels." The depth of sand in the Kern River district is from 200 to 400 feet. In the demonstrated field $5000 per acre is a common price, and contracts have been signed with that figure as a basis, with option to purchase extending one year.

The petroleum drawn from the shallower wells, mainly in the southern part of the field, is heavier than that taken from the wells in the northern end. The specific gravity of the former is 13° (Baume), of the latter about 15°. In the case of the heavier oil, steam is often injected into the casing at a point where the oil is drawn, the heated steam increasing the fluidity of the oil and making it easier to pump. Steam is also injected into the bottom of the oil tanks, making the thick fluid more ready to flow through the outlet pipes.

Although considerable gas is present in the Kern River oil, no systematic method of saving it has been devised, as in the Coalinga field, where it is collected at the various wells, conducted to a retort, and there drawn off as fuel for different boilers. Occasionally the inflammable gas causes disaster, as in the case of the Sterling Company (as reported in the MINING AND SCIENTIFIC PRESS of the issue of the 6th inst.), where an open forge in the derrick enclosure set fire to escaping gas, the derrick being immediately consumed. The presence of gas is evidenced by bubbles which force themselves through the thick fluid, in a few instances carrying oil over the top of the casing, and thus creating flowing wells. Freshly drawn oil is filled with minute gas bubbles; as these escape the fluid settles to a heavy, dark, viscid mass, somewhat resembling thin tar. Thus the real production of a well is sometimes overestimated, by reason of the gaseous character of the product.

Oil wells in the Kern River district are sunk either by contract with well drillers, or competent help is employed by the companies at day's pay. Where contracts are made, the price varies from $1.50 to $3 per foot. In a majority of instances the day's pay method is adopted, because the companies' operations are usually managed by superintendents, each of whom may assume general charge over a dozen gangs of drillers. Where a company desires to be economical, and wishes to sink first an experimental well, the contract plan possesses advantages. It obviates the direct employment of high-grade help and lessens the preliminary investment, as contractors possess complete drilling outfits of their own. In fields distant from railroad facilities, contractors' prices run as high as $5 or more per foot, in addition to which the company must, of course, supply the casing and accessories. In such districts the well may cost $10 per foot. There is brisk competition among contracting drillers at Bakersfield, and where several bids are solicited a company may get its work done at reasonable rates. A conservative estimate of the expense of sinking a well 1000 feet in the Kern River district is as follows:

Cost of rig for first well	$2,200
Labor	1,200
Casing (1000 feet)	1.800
Incidentals covering accidents, etc.	1,000
Total	$6,200

Deducting $2200, the cost of the rig—which is in the nature of a permanent investment, available in drilling other wells—and the net cost of a 1000-foot well is $4000. The formations in this district are exceptionally favorable, as no boulders or inclined strata of hard rock (those banes to the driller) are encountered. This is shown by the log book of one of the companies in the central part of the demonstrated field: First 15 feet in soil; 15 to 50 feet, gravel; 50 to 90 feet, yellow clay; 90 to 220 feet, blue clay; 220 to 300 feet, dry sand; 300 to 360 feet, sand, some oil; 360 to 372 feet, white sand; 372 to 384 feet, blue clay; 384 to 409 feet, oil sand; 409 to 443 feet, white sand; 443 to 482 feet, oil sand; 482 to 505 feet, blue clay; 505 to 535 feet, oil sand; 535 to 540 feet, blue clay; 540 to 585 feet, oil sand; 585 to 606 feet, blue clay; 606 to 658 feet, oil sand; 658 to 664 feet, blue clay; 664 to 741 feet, oil sand; 741 to 755 feet, slate; 755 to 760 feet, oil sand, stopping in blue clay. This well was started 125 feet above discovery well on bank of Kern river.

The wages of workmen in the Kern county oil fields are about as follows:

	Per Day, with Board.
Boss drillers	$5 00 to $6 00
Tool dressers (helpers to boss).	3 00
Boss rig builders	3 00 to 4 00
Ordinary carpenters	2 50 to 3 00
Roustabouts	2 00

The above, as indicated, includes board and conveniencies for lodging in bunk houses, the workmen furnishing their own blankets.

One of the most frequent causes of stoppage in a productive well is the "sanding" of the pump. The pump tubing is 2 inches in diameter, inserted in the center of the casing, which is capped. The sand which floats with the oil through perforations in the casing acccumulates in such quantity in the tubing that the pump valve becomes clogged. It is then necessary to draw out the entire string of tubing, and to bale the casing free of accumulated sand. Then the cleaned pump, with its tubing, is lowered into position and operations resumed. There have been instances in which heaving sand, or that which accumulates above the pump by the working thereof, holds a pump so firmly in the casing that the pump cannot be moved. Then the pump must be hydraulicked loose, or the entire string of casing has to be drawn. This trouble involves great expense and sometimes results in a ruined well.

Oil lands are now largely worked on long-term leases, with option to purchase at a fixed price within a year or two. Besides a cash bonus which is often exacted for a lease, a royalty must be paid by the lessee, varying from 10% to 50% of the gross output from the land. This royalty is governed by the "sure" or the uncertain character of the territory leased. In Kern River district the maximum royalty is 50%; a customary royalty is 33⅓% or 37½%, while the option purchase price is $1000 to $5000 per acre. There are usually conditions in leases to the effect that drilling shall actually begin within thirty or ninety days; that a certain number of feet shall be drilled each year, or a certain number of wells be completed within a specified time, and usually one to each acre. With the present feeling of confidence in oil operations, the lessors dictate the terms. If not suited, the contemplating lessee can take to "wildcatting," as ventures are entitled which are located outside of demonstrated oil fields. In outside districts leases are effected at royalties ranging from 10% to 25%.

The development of Kern county's oil fields has given great impetus to the business affairs of Bakersfield, the practical center of all the districts in this county. It is estimated that there are employed in this industry in the Kern River district alone 1000 to 1200 workmen. Besides this, employment is given indirectly to many teamsters, freight handlers and other classes of labor. Surely, Bakersfield has reason to bless the day when old Jud Ellwood and Tom Means uncovered the hidden wealth lying beneath the barren hills of eastern Kern. She might appropriately perpetuate their memory by erecting in her Chamber of Commerce, or in her contemplated Oil Exchange, statues of these worthies cut from solid asphaltum, with their feet anchored in the oleaginous sands which have shaped the destiny of the city.

With reference to individual or company effort in the Kern River district, many interesting and commendable records have been made. I particularize in the following instances:

J. J. Mack and John M. Keith of the Bank of Bakersfield, with their associates, were among the pioneers in the field. They showed their faith in the stability of the oil industry by the investment of capital when such investment meant a great deal in the direction of development. They formed the Imperial Oil Co., secured an entire section of land, and began work in August, 1899, at a point where their subcompany, "Thirty-three," have since registered such a success. The latter company now have seventeen completed wells, with four more drilling. They are laying an 8-inch pipe line 5600 feet to the railroad track. They estimate that their output will amount to 1200 barrels per day. Besides owning Sec. 33, 28–28, the Imperial Oil Co. own all of Sec. 1, 29–28. They have eight completed wells on territory not controlled by "Thirty-three." Mr. Mack and associates are interested in other lands and properties. On account of this, and by reason of their commercial position, they are considered important factors in Kern county's present advancement.

Chanslor & Canfield were among the early operators in Kern River district. Their success at Coalinga gave them prestige, and, when they evinced their faith in the newer districts by investments, they added impetus to the oil "boom." These gentlemen, with their associates, notably Mr. Doheny, who met with such success as a pioneer on Sec. 3, 29–28, Kern river, organize companies and prosecute work for the purpose of securing productive wells. They are not sellers of stock, but are in the field as buyers or lessees of land and shippers of oil. They are connected with the Comet Oil Co., on Sec. 28, 28–28; the Canfield, the Chanslor and the Doheny oil companies, on Sec. 29, 28–28, and other enterprises in various parts of the field.

The San Joaquin Oil & Development Co. began operations one year ago. They own nearly 500 acres of patented land in the Kern River district and lease ten acres in the heart of the defined belt. On Sec. 5, 29–28, they are pumping from six wells, having here a complete pumping jack. There are two good water wells on this section. On the Means tract, Sec. 3, they have four wells completed and ready to pump, but no pumping jack. The company keep four new strings of tools at work all the time, and by Jan. 1st, 1901, expect to have completed six new wells. The product of the company at present is stated to be about 750 barrels per day. They shipped during the first half of October sixty-four carloads of oil, are now completing a 6-inch pipe line, 1 mile long, to the railroad track; have tankage capacity of 42,700 barrels. They have eighteen of the small forest of derricks which dot the field in their locality.

(A good idea of how this whole section of country looks is afforded by the views on the front page, for which I am indebted to the courtesy of the Bakersfield Californian.)

The Central Point Consolidated Oil Co., on the east side of Sec. 4, 29–28, has eighty acres leased from the Bakersfield & Fresno Oil Co. on one-eighth royalty. Work was begun on the property last March. In May 1100 barrels of oil were delivered at the Santa Fe station in Bakersfield by wagon; in June, 3800 barrels; July, 4600 barrels; August, 9200 barrels; September, 15,300 barrels. The oil during the latter month was delivered direct from pipe line into the cars on branch line running up Kern river. During September this 15,300 barrels were pumped from six wells. They expect that October will show an output of 20,000 barrels, and think by the first of November they will have eleven wells in operation, producing about 30,000 barrels per month. The company is capitalized at $200,000; par value of shares, $1 each; B. F. Brooks, president; L. Peyton, secretary; principal place of business, Bakersfield.

---

*See engravings, front page.

The Senator Oil Co. furnishes another good showing. They paid $650 per acre for eighty acres in Sec. 31, and have executed a lease to Fresno men for 37½% royalty, lessees having an opportunity to buy within eighteen months at $5000 per acre. The three wells that the company have completed are reported to be pumping 125 barrels oil per day each; No. 4 is down 735 feet, showing a body of oil sand; wells Nos. 5 and 6 are down 400 feet and 200 feet, respectively. The Bear Flag Oil Co. have leased their west 40, are putting up derricks and houses and expect to be drilling on their first well Nov. 1. As in the case of the Central Point Con. Oil Co., B. F. Brooks is president and L. Peyton secretary of the Senator Oil Co. at Bakersfield.

The Aztec Oil Co. is another evidence of what the Kern River oil district will show under careful management and energy. This company bought eighty acres of the Kern Oil Co. May 25th and now has eight completed wells, and are drilling on No. 9. They have a storage capacity of 17,000 barrels; pipe lines laid to the railroad and facilities for loading nine cars per day. The company is capitalized at 250,000 shares, of the par value of $1 each. The company paid $1350 per acre for the land. The wells, drilled to 800 and 900 feet, are producing 125 barrels of oil per day and show a depth of 500 feet of oil sand. Their principal place of business is at Bakersfield; B. F. Brooks and L. Peyton are president and secretary, respectively, of the Aztec Oil Co., also.

The Petroleum Center Oil Co. own all of Sec. 8, 28–28, twenty acres in Sec. 28, 28–28, forty acres in Sec. 24, 28–27 and eighty acres in Sec. 13, 28–29. They have four producing wells on Sec. 28, with a complete pumping plant; on Sec. 8 they have one well in process of drilling; on Sec. 24 they are drilling a second well, the first having been injured by an accident, and it was then converted into a water well. They operate two complete drilling rigs. The Petroleum Center was the first company to strike oil in Township 28–27. Operations were begun in December, 1899, and oil was struck the following February. They are now 200 feet in oil sand. Dr. Wm. Johnson has assumed management of operations in the field, E. F. Beck (formerly in charge) having gone East.

The Shasta Oil Co. are operating an extensive plant in Sec. 14, 28–28, developing a considerable amount of gas, are working in oil sand and expect to get a gusher. Much development work is going on in Township 28–27 and to the westward. Wm. P. Todd is looking after the interests of the Shasta Oil Co. in Bakersfield.

The Century Oil Co., on Sec. 24, 28–27, are nearing oil sand in their third well. Their neighbor—the Santa Barbara Co.—dropped into oil at 850 feet.

The Petroleum Development Co. have their main interests in the oldest part of the field, where they did so much in the fall of 1899 to prove the abiding character of the new industry. Their first well is not 100 yards from the old discovery well of Jud Ellwood, on Sec. 3, 29–28. Around their enterprise and that of the Treadwell Co. at this point a settlement has sprung up amounting to a village, and dignified with the name of Oil City, though it is thought Ellwood is a better name. The company started their first well Sept. 14, 1899, on land leased of the Kern River Land Co. and struck oil in twenty days at a depth of 280 feet. They now go deeper, the average depth of the twenty or more producing wells of the company being 500 feet. The average production of each well is stated to be forty-five barrels per day. They shipped in September 18,000 barrels. They keep three drilling rigs at work. Nearly all of their wells are in the northeastern end of the field, close to the river bank.

The Treadwell, or S. P. Co., have a cluster of wells in the same neighborhood, both companies being convenient to the spur railroad track, which terminates near there.

The Reed Crude Oil Co. is a large producer and a vigorous prosecutor of development work. It is composed of Los Angeles business men, who have done so much by their energetic methods to advance the oil interests of Kern county. They knew something about the oil business before coming into the field, and their operations have been characterized by the spirit of push which merits success. They have nine producing wells on Sec. 34, 28–28; ten producing wells on Sec. 28, 28–28, five drilling, with derricks for five more; three producing wells on Sec. 32, 28–28, two drilling, one discovery, one water well and four derricks; two producing wells on Sec. 20, 28–28, and three drilling. They own forty acres on Sec. 2, 29–28, and 320 acres on Sec. 14, 29–28. Their estimated output is 800 barrels per day.

The Monte Cristo Oil Co., on Sec. 5, 29–28, have one of the few flowing wells in the district. This well is 1000 feet deep and daily yields nearly 150 barrels. The average of their four producing wells is seventy-five barrels per day each. They are drilling two new wells and have a rig for another. Ordinarily, this company has struck oil at a depth of 450 feet; their oil stratum is 280 feet thick.

The Globe Oil Co., having forty acres on Sec. 30, 28–28, are pumping from four producing wells, yielding an aggregate output of 400 barrels per day, and drilling a fifth well. T. H. Noxon, the superintendent, is a believer in deeper wells for the Kern River district, and will drive his fifth well beyond 1000 feet.

The Grace Oil Co., on N. E. ¼ Sec. 8, 29–28, have three producing wells; have just completed a boiler-house and are about ready to begin pumping.

The Kern River Oil Co., having eighty acres on Sec. 4, 29–28, are getting oil from four producing wells. This company owns very productive property in the McKittrick district. The Peerless Oil Co., on Sec. 31, 28–28, have five producing wells, two drilling, one being in oil sand at 550 feet. The Kern Oil Co., on Sec. 32, 28–28, have one producing well, one water well and three drilling; are planning to put up three more rigs and are laying 5⅝-inch pipe line to railroad. The Comet Oil Co., on Sec. 28, 28–28, have two producing wells, one of them yielding at 460 feet; 50 to 100 barrels per day from each well. The Independent Oil Co., on Sec. 28, 28–28, have two producing wells, the one last finished yielding thirty-five barrels per day, the other having settled down to a steady product of twenty-five barrels per day. This company own 160 acres in Sec. 2, 27–29. The Continental Oil Co. of Los Angeles, on Sec. 29, 28–28, have two producing wells of 200 barrels each per day; they intend to put down forty wells on forty acres. The Canfield Oil Co., on Sec. 29, 28–28, have five producing wells of 100 to 125 barrels per day, with two wells drilling; have rigs for two more wells. The Junction Oil Co., on Sec. 9, 29–28, have three producing wells and one now drilling. Spellacy et al, on Sec. 30, 28–28, have two producing wells, and are now at work on a third. Several wells have struck the oil sand in the northeastern part of the field, in F. 28, R. 27, but the oil belt is not yet clearly defined at this distance from the point of first discovery. Those who own property in the trend, as already defined, are very hopeful. Land thereabouts can not be bought for less than $150 to $300 per acre. I visited many producing wells not mentioned herein, but those described are types of those in the district.

Bakersfield, Oct. 17.

Tests of Concrete.

On page 376 of the issue of Sept. 29th appeared some excellent notes on mixing concrete, the result of U. S. engineering tests at Duluth, Minn.

It is to be further noted that the U. S. engineers there adopted a plan for determining the real tensile strength of cement when used in concrete.

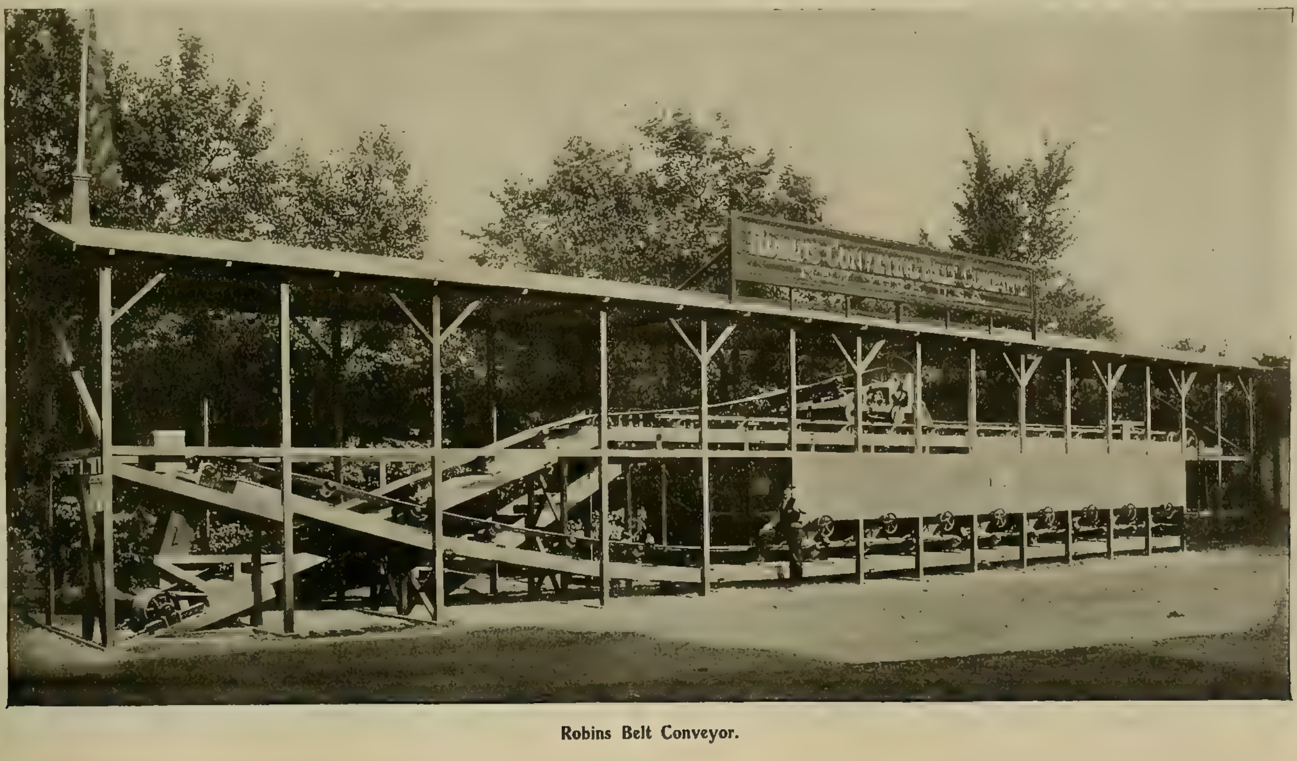
During the construction of the concrete footing blocks samples of the concrete were taken from the mixing platform as mixed, from which briquettes were made. These briquettes were treated as nearly as possible to conform to the treatment of the concrete in the footing blocks. The results obtained were satisfactory. In making these briquettes it was necessary to remove pebbles more than ¾ inch in their greatest diameter to permit the concrete to be compacted into the briquette molds. It was found on breaking those briquettes that at twenty-eight days and thereafter pebbles imbedded in the mortar at the breaking section were almost invariably broken. It will be seen from the table that the mean tensile strength of five briquettes, one year old, was 643 pounds. Assuming a coefficient of 7 for strength in compression would give 4501 pounds per square inch, or 324 tons per square foot, as the ultimate resistance to destructive stress in compression. The following table shows the tensile strength of briquettes at different ages:

Age.	Pounds per square inch.
7 days	222.4
28 days	388.4
6 months	414.6
1 year	643.0

Robins Belt Conveyor.

The engraving on this page shows an exhibit of the Robins Conveying Belt Co. of New York City at the Vincennes machinery annex of the Paris Exposition, for which the company was awarded a grand prize, announced as the only one awarded to any manufacturer of conveying machinery. It consists of a 20-inch Robins belt conveyor, 90 feet long, running level under a series of bins, after clearing which it takes a curved incline, elevating the material to a height of 7 feet, at which point it is delivered to a horizontal 20-inch conveyor, which carries the material in the reverse direction. On this upper line of conveyor a patent tripper operates, distributing the material into the bins, reversing automatically at each end of the bins and requiring no attendance. The capacity of the system is 200 tons per hour, and it is constantly in operation, handling broken stone.

The company also makes two other exhibits, one in the machinery and electricity building, consisting of two 20-inch conveyors 35 feet long, and the other in the mining building, consisting of a one-quarter size model, including the automatic tripper, of the Vincennes exhibit. These exhibits are also in constant operation. In addition to the machinery, there is a large collection of photographs of Robins belt conveyors, showing installations in all the mining countries of the world. While some of the pictures were of interest to the Exposition crowds, it was the conveyors themselves that attracted the attention of all, especially those on which automatically reversing trippers were working. This invention had not been exhibited before in Europe, and the smoothness and regularity of its operation, requiring no attention, occasioned curiosity and interest. Special Exposition illustrated catalogues, in French and English, were distributed at each of the exhibits.



Robins Belt Conveyor.

Successful Working of Cement Gravels.*

Written for the Mining and Scientific Press by
G. E. Bailey, M. E.

The famous "blue gravel" deposits that cover large areas in the placer districts of California have been for years the torment and despair of the miners. The practical miner cares little as to whether they are the result of glacial action, or torrential erosion, or of some other cause, for he does know that they have been deposited by some means in the ancient channels of mighty rivers. He knows, also, that the gold is more uniformly distributed in them than in the more recent gravels, and that they yield higher returns in gold per yard or per ton.

In some places they are capped by lava, sandstone and other recent formations to a depth of 400 feet and over, and have to be mined like a coal vein. Their values run from $2 to $20 per ton, the aggregate in California being estimated by official reports as $400,000,000.

The blue gravels are so hard and compact that they are commonly called "cement." They are too hard to be reduced by the highest available heads in hydraulicking. Stamp mills have worked at a profit on them in many places in the State, but this is a wasteful method, as the barren boulders have to be crushed as well as the bonding material, which alone carries the gold. The Adele Mining Co. have been carrying on a series of experiments in Trinity county since last July that have proven successful, and their methods are of interest throughout the State. The mill proper consists of six grizzlies, arranged so as to form a barrel 6 feet long by 6 feet diameter. The corners of the grizzlies do not join, but overlap, with a 3-inch space between. Outside of and surrounding the grizzlies is a set of screens, $\frac{1}{16}$ mesh. The cement is fed into the barrel through an opening some 22 inches in diameter, and the boulders and coarse gravel are discharged at the opposite end through an opening slightly larger than that of the feed end. The barrel is slowly revolved, making from twenty-five to thirty revolutions per minute. In this way the cement is tumbled over and thrown down on itself, rubbing, crushing and grinding the bonding material, but not crushing or wearing the boulders or coarse gravel. Water pipes from a tank set 6 feet higher than the mill throw jets and sprays with considerable force upon all portions of the material being treated, assisting in softening the cemented matter and washing the boulders and smaller gravel absolutely clean.

The pulverized bonding matter passes through the grizzlies onto the screens, and then goes with the water to the amalgamators. If any particles are too coarse to go through the screen they soon slide back into the barrel at the corners where the grizzlies overlap. The speed and the feed being quickly adjusted, it is found that the mill remains about half full, the blue gravel being fed into the mill in a constant stream at one end, and from the other comes a steady stream of absolutely clean boulders and gravel. The gravel as it comes from the mine runs from 50% to 60% boulders and coarse gravel that carry no gold, and all of this is discharged from the machine uncrushed and thoroughly washed, no cement adhering to the rocks.

The capacity of the mill has exceeded the expectations of the company. With the very hardest material it works from nine to eleven tons per hour; upon the medium material it has a capacity of from fifteen to twenty tons per hour, while upon what is called soft material, or that usually found hard to pipe in ordinary placers, its capacity depends wholly upon one's ability to get the material to the mill and away from it.

The Amalgamators.—The amalgamators consist of two tables 4 feet long by 3 feet wide, composed of trays and fine riffles. These tables are adjustable for grade and speed. They are given a gentle side shake of 300 vibrations a minute. The riffles are filled three-quarters full of mercury. No mercury is floured or shaken over. In fact, these machines would make good amalgamators in a stamp mill. In Trinity county it was found that a considerable percentage of the gold saved would pass through an 80-mesh screen, and nearly half of this would pass a 100-mesh screen, showing that the fine gold is saved.

The capacity of each of these amalgamators has been found to be from three to six tons per hour, according to the percentage of black sands and sulphurets in the gravel. As from 50% to 60% of the material going to the mill does not reach the amalgamators, two of them are enough for one cement mill. The agitation of the pulp keeps the sand in suspension, while all of the gold is brought into contact with the mercury.

The riffles are $\frac{5}{8}$ of an inch wide by $\frac{3}{4}$ of an inch deep. The trays are quickly removed for cleaning up, extra ones being put in their places, and the stoppage of the plant being only a few minutes.

Black Sands.—The Trinity cements carry a large percentage of valuable black sands. Owing to the large quantities of pulp handled per hour, it was found that it would take too large a plant at the present stage of the work to use the concentrators now in the market. The process adopted during the experiments was as follows: A revolving screen was placed below the amalgamators to remove the coarser sands, as all of the black sands are in small grains, then the pulp goes on to a moving carpet table, where clean water is added. The result is a partially cleaned concentrate that is piled up to await final treatment later on with some of the standard tables. At all events, the black sands are kept from going into the river. Test shipments of quantities of the sands to the smelter show that the sands will form a considerable item in the profit column.

Sulphurets.—Considerable sulphurets have been found in the cements near bedrock, but there has not been time yet to fully determine their true value. It is possible that they are of secondary formation, having recrystallized in the deposit instead of being the original sulphurets brought there by erosion from veins. If this proves to be the case, the concentrator adopted for the final cleaning must be one that makes two grades of headings, saving the black sands and their gold and eliminating the sulphurets. This is a point worthy of noting in other mines.

The Mine.—The mine on which this plant is located presents some features of general interest. The cements here form the false bedrock of an hydraulic placer that has been worked for years, so that mining the cement is really a question of open quarry work. On going down on the hard blue cements it was discovered that the bedrock was pitching at a rate of 20°, and that below the hard was a 7-foot stratum of soft blue gravels that could be handled rapidly with pick and shovel alone. This made it easy to run in drifts and fired, small bank blasts breaking down and shattering the hard cements in large quantities, the problem, then, being simply one of tracks, cars and hoist.

In General.—A few general points are worth noting. This class of mills should not be expensive, considering their capacity. As the ore falls on ore, and the process is a rolling one, the wear and tear of the steel bars and steel end liners to the mill is insignificant when compared to any other style of machine. A 30 H. P. engine and a 45 H. P. boiler is ample power for the hoist, pump and plant. The quantity of water necessary depends upon the quantity of material put through. The green and black sands are heavy and the hard cements require 200 gallons per minute, the mill handling ten tons per hour, and larger quantities will be in proportion. All launders, etc., must be made unusually steep. Instead of a car, future machines will probably use some form of link belt conveyor for taking the boulders away from the machine. The machine described was made for the Adele Co. by the Krogh Manufacturing Co. of San Francisco. Since the photos were taken the machinery has been enclosed and some minor additions made. The total expense of mining and milling, at ten tons per hour, is less than 30 cents per ton.

---

* See engravings on front page.

Pumping Oil in Colorado.

At Florence, Colo., the Oil Well Supply Co. of that place has put in a pumping station such as is in general use in Eastern oil fields, but new in Colorado or California. It consists of a perpendicular shaft upon which are two eccentrics with numerous holes in them for attaching the wire line that runs from the power to an iron jack at each well. It is mounted on an iron frame bolted to a stone and cement foundation, made on a slope corresponding with the lay of the surface, and operated half a mile from some of the wells. It receives its power from a gas engine 30 feet away, which takes its gas supply from one of the producing wells. All that is required to start all the wells that are attached to the plant is to start the gas engine and throw on the friction clutch, which starts the shaft on the power to revolving, and the eccentric motion given to the wire pulls up the sucker rods at the wells, just the same as if there was an old-style engine and boiler there. It will pump as many wells as there are holes for wires to be inserted. If there are 100 wires and holes, it will pump as many wells; one man is required to operate the plant; under the old style of pumping it usually required one man to each well.

The average production of each well drilled in the Florence district is 100 barrels per day.

Forester Pinchot of the Department of Agriculture says the age of the big trees on the western slope of the Sierra Nevada mountains makes them the oldest living things. Before the glacial period the genus of big trees called Sequoia flourished widely in the temperate zones of three continents, and Europe, Asia and America each had its share. But when the ice fields moved down from the North the luxuriant vegetation of the age declined, and one after another the different kinds gave way until only the big trees and the redwood survived. These trees have come down to us through the vicissitudes of many centuries, solely because of their superb qualifications. Their bark is often 2 feet thick and almost non-combustible. The oldest specimens felled are still sound at heart and fungus is an enemy unknown to it. Yet the big trees have not increased their range since the glacial period, and have just managed to hold their own on the little strip of country where the climate is locally favorable.

Interior Department Ruling.

The Secretary of the Interior has denied the motion for review filed by C. F. Blake and others for patent to the Calumet lode mining claim and mill site, Survey No. 710 A and B, Boise. On May 19, 1900, the land department held that these applicants had, by reason of their delay of nearly seven years after the expiration of the period of publication of notice of their application, and no further effort being made for final entry, forfeited all rights acquired under the previous proceedings upon application to get patent. It was held, however, that they should commence patent proceedings anew if they so desired.

In this motion for review it was contended that the decision of May 19, holding that the applicants had lost all rights by not having completed their application within a reasonable length of time, was erroneous, as such a ruling was contrary to the uniform decisions of the courts, to the effect that a properly located mining claim constitutes a property right and estate of the locators, or their guarantee, and gives them the exclusive right of possession.

"The department, however," says the Secretary, "did not claim in its decision that the applicants 'have not exclusive right of possession and enjoyment of their claim, and by virtue of the location thereof.' On the contrary, it was stated in that decision: 'As to the question whether the appellees have or have not performed the conditions necessary to the maintenance of their possessory rights under the location, the land department has nothing to do with such matters, and can make no determination with respect thereto. Its duty is to administer those provisions of the mining statutes which relates to proceedings of obtaining patent from the Government, and it is with reference only to the application for patent, and the proceedings had thereon, that any determination is intended to be made in this case.'"

Thus, according to the decision of the Secretary, there is nothing in the contention that the possessory rights of the mineral claimants have been injuriously affected by the action taken by the department in the former decision, as it was with respect to their rights as applicants for patents that the department dealt in this decision of May 19, 1900. It was not held that the claimants had waived their possessory rights, but on account of their delay had waived all rights acquired by the earlier proceedings upon their application and could take nothing under those proceedings, but that they could renew proceedings for patent should they so desire. Under these circumstances, the Secretary decided that there was no reason for entertaining the motion for review, and it was accordingly denied.

Electrical Machinery in South Africa.

The British and South African Export Gazette says that during the last ten years on the gold-bearing reefs of the Witwatersrand a marvelous collection of machinery of all sorts has been installed over a section of country about 40 miles in length. There is yet room for a great deal more, as many of the small mines have never been properly developed and many of the large mines have neglected their extensions and deep levels. It will not be many months before the mines will be again occupied and the question of new electrical machinery gone into. Then it will be seen how much of the old machinery has been irreparably damaged by neglect and by water; and, inspired by confidence in the new state of things, orders will go out broadcast for this machinery and for plants which the mines have been waiting for years to put down. New schemes will be taken in hand, new districts developed, and every bit of machinery will be wanted at once.

Inventor of the "V" Flume.

By the death of J. W. Haines the inventor of the "V" flume passed away. Haines was in the wood business in Washoe in the early days and constructed a box flume to carry wood out of the mountains. The square flume didn't work. Haines looked over the big line of boxes and turned one sidewise. He found that the water was confined to less space and less room for friction. The order was given to turn the whole length of flume on its side, which was done, and the result was that the wood went booming down the hill. From that day the transportation of wood from the steep canyons has been done by means of Haines' "V" flume, and although no patent was ever taken out it proved the greatest invention the woodmen ever had.—Virginia, Nev., Enterprise.

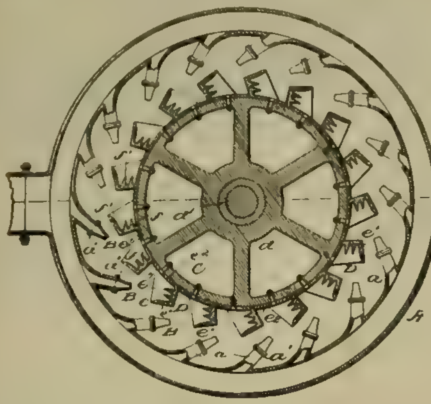
Several Colorado mine shafts are being equipped with cages having safety chairs attached, to prevent accidents to cages in passing down the shafts. By their use the old method of a set of chairs for each landing is eliminated, the chairs being carried attached to the cage, and are always under the control either of the cage man or the station man. The chairs, which are flanges, which may be thrown out at will, are designed to prevent accidents and loss of life through neglect to remove stationary chairs from the landing, upon which the cage would drop with force in the descent, often crushing the cage and injuring or killing the occupants.

Mining and Metallurgical Patents.

Patents Issued October 16, 1900.

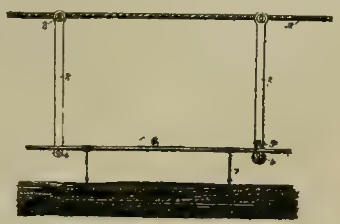
Specially Reported for the MINING AND SCIENTIFIC PRESS.

IMPACT WATER WHEEL.—No. 659,652; J. R. De Remer, Glenwood Springs, Colo., assignor one-third to H. D. Crippen, Denver, Colo.



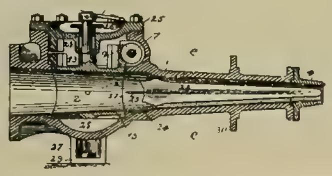
Combination with wheel, of series of buckets mounted on periphery thereof, having each open end, buckets composed of inner and outer walls and curved connecting wall, inner and outer walls divergently arranged in relation to each other from their union to curved portion of connecting wall, latter wall flattened at tops of inner and outer walls, ribs formed with curved portion of connecting wall, inner sides of ribs substantially parallel with outer wall, outer sides substantially parallel with inner wall of bucket.

CONVEYOR FOR ROPEWAYS.—No. 659,745; Andrew S. Hallidie, San Francisco, Cal.; Martha E. Hallidie executrix of said Andrew S. Hallidie, deceased.



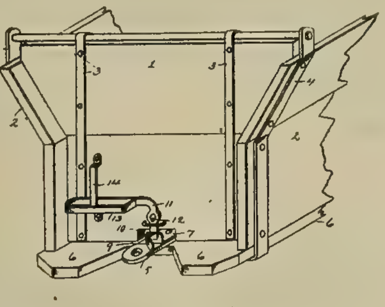
Endless traveling rope tramway carrier consisting of hangers, means for supporting and connecting hangers with traveling rope, hinged arms projecting approximately horizontal from one or both hangers, pole adapted to rest upon and be supported by arms, slings within which bundles are maintained, means for securing slings to pole, latch mechanism by which one or both arms are disengaged so as to drop bundle at delivery station.

HYDRAULIC NOZZLE.—No. 659,794; W. A. Doble, San Francisco, Cal.



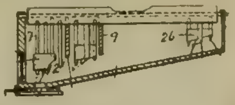
Hydraulic nozzle, main tube of tapering bore, recessed transverse circular chamber formed integral therewith adapted to receive revoluble valve, latter chambered or out of contact at sides and ends, provided with removable faces to fit upon and close bore of nozzle toward discharge end thereof; in main tube with tapering bore, member 22 mounted contentrically therein, provided with thin radial vanes extending toward but not reaching inner surface of nozzle, and extending longitudinally near to or beyond tip or point of issue.

MINE CAR LATCH.—No. 659,777; A. C. Walters, Uniontown, Pa.



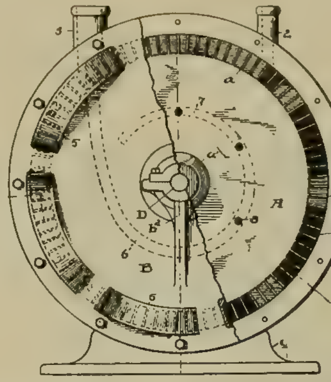
Latch for mine cars, consisting of keeper, formed from plate 7, attached to coupling bar 5 of car, keeper having portion bent at right angle and inclined part 9, latch bar 11, pivoted to end gate, adapted to engage with keeper, provided with handle portion 13, strap 14 for guiding and holding bar in position.

ORE WASHER AND SEPARATOR.—No. 659,813; E. W. Eaton, Socorro, New Mexico.



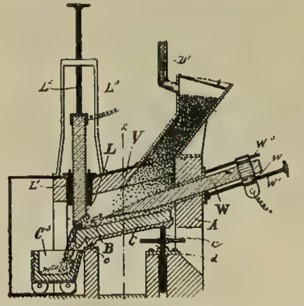
An ore washer and separator, a tank having overflow opening and lower discharge opening, water supply vessel mounted on tank provided on under side with pulp-stirring arms, mechanism to rock vessel and stir pulp, part of arms being hollow to convey water from vessel to near bottom of tank, having discharge ends bent toward concentrate discharge end of tank, and partitions extending from top of tank to level below overflow opening.

STEAM TURBINE.—No. 659,930; D. Kemble, Cleveland, Ohio. Filed Nov. 17, 1898. Serial No. 696,686.



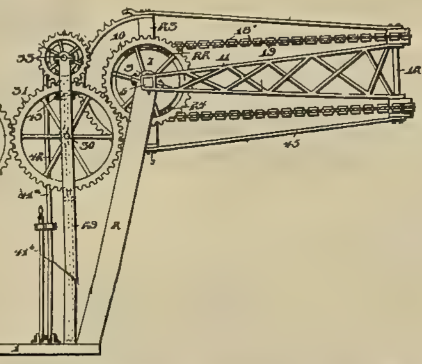
A steam turbine casing having two sides and series of ducts successively in each side curved in direction of length arranged successively to form sinuous circular channel, in combination with single disk-shaped wheel having series of radially disposed vanes on its periphery full width of wheel and full depth of channel, length of curvature of ducts constituting steam channel being such that at each point where steam traverses periphery of wheel it will strike series of vanes.

ELECTRICAL FURNACE.—No. 660,043; W. Borchers, Aachen, Germany.



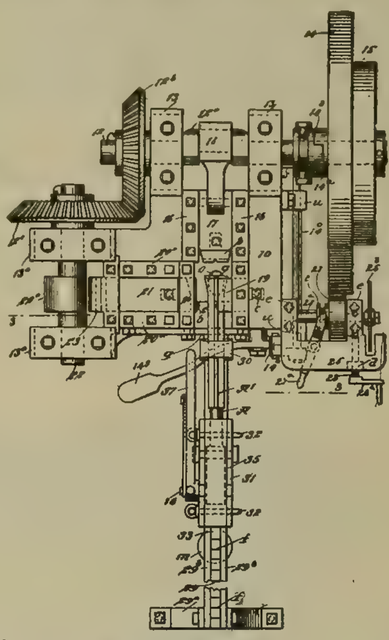
In an electric furnace, combination of furnace structure, pivoted hearth therein, means for tilting hearth to vary its angle of inclination, electrode disposed over lower end of hearth, tapered electrode disposed longitudinally over hearth adjustable toward and from other electrode, means for feeding material to be heated onto hearth and over and past tapered electrode, and electrical connections for establishing arc between electrodes.

MINING MACHINE.—No. 659,984; E. O'Toole, Leisenring, Pa.



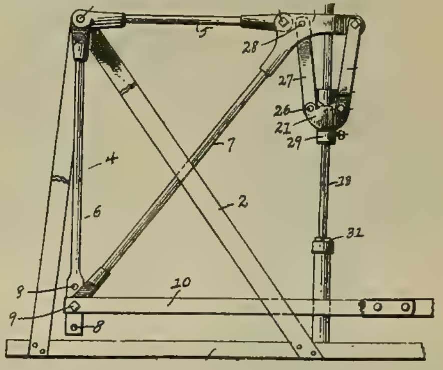
Coal mining machine, combination with base and inclined supporting standards, of rock shaft mounted in standards, vertically disposed shaft 23 connected centrally the ends of rock shaft, miter gears 22, 24 loosely mounted on shaft 23, miter gears 6, 7, loosely mounted on rock shaft for engagement with gears 22, 24, frame mounted on ends of rock shaft, guides carried by frame, endless cutter chains disposed one above the other, operating through guides engaging gears 22, 24, means connected to miter gear 7 for driving train of miter gears and operating chains, vertically disposed rotating worm, segmental rack connected to shaft 23 engaging worm, means for shifting rotation of worm to impart oscillatory movement to cutter chains simultaneously with endless travel.

DRILL FORGING AND SHARPENING MACHINE.—No. 660,009; W. J. Evans, Butte, Mont.



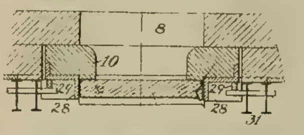
Drill forging and sharpening machine, combination with plurality of dies adapted to upset and sharpen cutting edges of a four-winged drill, drill supporting device comprising horizontal guideway, carriage movable on guideway, means to hold carriage at different points on guideway, cam head held to rock on pivot shaft between uprights on carriage, handle arms on pivot shaft of cam head adapted by manipulation to rock cam toward end of drill shank to feed it up against impact of edge-sharpening die.

OIL WELL JACK.—No. 660,059; R. W. Hudson, Toledo, Ohio.



Pumping jack three-part frame suitably supported upon standards, surface rod connected therewith, hinges formed at two angular points of frame, means for disconnecting frame at third point, bifurcated extension on frame having inwardly extending recess, cradle formed with inwardly extending recess, straps pivotally attached to forward sides of cradle and to forward sides of bifurcated extension, strap pivotally attached to rear of cradle and also to rear of bifurcated extension, reciprocating polish rod adapted to occupy recesses in cradle and bifurcated extension, collar on polish rod having lower bearing points adapted to fit into recesses in top of cradle whereby working parts of jack are capable of being removed from proximity to polish rod.

METALLURGICAL FURNACE.—No. 659,941; W. Swindell, Allegheny, Pa.



In metallurgical furnace, combination of combustion chamber having charging opening in wall, stay bars fixed to walls, door frame having body of refractory material fitting in recess of wall of combustion chamber around charging opening, metallic facing strips connected to body, keys bearing on facing strips and on stay bars of wall, securing door frame removably to combustion chamber, door fitted to traverse between facing strips and control charging opening.

Machine Mine Rock Drills on the Pacific Coast.

NUMBER III.

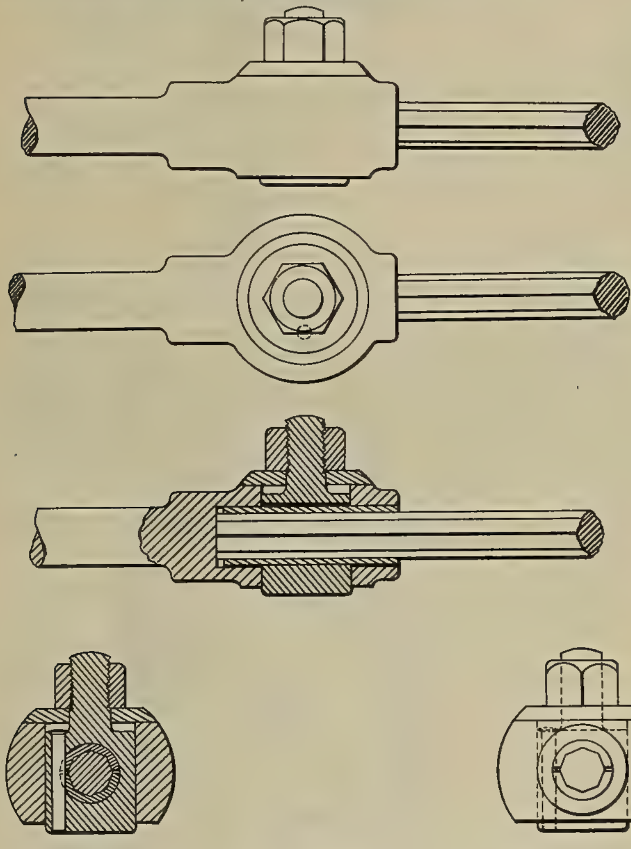
Written for the MINING AND SCIENTIFIC PRESS by A. E. CHODZKO.

"GIANT" ROCK DRILLS.—Compressed Air Machinery Co., San Francisco: Valve motion, tappet; feed, hand; rotary motion, stationary pawls, movable ratchet head.

Valve motion: The plain slide valve used in this machine is now being superseded by a different arrangement, consisting of a balanced piston valve, both ends of which are fitted into cylindrical chambers, open to atmosphere when the drill is working at full stroke. This type of valve is claimed to reduce the wear of the tappet.

When it is desired to beat at reduced stroke a turn of a cock replaces atmospheric by working pressure into the rear valve chamber, thus throwing the valve forward as soon as the tappet is relieved of its contact with the main piston. This arrangement aims at the same object as the Gleeson device, described in connection with another local machine of the same type.

Rotary motion: The ratchet head, keyed on the rifle bar, has teeth symmetrically shaped, and which, when worn on one side, can be used on the other by changing the setting of ratchet head on bar, end for end. Pawls pivoted into hardened steel bushings take up the thrust and prevent cracking of the back head, which was of frequent occurrence prior to their adoption.



"Giant" Rock Drill Chuck.

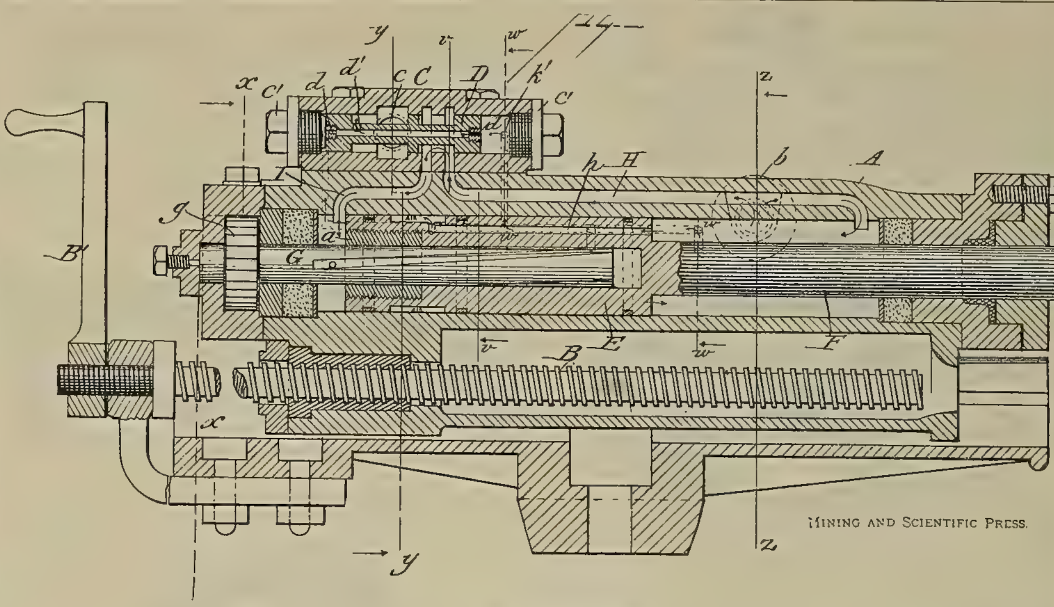
Shell strips: The cylinder is cast, as usual, with side slides moving longitudinally into corresponding grooves carried by the shell.

The upper part of each groove is here made of a bar held down by cap screws passing through oblong holes, and bearing against a ridge cast with the shell. As cylinder slides are working loose, bars are made adjustable by slackening the screws and shimming up between bar and ridge, then jamming the screws again.

Clamp: The shell is cast with an inverted conical recess, i. e., the larger diameter inward and the smaller diameter outward. The clamp connecting the shell to tripod or column carries a boss of the same shape as recess, one half of which is stationary, while the other can be moved nearer to or farther from it by acting on a single bolt. When both halves are brought together the boss can be engaged into the recess of the shell, and then, by tightening up the bolt, they are spread apart, which sets the clamp.

Chuck: Instead of the bolt generally used for jamming the half bushings in the chuck around the shank of the bit, a single bolt is here used for this purpose, the claim being to avoid the frequent breaking due to unequal tightening of the bolt's nuts.

A goose neck and special clamp are also used for connecting the air hose to the machine. They have been illustrated and described in a former issue of this paper.



The Cummings Drill.

THE CUMMINGS DRILL.—Valve motion, Eclipse type; feed, hand; rotary motion, stationary pawls, movable ratchet.

This machine was designed to work upon the double pipe system, the exhaust air leaving the drill at a pressure considerably above the atmospheric, and being returned to the compressor through a closed pipe. In this respect the Cummings drill is at marked variance with all the other machines in use at the present day. An application of it, mentioned in this paper some months ago, is reported by the inventor as made with 220 pounds live pressure and 100 pounds return or exhaust pressure, all effective, the average speed of the machine being 300 blows per minute.

In its general appearance, this machine does not differ from the more familiar types of rock drills. In fact, no particular feature is claimed for the feed and the rotary motions; neither is any special design recommended for the shell, clamp, column or tripod, machines of this system having occasionally been used with other makes of these several pieces.

The Cummings drill receives permanently the live pressure on the front end of its piston, whose working size is therefore that of its rod at the stuffing-box.

At the same time, the valve chest is removed near the rear end of the cylinder, the object being to shorten the rear port, and thus reduce the clearance, of which there is none at the front end.

The piston valve is operated by admitting live pressure at the proper time into the end casings of the valve chest, through separate ports, of which the other ends are alternately covered by the main piston, or put in communication with the live pressure. These end casings exhaust through a passage drilled clear through the valve, communicating with the main exhaust of the cylinder. The scope of this article would not admit of a comparison between the double-pipe system and the ordinary way of operating rock drills; besides, the former applies to any kind of pressure motors, of which rock drills are only one particular case, and a treatment of this subject would unavoidably extend beyond what the title of these remarks implies.

It is, moreover, noteworthy that the double-pipe machine is the only one where an effective attempt can be made to complete expansion without the use of a reheater.

THE FIRTH DRILL.—Valve motion, auxiliary valve; feed, hand; rotary motion, stationary pawls, movable ratchet head.

Valve motion: Operated direct from the piston, the auxiliary valve resting on a tapered part of it, with a hard steel ball interposed.

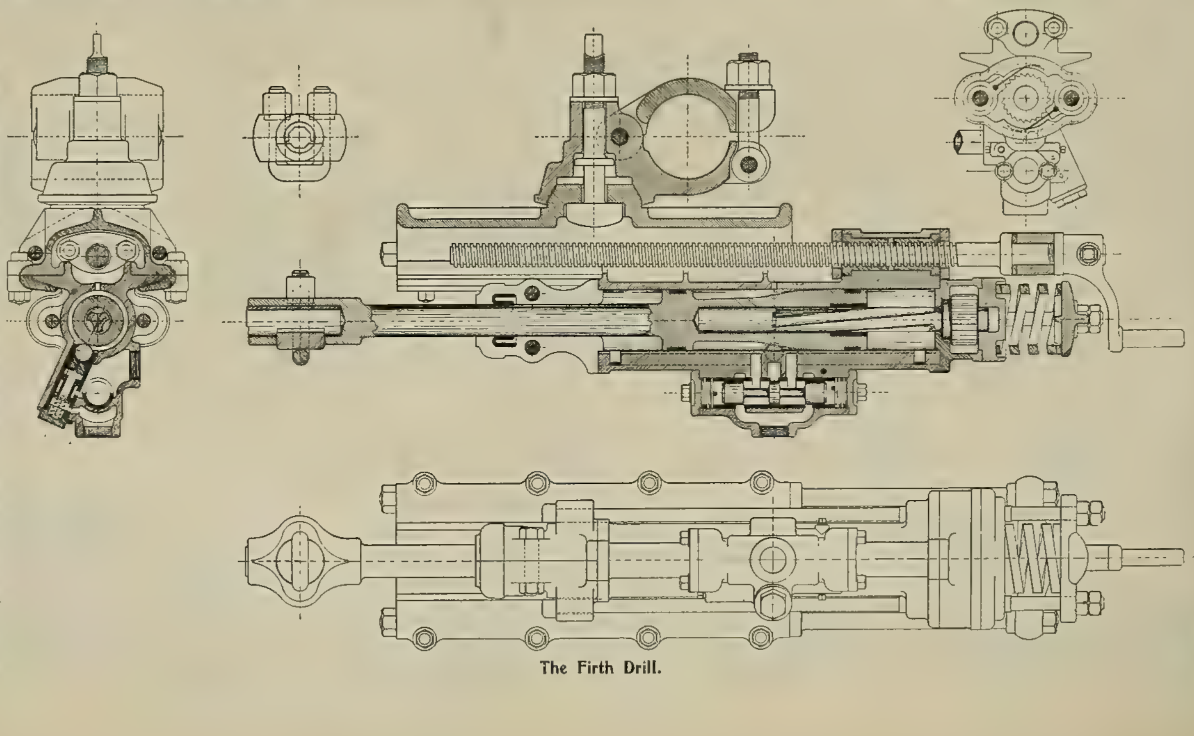
Valve seats provided with a liner, which can be changed, when worn, without removing the entire valve chest, the latter being cast with main cylinder.

Rotary motion: With hardened steel reversible pawls swinging on head bolts.

Adjustable feed nuts to take up wear of feed screw. The side guides of cylinder are engaged into corresponding solid V-shaped grooved bars, secured to cylinder by means of excentrically turned bolts, so that a slight angular motion of these will move the whole guide bar towards or from the cylinder guides.

Cast steel clamp of the Ingersoll type, with T-headed bolt which a partial turn can engage or disengage from shell.

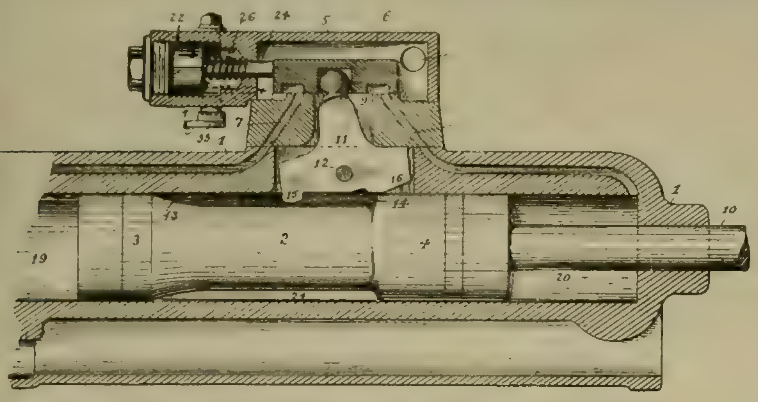
RIX DRILL.—(See Fig. "The Gleeson Device.") Valve motion, tappet; feed, hand; rotary motion;



The Firth Drill.

pawls pivoted into head solid with rifle bar, and turning with same; stationary ring with ratchet teeth in back head of cylinder.

Valve motion: A plain slide valve is used, operated by the tappet in the usual way; but the possibility of beating at reduced stroke is assured by a special addition, known as the Gleeson device. This consists of boring out a portion of the rear end of the valve chest, to form a small cylinder, in which is a plunger, marked 22, having attached a stem, 24, around which is wrapped a spiral spring, 26. The device is acting when the stem is brought in contact with the valve; it becomes inoperative when this contact ceases.



The Gleeson Device.

The small cylinder is capped by a brass plug, as shown, and on one side of its forward portion there is a plug cock, 33, with a handle about 1½ inches long. The stem of the plunger has a working fit into the rear end of the valve chest, as also the plunger into its cylinder; but the air pressure will pass around them to some extent.

When the device is inoperative and the drill works at its normal stroke, the pressure acts on both faces of the plunger, which, being balanced, is pushed back by the spring, 26. But if the cock, 33, is given a quarter of a turn the chamber in front of the plug is open to atmosphere, while its back end is under pressure, overcoming the action of the spring, 26, presses the plunger's stem against the valve, 6, thus throwing it forward as soon as the tappet abandons it.

What little air would leak into the front chamber of the plunger escapes continually, and the device remains operative until the cock is turned back, when the plunger is instantly thrown away from the valve, 6, and becomes inoperative.

The general features previously described are here retained, a distinctive detail being that the ratchet teeth are out on the inside of the rear end of the cylinder, thus dispensing with a separate ratchet head.

No adjustment is provided for the slide bars.

The bolt use for the chuck has a releasing wedge on top of it.

The recess for connecting shell to clamp is made in the latter, which is machined in every bearing.

This machine was designed as and is claimed to be a one-man drill.

Another feature consists in an adjustable connection between the air hose pipe and the drill, by means of a ½-inch pipe, passing clear through the valve chest, perforated with ⅛-inch holes to the extent of its area, and jammed into position by a bronze nut at its outer end. The hose coupling is permanently closed, and connecting to the drill is made to suit any inclination by loosening the brass nut and jamming it again after proper setting.

(TO BE CONTINUED.)

Poisons; Their Nature and Effect.

A poison is any substance which, when taken into the body and absorbed, or by its direct chemical action upon the parts with which in contact, or when applied externally and entering the circulation, is capable of producing deleterious effects. There is no doubt that all poisons are to a greater or lesser extent absorbed into the circulation. In fact, with most of them this is certainly a condition essential to the production of their effects; yet it would appear that in the action of some substances, which produce local chemical changes, death, in some instances at least, can be referred only to the effects of the changes thus produced. The mineral acids and caustic alkalies are the principal poisons which have a direct chemical action upon the parts with which they are brought in contact. This action is due to a mutual affinity existing between the agent and the tissue. In this respect the action of these substances differs from that of certain heated liquids, such as boiling water, which are inert at ordinary temperatures, but which, simply on account of their condition, induce a chemical change in the part to which they are applied, without themselves being chemically concerned in the change. When applied externally, some poisons are absorbed by simply being brought in contact with the unbroken skin; while others do not enter the circulation unless applied to an abraded or wounded surface.

Poisons differ greatly in regard to the quantity necessary to prove injurious. Thus, the fiftieth part of a grain of aconitine has seriously endangered the life of an adult, while, on the other hand, an ounce of magnesium sulphate may generally be administered with impunity; yet in large quantities the latter substance has in several instances caused death, and is strictly a poison, although not commonly reputed as such. As yet we know of no substance that is poisonous in every proportion. Any of the most powerful poisons may be administered in certain quantities without producing any appreciable effect, and most of them may be so employed as to constitute valuable remedial agents.

In medico-legal inquiries, the leading idea connected with the term poison is whether the given results are directly traceable to the substance and the intention with which it is employed.

Poisons do not differ from each other in regard to the quantity necessary to destroy life; but the effects of the same substance may be much modified by circumstances, and even substances which to most persons are harmless may, on account of certain peculiarities of constitution, produce deleterious effects.

An Electric Staircase.

At the Fifty-ninth street station of the Third avenue line of the Manhattan Railway Co. in New York City is now being given a test of an electric staircase or inclined elevator, made by the Reno Inclined Elevator Co., New York City. Similar apparatus have been put in department stores in New York, Philadelphia and other cities, and the device has attracted attention at the Paris Exposition.

Fig. 1 illustrates the elevator in position at the station; Fig. 2 is a section showing how the moving platform ends at its upper and lower extremities. The hand rail moves along with the inclined floor of the apparatus, and at the same speed, so that the passenger simply steps on the moving incline, resting his hand on the hand rail, and is carried at a moderate rate of speed to the upper or lower floor, thus doing away with the ordinary labor of "climbing stairs."

The surface of the incline consists of a series of shallow longitudinal rubber-covered ridges, which at the top pass between the prongs of a comb-shaped landing, as shown in Fig. 2. In this way the passenger is slid out upon the landing without danger of accident, such as a woman's clothing being caught.

It is calculated that the average New Yorker climbs about 20,000 feet a year up the elevated stairways. These elevators have a capacity of 3000 passengers each per hour. Small electric motors will furnish the power requisite for their operation.

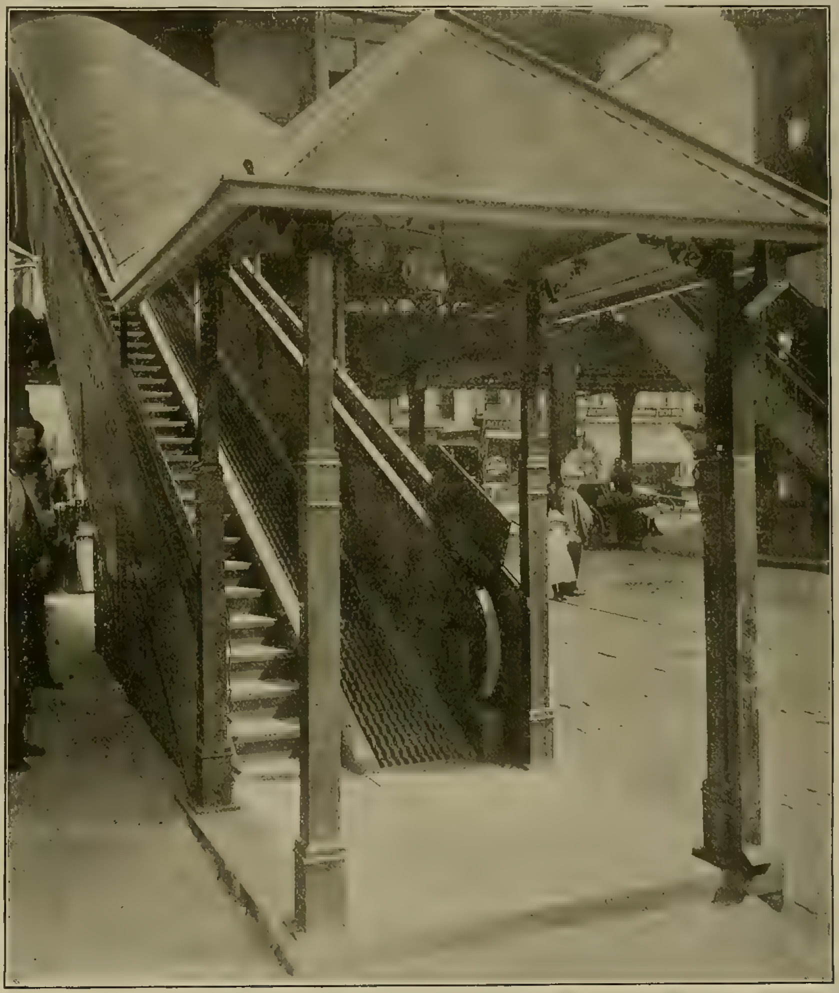


Fig. 1.—Elevator in Position at Station.

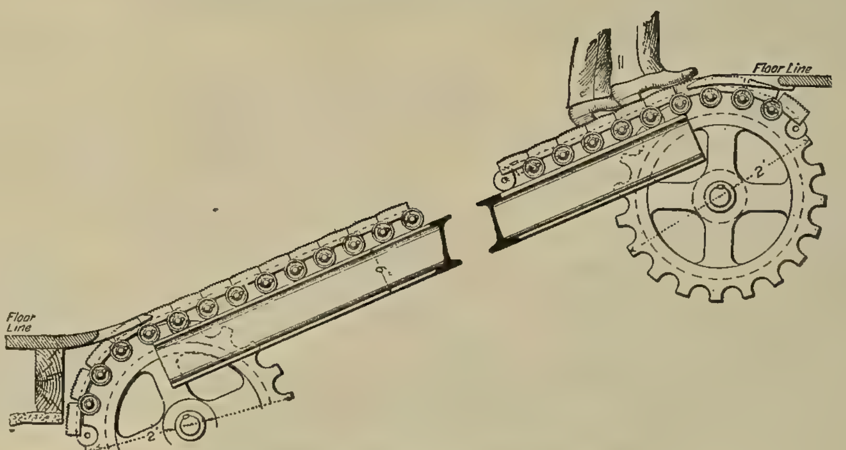


Fig. 2.—Section Showing How Moving Platform Ends.

MINING SUMMARY.

ALASKA.

The Ebner mill, in Gold Creek valley, near Juneau, is dropping fifteen stamps.

A 12-drill air plant will be installed at the Jualin, Berner's bay.

Replacement of the foundations of the 240-stamp mill at the Alaska-Treadwell will be completed in November.

The U. S. telegraph system will be completed from Nome to Tanana by Jan. 1. The line from Dawson northward to Eagle, on the American side, will be completed Dec. 1.

The Cape Nome G. M. & T. Co. is working the tundra adjoining the beach 7 miles from Nome City. The small companies are waiting to see the results of the experiment. The company owns twenty-one claims and employs thirty men. The shaft near the beach is down 60 feet to bedrock and a tunnel runs under the sea. The ground soil on bedrock is wash gravel and mica schist. Everything taken out is being run through sluice boxes. What they are trying to locate is an old river bed which they believe is under the tundra.

ARIZONA.

COCHISE COUNTY.

The Eastern & Montana Development Co. will resume work on the Silver Bill group, near Turquoise.

The Copper Crown Co., Supt. Blackburn, is pushing work on its mines in the Dragoons, near Tombstone.

GILA COUNTY.

The Minneapolis M. Co. will resume operations near Globe.

Six miles west of Globe, in the Pinal mountains, the new deposit of turquoise is being worked.

The Troy Copper M. Co., Troy (formerly Skinnerville), C. H. Cutting manager, will crosscut at 300-foot level. Thirty men are employed.

GRAHAM COUNTY.

The Arizona Copper Co. will put in a 200-ton concentrating plant at the Longfellow mine and will remodel the old reduction works, Clifton.

MARICOPA COUNTY.

The tailings from the Trilby mill, Wickenburg, will be run through a 20-ton cyanide plant.

MOJAVE COUNTY.

The new 300-ton concentrator for the Wallapai M. Co. will be erected on the old site at the Tennessee, Kingman.

Men are at work on the Minnesota, Chloride, timbering, etc. Operations will be resumed in near future.

It is reported that the Elkhart, Chloride, will start up before first of the year.

The water shaft at the Maguire mines, Chloride, is down 50 feet, furnishing 25,000 gallons water daily.

Turquoise mines near Mineral Park ship twenty-five pounds gem stones weekly to New York.

PIMA COUNTY.

The report that the Helvetia Copper Co. is about to erect a second 150-ton smelter is unconfirmed. During July, August and September the smelter was run about half the time and turned out an average of 100 tons of fine copper per month. The ore ran from 5% to 7½% copper, and with the gold and silver averaged $19 per ton. To date the Helvetia Co. has sold about $150,000 worth of copper.

PINAL COUNTY.

The Chief & Century group of mines, south of Casa Grande, is bonded to a New York company. The properties are being developed under the superintendence of C. B. Attex of Tucson.

The double compartment working shaft at the Troy mines is 200 feet deep, and Supt. Cutting says he will drive it another 100 feet.

SANTA CRUZ COUNTY.

The pumping plant at the Young America, Nogales, is nearly completed.

YAVAPAI COUNTY.

The Octave M. Co., employing 400 men, has forty stamps running.

The Verde Copper Co. is organized at Jerome, capital $3,000,000, to work property near there.

The United Verde Copper Co. this year paid $20,000 taxes.

The Hooper process, now in use at the Buster, Pine Grove district, Prescott, is reported a success.

At the Homerun, Groom Creek district, Prescott, a double compartment shaft is down 100 feet in ore. J. O'Connell is owner and D. Monihon manager.

H. Blauvelt is sinking on the Monte Christo, in Groom Creek district, Prescott. He has put up quarters for miners and will push development work.

At the 100-foot level in the Treasure Vault ore shows steady increase in copper sulphurets.

Macklin Bros. will resume work at the Silver King, Groom Creek district, Prescott.

Linderman & Co. are working gold bearing gravel near Lower Lynx creek crossing, Prescott.

The new 40-ton smelter at the Verde Queen, Jerome, is in operation. At present it will only run about fifteen days each month. Forty-five men are employed at the mine and smelter. General Manager Bosworth, J. A. King, Supt.

YUMA COUNTY.

The Advance Gold Dredging Co., Yuma, will start dredging at the Potholes when river permits.

CALIFORIA.

AMADOR COUNTY.

The Bunker Hill shaft, near Amador City, has been unwatered and retimbered to 40 feet below the 600-foot level.

The Kennedy M. Co., Supt. V. S. Garbarini, has bought the old machinery of the South Eureka, Sutter Creek, for the Kennedy.

The Sargent, on the Mokelumne, near Sutter Creek, has an increased force working on the 700-foot tunnel.

The Balliol mines, W. H. Storms Supt., employs sixty-five men. A new addition to the sulphate house is being built.

At a depth of 25 feet, Dooley Bros. took out $9000 the past month on a prospect near the Newton copper mines, Sutter Creek.

The Defender mine, near Camp Contreras, has a new steam pump and will continue sinking.

BUTTE COUNTY.

G. L. Smith, Supt. Nimshew Gold M. Co., Nimshew, is working day and night shifts on the new tunnel.

J. F. Newsom has bought 116.88 acres on Feather river for dredging purposes for $11,688.

CALAVERAS COUNTY.

New foundations will be put under the compressor at the Lightner, Angels.

The dam of the Melones Co., at Robinson's Ferry, on Stanislaus river, is nearing completion.

The Mutual M. & M. Co., Col. U. J. Hussy, Mgr., is putting in machinery at the old Lucky Boy, on Dry creek, near San Andreas. Operations will probably resume in a few months.

EL DORADO COUNTY.

The Church, three miles east of El Dorado, is leased by C. J. Garland, of Oakland. New machinery will be erected, and operations resumed.

The Gazette hears that the 5-stamp mill on the Wagner mine is to be moved to the St. Clair mine at Kelsey.——Work is to resume soon on the old California Jack mine, near Georgetown. A new shaft will be sunk.——The tunnel on the Electric and Bright Hope mines is in over 700 feet.

FRESNO COUNTY.

The Confidence Oil Co. will build another rig for well No. 2.

INYO COUNTY.

Smith & Bell, of San Francisco, will build a boracic acid plant on west side of Owens lake.

Barnes & Anderson will build a 5-stamp mill at Willow Spring, near Citrus.

MARIPOSA COUNTY.

Work on the Buckeye Group, on Buckeye creek, near Bridgeport, will resume.

The Spencer mine and mill, Whitlock, John Bros. lessees, have closed down. Ten men are employed.

Sinking at the Mariposa, Mariposa, is resumed. The outlook for the mine is promising. The company is putting in a large hoist and will run two skips shortly.

The Hite's Cove M. Co., E. L. Foster Pres., will soon begin the erection of their cyanide plant at the Cove, near Mariposa. A new compressor will also be put in.

MONO COUNTY.

In the Standard Con. mine at Bodie, for the week ending October 13, 369 tons of ore were crushed. Amalgam produced, 1153 troy ounces. Tailings plant No. 1 treated 153 tons tailings during the week. Plant No. 2 treated 247 tons tailings.

NEVADA COUNTY.

The new electric plant is in full operation at the Reward mine. The mine has been pumped dry of water, sinking has been resumed in the shaft and two more pumps will be added to the mill.

PLACER COUNTY.

Work is resumed on the Azalea, near Blue canyon.

The tunnel at the Herman, near Westville, is in 300 feet on 1400-foot level. Two 3-stamp mills will be erected. Thirty-five men are employed.

PLUMAS COUNTY.

Independent: In the Lost Channel mine, near Cromberg, main tunnel is in 430 feet in hard rock. At a distance of 390 feet an upraise of 15 feet was made and blue gravel struck, showing gold in paying quantities.——W. Menifee of Alameda will start an incline on the Seminole, 2 miles south of the Lost Channel; he will employ men and put on machinery for hoisting.——Penman & Fitzgerald, at the Tefft hydraulic mine, are preparing for the water season.

SAN BENITO COUNTY.

The Hollister Crude Oil Co., Hollister, expect to start operations Nov. 15.

SAN BERNARDINO COUNTY.

Black Nugget mines, 20 miles north from Daggett, continue to produce gold in paying quantities. Latest report says three men took out ninety-one ounces in three weeks with a dry washer. This is ten ounces, or about $175 per week, to the man.

The Helene Copper Co. is incorporated in Arizona, to work copper properties in Camp Vera, 18 miles north of Barstow.

Sixty stamps will be added to the forty now in operation in the Gold Mountain mill, making a total of 100.

SHASTA COUNTY.

About 300 employes of the Mountain Copper Co., at Keswick, have struck for an eight-hour day at the same wages they have been getting for a ten-hour day on the day shift and nine hours on the night shift. Of those who decline to work, the miners have been getting $2.75 per day; machine men, $2.85; muckers, $2.50; timbermen, $3. The company declines to accede to the demand, and states it has enough ore on hand to run the smelter for a year.

Searchlight: The Old Colony Co. of New York and Chicago have bought the Paige group of gold quartz mines on Clear creek, 9 miles west of Redding; price, $100,000. The same company has bonded the Happy Jack group of patented claims for $30,000.

SIERRA COUNTY.

Six men are employed at the Ruby Quartz, Downieville, W. Wolf manager, and development is progressing.

SISKIYOU COUNTY.

A cyanide plant goes in at the McKean, 3 miles from Callahan.

The Montezuma and other river claims on South Fork of Scott river will be worked with dredger by New York men next spring.

At the Blue Jay mine, near Cole, the new 10-stamp quartz mill is in operation. Supt. S. J. Fore has twenty-five men making an upraise from the lower chute to the main tunnel and putting in a chute from the mine to the mill. The bullion will be retorted and smelted on the premises. The ore averages $12 per ton.

SONOMA COUNTY.

The Oakland yields monthly thirty flasks quicksilver and the Cloverdale forty flasks.

The Missouri is being opened by the Oakland Co.

TRINITY COUNTY.

Work on the Forest Queen, near Nash Store, is resumed.

TUOLUMNE COUNTY.

The Green Con. G. M. Co., Sugar Pine, has erected a new hoist at shaft No. 2, Green claim; their tunnel on Mt. Vernon is in 160 feet.

The management of the Riverside, near Columbia, expect to erect a mill and cyanide plant soon.

A 10-stamp mill will be erected on the Duleek, near Jamestown; W. Graham is Supt.

The Gagnere M. Co., R. L. Long Supt., will resume sinking near Tuttletown.

The new aerial tramway from Tuttletown to Angels will be running in ninety days.

COLORADO.

BOULDER COUNTY.

The Success Co., Ward, Wm. Coleman, Mgr., has new milling machinery at the pyritic smelter. Work will resume this month.

The Great Eastern G. M. Co., of Boston, Mass., J. E. Harrison, Jr., Mgr., will reopen and work the Melvina, near Selma.

The Colo. Springs Co., Chas. Johnson, Mgr., will put in a new plant at Tambourine mine, Four Mile creek, near Salina.

CHAFFEE COUNTY.

A compressor and air drills are being put in at the Queen City by the Nabob M. Co., Salida.

The Turret City G. M. Co., W. J. Root Prest., will resume on the Vivandiere, Turret.

Work on the Jasper, Turret, is progressing and good ore is being mined.

CLEAR CREEK COUNTY.

The Big Alice, near Yankee, will resume.

The Cumberland, near Yankee, has resumed.

The Oro Verde Co., Yankee, has installed new electric drills, and a gasoline engine. A large ore bin will be erected.

Changes are being made in the Wilkie mill, Idaho Springs, by the Crown Point-Virginia Co. It has installed a blower with 15-inch outlet.

Omaha men propose to tunnel the Continental divide 12 miles south of Georgetown and operate an electric road through it. It would start at the base, about 14 miles from Grant, and terminate at the headwaters of the Snake river, and would be 7000 feet long and 1700 feet deep.

A shipment of 23,000 pounds ore from the Bismarck, Blackhawk, ran 330 ounces silver, with lead and small percentage of gold.

The new electric power plant of the Georgetown L. & P. Co. of Georgetown is running, and is furnishing power over its 10,000-volt transmission line to the Lamartine, near there. A force will be put on to run it day and night, when it will furnish power to the Griffith and the Mendota also.

Stewart Bros. have bought the Puritan, Idaho Springs, for $20,000. They will put in electric power and push work.

The Puritan mine, near Idaho Springs, is reported sold to Stewart Bros. for $20,000. The Gazette says a tunnel is being run to cut the vein and that electric power to drive the drills will be put in.

Some good ore is coming out of the Mogul and arrangements are being made to put in machinery to sink the shaft to greater depth.

The Oro Verde M. Co. will put in heavier machinery at the Florence, Yankee, and continue driving the tunnel, now in 600 feet.

The Colorado-California S. M. & M. Co., W. H. Knowles manager, will use German system of concentration at the Allen mill, near Idaho Springs.

EL PASO COUNTY.

P. Busch, Supt. Moose mine, Victor, has leased the Ben Harrison, on Bull hill opposite the Moose, and will begin tunneling.

FREMONT COUNTY.

The Dorcas cyanide plant, Florence, capacity 100 tons ore per day, will soon run.

GILPIN COUNTY.

At the Alps mine, near Blackhawk, sinking is being done in the submarine shaft below the 800-foot level.

Harry & Co. have leased the French mine, Quartz hill, and are taking out ore at a depth of 200 feet.

McLeod & Co., at the Kemp–Calhoun mine, near Blackhawk, are drifting east and west at a depth of 230 feet. They are taking out concentrating and smelting ores.

The Gold M. Invest. Co. is widening the bucketway of the West Calhoun mine, Leavenworth gulch.

R. Hughes, lessee of the Lillian Russell gulch, will erect a plant there.

The Gettysburg M., Devel. & M. Co., H. M. Steele manager, reports a strike at the Gettysburg, formerly the Illinois mine, in Lump gulch. They will sink 200 feet and drift.

The Pocahontas shaft, on Quartz hill, Central City, is down 320 feet.

The Rocky Mountain concentration works and 25-stamp mill, Central City, is treating ore from the Minnesota, Russell district, owned by Central Improvement Co., Geo. Collins manager.

The rapid-drop 30-stamp mill of the Tonawanda M., M. & L. Co. is treating ninety tons ore per day from the Perigo, Independent district, Central City. Fifteen men are employed.

The 80 H. P. high pressure boiler for the Sun & Moon, Gilson gulch, Central City, will soon be running.

During September 5634 tons, or 304 cars, smelting ore and concentrates (to Denver) and crude ore (to Idaho Springs) were shipped from Blackhawk.

GUNNISON COUNTY.

The Black Queen, Crystal, is leased to Aspen men. Machinery will be put in and development started.

HUERFANO COUNTY.

The Occidental Development Co., Manager E. W. Redding of Boston, will erect a smelter at Ojo next spring to cost $50,000. The same company, A. A. Foote, Supt., has ten men opening a vein of coal near Ojo.

The Ojo M. & M. Co.'s property at Ojo is sold to Topeka, Kansas, men for $35,000. Name will be retained by new owners and work pushed.

L. Capro of San Fernando M. & M. Co. has men sinking near Ojo.

LAKE COUNTY.

The Rose–Emmet shaft, Arnold Leasing Co., Leadville, present depth 520 feet, will be sunk an additional 100 feet.

The Gordan–Bengal Tiger, Leadville, will be operated this winter.

At the Greenback, Graham Park, Leadville, the new pumping plant will soon be in operation.

The Fortune, on Little Ellen hill, Leadville, Supt. Grimm, employs thirty men and produces about thirty-five tons of ore per day. It is operated by the Fortune G. M. Co., L. C. Ferrel manager.

Work at the R. A. M. shaft of the Small Hopes, Leadville, is resumed. Output from 1100-foot level is 125 tons sulphide per day.

After years of litigation, operations on the Tiger, Leadville, Manager J. McNeece, will resume.

At Resurrection shaft No. 2, Leadville, surface and underground work is progressing.

A streak of lead sulphides, carrying a high percentage of silver, was found in the drift at the Evening Star shaft, Carbonate hill, Leadville.

OURAY COUNTY.

The new smelter at Ouray, F. Ward, Supt., will start up in December.

J. A. Mills, Pres. Blaine M. & E. Co., Toronto, Canada, is at Ridgway, superintending work on the tunnel, which will cut the company's claims. It will be 3000 feet long.

It is locally expected that the Camp Bird deal will go through next month. J. H. Hammond is looked for in Denver Nov. 1, with F. W. Baker.

PITKIN COUNTY.

A. H. Martin of Aspen has a 6-inch streak of galena ore in Lincoln gulch, averaging eighteen ounces silver, 55% lead, besides copper and gold values.

PUEBLO COUNTY.

The Mountain Telegraph Co. is controlled by the officials of the Colorado Fuel & Iron Co. It is capitalized at $1,000,000, and it is the intention of the company to construct a telegraph and telephone service of its own. The lines will connect all the works of the company located in Colorado, New Mexico and Wyoming. In this way the mines as well as the plants will be brought into close connection with the central management.

SAN MIGUEL COUNTY.

The San Juan Gold M. Co., Telluride, will install concentrators. Their new electric drill on the Bessie group is running.

The Smuggler-Union M. Co., Telluride, has acquired Bridal Veil falls, at head of San Miguel river, for power purposes. A fall of 1200 feet will be obtained. Owing to freezing of tailings, the Suffolk cyanide plant at Ophir, after a successful season, has shut down. The capacity will be doubled next spring.

Ore 8 feet wide and carrying copper, iron, gold and silver is reported at a depth of 400 feet at the Daniel Webster mine, near Telluride. Wm. Sullivan, owner.

Adna Lamson has bonded the Jack Hazlett group, near Gladstone.

The Kankakee Gold M. & M. Co. proposes extensive work on its Bear Creek property.

SUMMIT COUNTY.

It is reported that the Ten Mile Leas. & M. Co., of Leadville, will soon begin operations near Robinson.

During a four months' run at the Mecca Co.'s placer, near Breckenridge, 100 pounds gold were cleaned up.

TELLER COUNTY.

A 4-inch streak in the El Paso vein in the Columbia, Cripple Creek Columbia Co., on Beacon hill, Cripple Creek, carries ore running thirty-six ounces per ton. The ore body is a foot and a half in width, and bottom ledge of shoot opened in the crosscut to the southeast, leaving 100 feet of stoping ground, with chances for ore body widening out as raise is run. Main ore body will be followed up and developed.

At the Mabel M., Cripple Creek, Woods Invest. Co., operators, good ore has been found on 355-foot level.

A hoisting plant will be erected on the Arno, Anaconda.

Lessees of Gold Hill portion of the Morning Glory, Cripple Creek, will deepen shaft to 500 feet. Crosscuts will then be run to two fluorine veins. Timbering is done as sinking progresses.

A shipment of twelve cars ore from the Elkton, Cripple Creek, averaged $6000 per car.

T. J. Moynahan has leased the old Finnerty workings of the Mariposa, Cripple Creek, and will begin work thereon.

A new plant is being erected at the Elkton, near Cripple Creek. The old plant will be put on the Hoosier, near there. Air drills will also be put in and the force increased.

Lessee Smith may erect a steam plant on blocks 8 and 9, Olive Branch property, near Cripple Creek.

The new plant at the John A. Logan, Bull hill, near Victor, is running. A new shaft house is to be erected.

Simes & Delaney have leased the Perkins, near Independence. They will put in 6x8 hoist and boiler and will begin stoping on 178-foot level.

A 55-drill compound air compressor will furnish air to the John A. Logan and American Eagle mines on Bull hill. It will be the largest tandem compound compressor in Colorado; steam cylinder 36 inches diameter, high pressure air cylinder 22 inches diameter, low pressure air cylinder 38 inches diameter, all 36-inch stroke, capacity 95 reels.

The Princess Alice Co., Victor, J. S. Fitting Supt., has reopened stoping ground at the 950-foot level.

The Virginia G. M. Co. will sink 400 feet on Lincoln claim; then drift and crosscut.

At the Paris Exposition silver medals have been awarded the Gold Coin, Portland and Independence, Cripple Creek, exhibits.

A whim will be put on the Silver Bell, on the saddle of Globe and Tenderfoot hills, Cripple Creek.

The Tenderfoot Hill Con. Co. has resumed on the Deadwood group, Cripple Creek. The 100-foot shaft will be deepened and lateral work done.

Ore from the Ajax of the Gold Hill Co., Cripple Creek, runs from $20 to $40 per ton.

At the Kimberly (block No. 2), on Beacon hill, Cripple Creek, Brownlee & Milliken are taking $80 ore from the 350 and 400-foot levels.

The Mountain Year, on Carbonate hill, Cripple Creek, is leased to Adams and others of that place. The old shaft, depth 60 feet, is being unwatered.

Work upon the Emma Palmer, Cripple Creek, is in progress.

A shaft house over No. 2 shaft is being erected at the Portland, Cripple Creek.

The Climax Leasing Co. has two shifts sinking at the Climax, Cripple Creek.

The machinery on the St. Patrick, Cripple Creek, St. Patrick G. M. Co. owners, is now running. Wm. Weston is manager. The shaft, present depth 400 feet, will be sunk to the 1000-foot level.

The El Paso Co. is erecting a new gallows-frame at the Orizaba, Cripple Creek.

The Portland G. M. Co., Cripple Creek, is building a reservoir, capacity 26,000,000 gallons, near there.

At Victor 1500 tons ore, value $91,500, were run through the new Rio Grande smelter in four days.

A. B. Jones, lessee of the Jefferson Davis, on Gold hill, Victor, has resumed operations.

The Lucky Gus, Victor, is sold to W. S. Stratton for $100,000.

Ore from the west vein at the Last Dollar, Cripple Creek, runs 100 ounces per ton. It is a white California quartz, sprinkled with free gold.

In ore from the raise being driven from the 215-foot level at the Morning Star, Cripple Creek, besides gold, manganese and sylvanite are found. Much of the values are carried in red talc.

Drifting at the 12th level is progressing at the Lillie, Cripple Creek.

The Easter Bell Co., Cripple Creek, has started drifting on the Easter Bell. The company has already spent $12,000 and may put $18,000 additional into the work.

The Lucky M. & Leas. Co., on Monument and Dillon fractions, near Victor, has erected a 6x8 hoist and has twenty men at work. Machine drills will be put in and crosscutting pushed.

The Granite, near Victor, will resume this month.

The south end of the Monument, Victor, is leased to the Par Value M. & Leas. Co. of Boston, Mass. Machinery will be erected and sinking resumed.

The new plant at the Coriolanus, Victor, will run Nov. 15.

IDAHO.

IDAHO COUNTY.

The Alamance M. Co., organized under laws of California, is incorporated to work near Elk City.

SHOSHONE COUNTY.

Tunneling will be continued at the Springfield, near Wallace.

The Stevens Peak Gold & Cop. M. Co. will continue operations during the winter.

The 20-drill compressor at the Hecla, Burke, is running. Upon completion of hoist, sinking will begin.

The new 50-drill air compressor of the Standard M. Co., Mace, will soon run.

Work at the Champion, and on the Wonderful group, Wallace, will continue during the winter.

The Cœur d'Alene M. Co., Murray, is making its first cleanup of bedrock uncovered by hydraulic elevator; scrapings are taken in wheelbarrows to mouth of elevator sucker and shoveled in, all going through elevator to sluice.

The Great Eastern M. Co., Ltd., Wallace, is incorporated, capital $1,000,000, to work property near there.

MONTANA.

SILVER BOW COUNTY.

The cyanide plant at the Revenue & Monitor, Butte—Roger Knox, general manager—will run soon.

The capacity of the Utah Con. Co.'s smelter, Butte, will be increased to 450 tons per day.

The new steel hoisting works of the Parrot M. Co., Butte, will start running this month.

The Montana Ore Purchasing Co. and the Anaconda Co., Butte, have increased forces at work.

Work on the Smokehouse shaft, Butte, present depth 335 feet, is being pushed.

The shaft of the Mountain View, Butte, is down 1800 feet.

The cyanide plant at the Revenue and Monitor, Butte, Roger Knox manager, will soon run.

Butte figures the daily capacity of Butte & Boston Reduction Works at 600 tons. Of this the Butte & Boston mines supply 350 tons of 3% ore; 250 tons of first and second-class ores are from the Anaconda, Parrot and Colorado mines.

NEVADA.

ELKO COUNTY.

The September yield of the Dexter, near Tuscarora, was $15,000.

ESMERALDA COUNTY.

The Blair estate may soon resume work in the Blair group of mines at Silver Peak. The Golden Eagle, in that district, is reported producing ore going $132 gold.

EUREKA COUNTY.

The Bay State mine, 12 miles east of Eureka, is in the hands of Salt Lake men, who have undertaken its purchase and made the first cash payment. The next payment becomes due March 1, 1901. In the spring the old 20-stamp mill on the property will be remodeled or a new one put in.

STOREY COUNTY.

It is expected that a 20-stamp mill will be built at the mouth of the Sutro tunnel. Water from the C. & C. shaft will be used for driving the machinery.

The entire plant of the Gould & Curry, Virginia City, is now run by electricity, its successful inauguration having been made on the 20th inst.

WASHOE COUNTY.

Ninety tons ore from Olinghouse canyon, near Wadsworth, recently netted $6000.

WHITE PINE COUNTY.

The tunnel at the Robust, Supt. Marx, Ely, is nearing completion. The mill and machinery will soon be ready for operation.

NEW MEXICO.

COLFAX COUNTY.

The Blue Bandana tunnel, near Elizabethtown, is in 720 feet. Wells & Sutton are in 240 feet on their Little Wonder mine.

The contract for 200,000 feet lumber for a new dredger on Moreno river, near Elizabethtown, is let to C. J. Dodd of that place.

DONA ANA COUNTY.

W. K. Shelton of Tularosa has bought the Mocking Bird, in the San Andreas mountains, and will develop same.

M. Allen has leased the Rio Grande and adjoining claims, near Organ, and will work them.

GRANT COUNTY.

The Deming M. & M. Co. is erecting a concentrator at Deming for their own and custom work.

The shaft house at the Philadelphia, Hanover, containing gasoline hoist, air compressor and other machinery, was recently destroyed by fire. F. C. Bell is owner.

SANTA FE COUNTY.

The New Mexico M. & Smelt. Co., Santa Fe, has changed its name to the New Mexico M. & Smelt. Co. of Colorado, to avoid confusion with another corporation of similar title.

SIERRA COUNTY.

Work at the Porter, near Hillsboro, has resumed.

SOCORRO COUNTY.

J. M. Allen, Supt. Grand Ledge M. & M. Co., will put in a 24 H. P. boiler and friction hoist, etc., at the Cavern, near Kelly.

TAOS COUNTY.

The machinery and boiler for the Copper King, Red River, will soon be in place.

OREGON.

BAKER COUNTY.

The Victor M. Co., Sumpter, is organized, capital $75,000, to work property near there.

The additions to the plant of the Columbia, Cracker Creek district, near Sumpter, including twenty stamps, sixteen concentrators, two 5-stamp mortars, etc., will increase output to sixty tons ore per day.

The Little Giant, Baker City, will resume. This will put another 10-stamp mill in operation.

It is reported that another strike has been made in the Bonanza, Baker City, ore running from $600 to $1500 per ton.

The new 10-stamp mill at the Brazos, Baker City, Geiser & Blewett owners, is running.

CLATSOP COUNTY.

The coal deposits near Knappa will be developed by Astoria men.

GRANT COUNTY.

Rountree & Diamond of Portland have leased the Monumental (silver), near Granite, and will begin operations.

JACKSON COUNTY.

Two arrastras are in operation at the Ashland,—Hill, Tucker & Grant owners,—near Ashland.

Ore from the Bill Nye, on Gall's creek, Medford, took first prize at the Industrial Exposition recently held at Spokane, Wash.

UNION COUNTY.

At Cornucopia the Union-Companion is working 150 men and the Cornucopia about 75 men.

SOUTH DAKOTA.

LAWRENCE COUNTY.

(Special Correspondence).—The Homestake Co. is constructing a water line from near Spearfish to Lead, to furnish a water supply for the mines, mills, cyanide plant and for all city and domestic purposes at Lead. The water will be conveyed through 11 miles of 28-inch vitrified stone pipe to reservoirs and pumping station near Lead. Reidler pumps, having 12,000,000 gallons capacity per day, will be supplied with steam from 200 H. P. Scotch marine boilers. The altitude at the intake is about 6000 feet, and the fall along the pipe line will be about 10 feet to the mile. The three Homestake mills have an aggregate of 700 stamps, and 200 more are being added. Concentrators, below the amalgamating plates, have been in use. The cyanidation of the mill tailings is soon to be an important feature of the work. A new plant, strictly modern in construction, is being erected for this purpose and will soon be ready for operating. The main building is 340x100 feet, the precipitating department 65x65 feet, solution storage building 50x100 feet; the brick and steel power house is 50x85 feet. The main structure is frame, but sheathed with asbestos. The solution and sand tanks are 44 feet diameter and 9 feet depth. The solution tank capacity will be equal to 8400 tons; and that tonnage of material will be in course of treatment through the mill. The material will be received and treated in the same tanks—that is, there will be no preliminary treatment. The tailings, however, in traveling from the mills by gravity to the cyanide plant, pass through a system of cone-shaped classifiers, which make a separation of the siliceous sands from the slate slimes. The cyanide work, both as to construction of plant and operating same, is under the supervision of C. W. Merrill, who still retains similar connection with the Drum Lummon mill of the Montana M. Co., at Marysville, Mont. WASCOTT.

Lead City, Oct. 18.

The oldest cyanide plant in the Black Hills, located at Deadwood, has a capacity of seventy-five tons per day.

UTAH.

JUAB COUNTY.

J. A. Beaman of Silver City has leased the old Primrose near there and has commenced development work.

G. Doetsch will erect a whim on the Scranton, near North Tintic.

At the May Day, Eureka, a good strike was recently made in the south drift at the 100-foot level.

SALT LAKE COUNTY.

Bothwell & McConaughty of Salt Lake will erect an ore refinery at that point.

The Chicago & Utah Onyx Co. is incorporated under the laws of Montana, capital stock $300,000, to mine onyx. The company's property is 40 miles from Salt Lake City and 3 miles from Salt Lake lake. The company proposes to build a tramway from the water's edge, from where the stone will be transported across the lake in barges to the Rio Grande Railroad. The company will introduce the Chanler system of quarrying. Up to the present time the onyx has been blasted like common limestone, and only such pieces as were large enough to be cut into fair-sized blocks were saved. The new system will permit blocks of any size to be cut from the ledge.

Work at the Alamo, Bingham, is resumed. The old tunnel, in 300 feet, will be cleaned out and timbered.

It is stated that West Mountain Placer Co., Bingham, will not resume until spring.

W. A. Farish estimates amount ore blocked out in Dalton & Lark mines, Bingham, at 200,000 tons.

At Tintic, the managers of the El Rey and the Sunbeam have made an arrangement by which latter will open up its vein at 1000-foot level through drift from former's shaft. Only 400 feet driving will be required. Pumps at the Sunbeam are running steadily, and water is being reduced to 400-foot level. The Showers Con. M. Co. will put in a concentrator and 4-drill air compressor near Diamond.

Rosa tunnel, Mountain Chief group, Bingham, is in 800 feet.

The crosscut tunnel on the Mystic Shrine, Bingham, will be continued to extreme western edge of property.

Sinking on the Albion, Alta, will be resumed this winter.

SUMMIT COUNTY.

O. Lawrence, at the Jupiter, Park City, is drifting on seams 1500 feet in tunnel.

The tunnel at the Apex, Park City, is being repaired. Work will resume.

Loring Bros. are inclosing the new tramway at the Weber dump, Park City, and will operate during the winter.

TOOELE COUNTY.

Ore from the Queen of Sheba, near Grantsville, shows 66% lead with 60 ounces silver per ton.

WASHINGTON.

FERRY COUNTY.

The Pointer shaft, Republic, is down 530 feet. Drifting is in progress.

Three samples ore from 100-foot level at the Gold Ledge, Republic, gave respective assays of $122, $204.24, $1084.84 per ton.

Supt. M. Downey, of the Tom Thumb, Republic, will sink No. 3 shaft, present depth 285, 100 feet deeper. He will then drift and crosscut.

The Quilp, Republic, is shipping ore to the Granby smelter, Grand Forks, B. C.

J. A. Bangs, owning a controlling interest in the Trade Dollar, Republic, will begin development work thereon soon.

The Flagstaff, Republic, J. Cody Supt., will resume.

The custom chlorination mill of Republic Reduction Co., Republic, will be overhauled and new machinery put in. It is expected that it will be ready Jan. 1, 1901.

It is expected that when the mill at the Republic, Republic, is in full operation 200 men will be at work.

The sampler at the Republic, Republic, is running, crushing twenty-five tons per hour to ½-inch mesh. It is estimated that by running it twelve hours daily it will keep the mill fully supplied.

The Gold Leaf, near Republic, has started preliminary development on a small scale. A 50-foot tunnel will be driven first.

Driving of the crosscut on the Boston & Butte, Republic, Supt. Nickerson, is progressing.

MASON COUNTY.

It is reported that the old Sanger, near Union, is sold to Eastern and Walla Walla men for $100,000, and that they will spend $25,000 in new development work.

OKANOGAN COUNTY.

The Bridgeport M. & M. Co., Supt. Wheeler, proposes to do considerable development during the winter on Mineral Hill, near Conconully.

Mgr. J. M. Hagerty of the Six Eagles M. Co., will put in a gasoline hoist at the Chapaca property. He also projects building a 50-ton mill.

The Golden Zone at Loomis will triple the capacity of its mills.

Mgr. D. G. Chilson at the Utica group, near Loomis, is tunneling on the main vein, and proposes putting in a milll.

SNOHOMISH COUNTY.

The Elwell-Darrington M. Co., Darrington, is incorporated to work the Kickapoo and properties of the Sauk River M. Co., near there. J. G. Givens, upon completion of the railroad to Darrington, will begin shipments.

The air shaft in the lower tunnels of the Mystery and Bride mines, Monte Christo, begun years ago, is completed.

The air shaft in the lower tunnels of the Mystery and the Bride mines of Monte Christo is completed. The new shaft renders the lower sections of the mines accessible. This is locally interpreted to mean an increased payroll of from $15,000 to $30,000 per month and the running of trains into Monte Cristo.

WYOMING.

CARBON COUNTY.

The Ferris-Haggerty Copper M. Co., Osceola, is building a telephone line to Rawlins via Battle Lake and Saratoga.

LARAMIE COUNTY.

Shipments from Hartville iron mines, Hartville, average 330 carloads per day. With the advent of increased rail facilities, now under construction, the output will be much larger.

FOREIGN.

BRITISH COLUMBIA.

Wages for mine workers in Kootenay are as follows: Men working in shafts, $4; machine men, $3.50; hammersmen, $3.25; carmen, muckers and laborers, $3. This is known as Slocan compromise scale, and is paid by every mine working in Slocan, Ainsworth, Nelson, Moyie, Boundary and Lardo districts. In the two last-named districts hammersmen get $3.50 a day. The management of the Ymir, Nelson district, have posted notices that the standard scale will be paid in future.

The Fletcher group at Whitewater is sold to an English company, C. Plowman manager; consideration, $30,000 cash.

The Rossland Bonanza G. M. & M. Co., S. W. Hall managing director, will resume on Bonanza No. 3, on St. Thomas mountain, Trail Creek division, near Gladstone.

Construction on aerial tramway from the Le Roi hoist to the Black Bear flats has begun. The Le Roi sampling mill will be finished next month.

The Venus G. M. Co. of Toronto will place a 10-stamp mill on the Venus, Morning mountain, near Nelson.

A compressor will be put in at Mansfield Camp, Kaslo, E. Mansfield, manager, in course of next two months. Tunneling will then be pushed.

The tram at the Ivanhoe, Sandon, is completed.

P. Johnson of Greenwood, manager smelter department of the British Columbia C. Co., Ltd., which will in December open its smelter at Greenwood, has offered the management of the Winnipeg mine in Wellington camp a freight and treatment rate of $4 per ton, to go into effect on December 1st. This makes $8 ore profitable. The Winnipeg has been paying a $5.50 rate to the Granby smelter at Grand Forks.

The Sunset Hydraulic M. Co., Atlin district, has closed down for the season, upon orders received from the Gold Commissioner, issued on account of complaints from numerous claim owners that tailings from the monitors were interfering with their washings. The balance of this season will be allowed the creek claimants to work out their 100 feet claims, and the hydraulic companies should have an open field next year.

The Mother Lode smelter, at Greenwood, Paul Johnson Supt., is nearing completion.

Amount of ore blocked out at the Old Ironsides, near Grand Forks, is estimated at 1,500,000 tons.

Shipments to Grand Forks smelter average 300 tons daily. It is expected that the output will be doubled during next month.

A 10-stamp mill will be erected on the Referendum, on Forty-nine creek, Nelson. Operations will resume.

A small plant will be erected on the Strawberry, Brown's Camp, Grand Forks.

Work on the Volcanic, Grand Forks, R. A. Brown manager, will resume. A 7-drill compressor will be put in.

The force at the Athelstan, Wellington Camp, Grand Forks, is now twenty-two men.

It is announced that ore will be quarried from the surface of the Knob Hill, Grand Forks, next spring.

An assessment of 10 cents per share has been levied on Iron Mask stock, to cover expenses of litigation with Center Star Co. Operations will be resumed.

Work on the Spitzee, Rossland, Alex. Sharp Supt., is resumed.

The Velvet M. Co., Ltd., J. L. Morrish manager, will install a sawmill, 15-drill compound air compressor, pumps, winding engines, etc., at the Velvet, Rossland.

The Rossland Great Western M. Co., Rossland, will put in a 40-drill electrical compressor at the Rossland G. W.

INDIA.

Bids have been asked of several electrical engineering firms for equipping an extensive electric power supply plant in the Mysore gold mining district. Current is to be generated at the Convery Falls and conveyed 100 miles to the gold mines. The Mysore Government is to defray the cost of the installation.

LOWER CALIFORNIA.

Supt. F. E. Russell, Aurora mine, Alamo district, says that the Aurora, Bracho, Ulysses, Montezuma and San Jacinto mines have their machinery in place, and most of them are in operation. The Aurora is shut down owing to a change of management.

At the Visnago, owned by Hartsell & Davis, 3 miles from Alamo, a 10-stamp mill is being erected. The cyanide plant there is in operation.

MEXICO.

Final action in the protracted litigation over the Weil and La Abra mining claims against the Mexican Government in the U. S. Supreme Court dismisses the appeal of Alice Weil from the judgment of the Court of Claims on the ground of non-prosecution. In view of the adverse decision in the La Abra case, the appeal was not prosecuted. The balance of the indemnity paid by the Mexican Government, amounting to some $200,000, will probably be refunded.

L. Davis has leased the Cinco de May, in the Escondido mountains, Chihuahua. Men are at work and shipments will soon begin.

SOUTH AFRICA.

The Rand mining companies are reported disappointed by the delay in ending the military campaign. They sent engineers and agents to Cape Town when Pretoria was occupied, where they have remained in idleness month after month. Engineers representing large mining interests have been allowed to go to Johannesburg and report on the condition of the plants, but pumping operations have not been resumed, and miners and natives cannot be employed until the railways are prepared to carry coal and supplies on a large scale. The railways barely suffice for the needs of the army, and it is not believed that the mines can be operated with efficiency before the end of six months.

Cape Town cables: "All eyes are turned yearningly to the Transvaal. The return of refugees to Johannesburg has now begun at the rate of a thousand arrivals per week. Nevertheless, there appears to be little chance of any active resumption of the mint output before the beginning of 1901, nor does the prospect of an early return of normal conditions in the Transvaal just now look encouraging."

Personal.

A. G. KEILLER of Dundee, Scotland, is in Denver.

C. TABOR, of the Red Boy, Baker City, Or., has returned from Portland, Or.

A. H. TARBET of Salt Lake, Utah, has returned from Nevada and California.

WM. DAVIES has resigned the foremanship at the Ray mine, Kelvin, Arizona.

MANAGING DIRECTOR HOLDEN, U. S. M. Co., Bingham, has returned from the East.

F. F. GRIMES, Supt. Diadem, Robinsonville Camp, Or., has returned from Butte, Mont.

JNO. TRUSCOTT has resigned the superintendency of the Oneida, Sutter Creek, Cal., mine.

F. W. SAMUELSON, of Humboldt, Neb., Pres. Golden Edge M. Co., is in Breckenridge, Colo.

F. D. FRENCH has been appointed general manager Rio Grande Sampling Works of Victor, Colo.

LOUIS JANIN, JR., has taken the superintendency of the Dorcas M. M. & D. Co. at Florence, Colo.

F. T. FREELAND of Aspen, Colo., who has been in Europe several months, will return home this week.

HAROLD BOEDTKER, late of San Diego, Cal., is now assayer and chemist for Verde Queen Co., Jerome, Ariz.

CHAS. H. DUELL, Commissioner of Patents, is about to resign to engage in law practice in Syracuse, N. Y.

EDWIN HAWLEY has declined the presidency of the Southern Pacific Co., at a salary of $40,000 per annum.

G. E. BAILEY, PH. D., late of Lewiston, Cal., has established engineering headquarters at 117 Sutter street, San Francisco.

H. C. BUSH, general agent Colorado Midland railroad in San Francisco, has been appointed general traffic manager of that road.

HENNEN JENNINGS of London, Eng., and F. W. Bradley of California and Idaho have been examining mining properties in Utah.

W. W. MEIN of Oakland, Cal., a son of the late Capt. Thos. Mein, goes to South Africa as assistant mine manger at an annual salary of $7000.

J. H. THOMAS of Oakland, Cal., W. W. Treat of Boston, owners the Mammoth Springs mine near Forest City, Cal., are visiting that property.

T. A. RICKARD, consulting engineer of the Venture corporation of London and State Geologist of Colorado, will arrive in Denver from Europe this week.

T. H. LEGGETT, former manager Standard Con. M. Co., Bodie, Cal., is in New York City and contemplates returning to Johannesburg, S. A., about Jan. 1, 1901.

S. BOWERS, stated by the San Diego Union to be "California's State Geologist, in the field, by appointment of Governor Gage," is in Yuma, Arizona, examining oil indications there.

Books Received.

"Free Hand Perspective," V. T. Wilson, for use in manual training schools and colleges, 8vo, 268 pages, cloth, $2.50. The entire subject is treated from a standpoint entirely different from the one formerly adopted, being more after the plan of model drawing, the idea being to apply the principles of linear perspective to free-hand drawing, an effort in which the author has achieved some measure of success; published by Jno. Wiley & Co., New York City.

"Famous Gold Nuggets of the World" is the title of an interesting little book on that subject by T. J. Hurley of New York City, in which he gives full credit to the sources of his information and presents a mass of data on a subject that must long continue of interest to many.

Catalogues Received.

Catalogue No. 3, fifth edition, "Hydraulic Mining Machinery," issued by the Joshua Hendy Machine Works, 38-44 Fremont St., San Francisco, illustrates and fully describes that firm's specialties in hydraulic mining appliances. There are many new illustrations, and every device described is well portrayed by sectional drawings. Valuable tables are also given, and the entire contents are copyrighted. A copy will be sent any of our readers on application.

"Hoisting Machinery" is the subject of the latest trade treatise, No. 42, issued by the M. C. Bullock Mfg. Co. of Chicago. The name of this company is indissolubly connected with the diamond drill, but that is not the only mining device furnished at 1170 West Lake street, as the indigo-covered pamphlet received shows. There are some good views and excellent descriptions of direct-acting and geared reel hoists with tables of rope and drum capacities. The pamphlet will be sent upon application.

The thirtieth edition of the Keuffel & Esser Co.'s catalogue is of interest to any one using drawing materials, mathematical or surveying instruments. The catalogue has nearly 500 pages—over fifty more than the preceding edition. The changes from the last edition are mostly additions. The descriptive matter has been elaborated and made more complete, and many cuts have been replaced by better ones or added. The index has been carefully revised. Of the several additions may be mentioned slide rules, new planimeters and pantographs, which are now listed in a heretofore unattempted variety and in a greatly improved assortment. Fine narrow steel tapes are listed in an increased assortment, and the reels are listed separately to allow of greater latitude in selecting. Current meters, hook gauges, tide gauges, aneroids, barographs, thermographs and hydrographs have been added, and of sextants and octants there is a new list. The assortment of drawing instruments, scales, drawing tables, etc., has been increased. Profile and cross-section rulings on cloth have been added. The catalogue will be sent upon request. The New York office is 127 Fulton St.; Chicago, 111 Madison St.; St. Louis, 708 Locust St.

Commercial Paragraphs.

JOHN T. ELKINS, nephew of S. B. Elkins of West Virginia, and son of the late John T. Elkins of Leadville, has opened an assay office and laboratory at 1736 Champa St., Denver, Colo., having purchased the equipment and business of Draper & McLeod.

E. G. DENNISTON, proprietor Denniston's San Francisco Plating Works, says: "We have moved our plating establishment from No. 652 Mission street, San Francisco, to our new and commodious place, No. 743 Mission street, between Third and Fourth, one block above on the opposite side of the street. We now have the largest and most complete plating works on the Pacific coast, and with our improved and extensive facilities will be enabled to fill orders for silver-plated copper mining plates, and the plating of every description of metal goods with gold, silver, nickel, brass, etc., with promptness and at greatly reduced rates. Our works have been in successful operation here for the last thirty-five years, and we will use our best efforts to please our customers and maintain our reputation for first-class work." A business establishment that has been in continuous and successful operation for thirty-five years has certainly just claims to the favorable consideration of customers everywhere.

Recently Declared Mining Dividends.

	Payable.
Buffalo Hump M. Co., Idaho, 1%	Nov. 1
Drummers' Dev. Co., Washington, ½ cent per share	Nov. 1
Mammoth M. Co., Utah, 5 cents per share, $20,000	Nov. 1
Utah M. Co., Utah, 2 cents per share, $2000	Oct. 25
Vindicator Con. M. Co., B. C., 1½ cents per share, $27,500	Oct. 25

List of U. S. Patents for Pacific Coast Inventors.

REPORTED BY DEWEY, STRONG & CO.,
PIONEER PATENT SOLICITORS
FOR PACIFIC COAST.

FOR THE WEEK ENDING OCT. 16, 1900.

659,949.—PACKING FRUIT—C. W. Arrasmith, Courtland, Cal.
659,804.—CAN HEADING MACHINE—E. C. Atwood, S. F.
659,645.—PIPE BOILER—C. D. Casad, Seattle, Wash.
659,810.—MECHANICAL MOVEMENT—E. Cherry, Santa Rosa, Cal.
660,049.—SUPPORT—C. E. Cook, Whittier, Cal.
659,794.—HYDRAULIC NOZZLE—W. A. Doble, S. F.
659,795.—GAS APPARATUS—McD. Elliott, Santa Rosa, Cal.
659,918.—MOP HEAD—J. R. Froberg, Grass Valley, Cal.
659,796.—MAIL POUCH—Gavin & Griffin, Eureka, Nev.
659,745.—CONVEYOR FOR ROPEWAYS—A. S. Hallidie, S. F.
659,748.—CULTIVATOR—R. L. Hill, Saticoy, Cal.
659,923.—WEIGHING MACHINE—G. Hoepner, S. F.
660,015.—SAWBUCK—T. J. Johnson, Harrington, Wash.
659,798.—SPRING CONNECTION FOR VEHICLES—P. L. Jones, S. F.
659,977.—OIL CAN—A. Kitterman, Portland, Or.
660,017.—ROTARY ENGINE—W. Lambert, Los Angeles, Cal.
659,684.—RUBBER DAM HOLDER—J. A. W. Lundborg, S. F.
659,932.—GOPHER TRAP—Z. A. Macabee, Los Gatos, Cal.
660,061.—LATCH AND LOCK—J. B. E. Macnamara, S. F.
660,062.—HAT—T. L. Mahoney, S. F.
660,077.—WEIGHING MACHINE—J. Manes, S. F.
659,934.—STAMP BATTERY MORTAR—W. A. Merralls, S. F.
659,753.—DRAG SAW—W. A. Miller, Wapinitia, Or.
659,987.—CARBURETOR—H. C. Ray, Visalia, Cal.
659,801.—ALMOND HULLER—W. G. Read, Colusa, Cal.
659,901.—WATER MOTOR—J. Sands, Seattle, Wash.
659,708.—PLANER—G. W. Stetson, Seattle, Wash.
660,035.—WAVE MOTOR—G. N. Todd, Los Angeles, Cal.
660,036.—WAVE MOTOR—G. N. Todd, Los Angeles, Cal.
33,400.—DESIGN—Rova E. Alexander, Garfield, Wash.
33,391.—DESIGN—C. H. De Voll, Seattle, Wash.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

CHECK HOOK.—No. 659,611. Oct. 9, 1900. F. G. Snook, Sacramento, Cal. This invention relates to a new and improved harness check hook or device for holding check reins in position. It comprises a post having at its upper portion a transverse slot or opening with a notch forming a depressed sheet, a continuation of the upper wall thereof and a ring or loop pivotally mounted to the base of the post and composed of spring material, said ring or loop adapted to be passed into the slot, and thus prevent the check rein which is fitted on the post from slipping off. The rein is easily released by disengaging the ring and turning it backward, leaving the upper part of the post clear for the release of the check rein.

TRACK CLEANER AND OILING DEVICE.—No. 659,408. Oct. 9, 1900. Wm. Morck, Peter Krickau and Wm. Boehle, Oakland, Cal. This invention relates to devices for clearing the tracks of railway cars from obstructions, and a means for making the connection between the clearing device which is carried upon the swiveling truck and the car body which is movable transversely independent of the truck. The invention consists of brushes having shanks slidable in vertical guides on the truck, a transverse bar connecting the shanks of opposite brushes, a second transverse bar carried by the car body, and a loose connection and guide between this bar and the first named one, with means whereby the second bar may be raised and lowered so as to raise and lower the first named bar and its brushes.

SPRING CONNECTION FOR VEHICLES.—No. 659,798. Oct. 16, 1900. P. L. Jones, San Francisco, Cal. The object of this invention is to connect the contiguous ends of side and end springs which are used conjointly upon buggies, carriages and like vehicles. It consists in cutting away an intermediate portion upon each side of the leaf near the end, leaving the extreme end of full width, then folding and welding the cutaway portion upon itself, with the end part overlapping and welding upon the end of the spring and rounding the folded smaller portion to form a cylindrical spindle. The second spring meets the first at right angles, and has the end bent into a cylindrical form. A rubber bushing fits within said end abuts within the collar of the first named spring. A metal sleeve is centrally fitted on said bushing and turns upon the spindle of the first named spring, and a nut and collar fitting upon the end of the spring abut against the outer end of the elastic bushing. This forms a tight and noiseless joint with sufficient yielding to allow the change in position which takes place during movements of the springs.

MAIL POUCH CLOSURE AND FASTENING.—No. 659,796. Oct. 16, 1900. Geo. Gavin of Eureka, and W. E. Griffin of Reno, Nevada, assigned to the Safety Mail Pouch Fastener Co. of Eureka, Nev. The object of this invention is to provide a novel and improved closure and fastener for the mouths of mail pouches. It consists in the application of front and rear slotted plates, centrally located similar plates fixed to the outer edges of the pouch, and a central plate secured to the front of the pouch below the previously named plates, and having a staple fixed to and projecting outwardly from it over which staple all the other plates are folded to overlap, so that the single lock or fastening through the projecting staple secures the mouth of the pouch. These plates thus form a rigid border for the closing edges, which prevent any access to the interior and a single fastening is sufficient to hold the parts together.

CONVEYORS FOR ROPEWAYS.—No. 659,745. Oct. 16, 1900. A. S. Hallidie, San Francisco, Cal. This invention relates to conveying attachments to be used for aerial wire ropeways or tramways, and is especially designed for the transportation of sugar cane and other material that can be made up into bundles or packages. It consists essentially of slings in which the packages or bundles are contained with a pole or rod from which the slings are suspended. This pole or rod is placed upon carriers suspended from the rope way, and thus the bundle is transported to the point where it is to be delivered. The delivery is effected by an automatically unlatching device which disengages the pole from the arm, and allows the bundle to drop at the point of delivery.

CAN HEADING MACHINE.—No. 659,804. Oct. 16, 1900. E. C. Atwood, Golden Gate, Cal., assignor to Pacific Coast Syrup Co. of San Francisco, Cal. The object of this invention is to provide a device for heading cans of that class in which the body is made of pasteboard or like material with metallic or other bottom, and metallic or other head, and it is designed to apply and crimp a metallic ring by which the head is secured upon the top of a can after the latter has been filled. It comprises a frame having upper and lower guides, vertical shafts mounted in said guides, one of said shafts having a spring seated table to support the can, and the other shaft having an encircling sleeve provided with a disk to rest upon the can head. A collar is splined upon the sleeve and a treadle and connections are employed for raising and lowering the shaft. Fulcrumed arms project from the disk and the collar, and other arms are fulcrumed between their ends to the arms on the disk and have their lower ends provided with semi-globular beaded heads which travel in contact with the cover, and form an indented ring which secures it to the body of the can. Links have one end connected with the arms on the collar, and their opposite ends pivotally connected with the upper ends of the arms which carry the beaded head. A lever is connected with the collar and the treadle and connection serve to operate the same, so that the beaded heads may be moved into and out of contact with the securing rings. The device is then rotated by suitable gearing, and the beaded heads are caused to travel around in contact with the cover until the latter is properly interlocked and secured upon the can body.

AUTOMATIC WEIGHING MACHINE.—No. 659,923. Oct. 16, 1900. Geo. Hoepner, San Francisco, Cal., assignor to the Union Scale & Manufacturing Co., of Sacramento, Cal. This invention relates to machines of that class which are designed to weigh powdered, granular or similar substances, and to deliver such substances in regular quantities into such receptacles as may be desired. It consists of a weighing receptacle, means for supplying the material to be weighed thereto, a fulcrumed scale beam with adjustable weights, from one end of which beam the receptacle is suspended, a plurality of chambers within the receptacle, a tilting partition, and mechanism by which this partition is alternately moved from one side to the other so that the material arriving from the source of supply will first fill the chamber upon one side of the partition until given weight has been reached, and will then be transferred to the other side, thus alternating without interruption. In combination with this is a mechanism by which an even feed is maintained, mechanism by which the parts are mechanically actutaed and locked intermediate of their movements so as to gold the tilting partition in position, and the hinged movable bottom of the receptacles so that the bottom of the one which is being filled will be closed while the other is opened for discharge. The position of these bottoms are reversed with the reversal of the partition which guides the material into each compartment.

RECEPTACLE FOR PACKING FRUIT.—No. 659,949. Oct. 16, 1900. C. W. Arrasmith, Courtland, Cal. This invention is designed to provide a means for packing fresh fruit rapidly into baskets, or similar receptacles, and to provide for a suitable convexity or crown to the surface of the fruit. It consists of a baseboard having a concaved depression and means for supporting the basket inverted over this depression. The bottom of the basket being opened, fruit is filled into it from the bottom, and when full a flexible covering or bottom is placed upon it and pasted or otherwise sealed upon the sides of the basket which is then inverted so as to be right side up when removed. The basket is held in place by spring-pressed arms which retain it while being filled, and which are disengaged to allow the basket to be released. When the basket is removed the baseboard and the basket are turned together so that the latter is in its proper upright position.

Latest Market Reports.

SAN FRANCISCO, Oct. 25, 1900.

SILVER—Per oz., Troy: London, 30¼d (standard ounce, 925 fine); New York, bar silver, 65⅛c (1000 fine); San Francisco, 65⅛c; Mexican dollars, 51¼c.

The combination of Indian and Chinese demands makes it likely that the improvement in the market for silver may continue, as there is prospect of further purchases of bar silver in the London market or elsewhere for the Indian Government, to be used in the coinage of rupees. Good crops in India and large exports during the ensuing year may give that country a favorable balance of trade, which would have to be settled in silver. Conditions of this character, moreover, would naturally create a demand for additional silver money for circulation in India, and it is therefore thought that the Indian purchases of silver during the next twelve months are likely to be larger than in any corresponding period since the closing of the mints of that country to the free coinage of silver. With favorable internal conditions India seems, in fact, likely to require and to buy as much silver each year as it did prior to the suspension of free coinage, and such demand, if kept up and not accompanied by considerable increase in the current supply of silver, would probably lead to higher average prices for silver than have prevailed since 1893.

The demand for Mexican silver pesos in the East is increasing, says Director of the Mint Leandro Fernandez, but the production of silver in that country is not commensurate with the increasing demand. He has heard nothing of the proposed abolition of the mint dues to induce producers to keep silver there. The measure, he declares, is not likely to be pushed at present. The smelters are shipping a large portion of their output to the United States, even paying the 5% export tax, thereby saving the charges for coinage established under the Mexican law of 1897. This law levies a coinage duty of 2% and a stamp duty of 3%. The pending elections in the United States have affected foreign exchange in Mexico. Four years ago gold exchange fell to 180. Last April the exchange reached 210. It is now 198, with a tendency to reach a rate lower than that prevailing in the fall of 1896. The production of silver in Mexico is hampered by local conditions, such as lack of water at Pachuaca and Zacatecas, and is not likely to increase materially unless an appreciation in the value of silver can make possible the working of low-grade ores from Chihuahua and elsewhere.

COPPER.—New York: Lake, 1 to 3 casks, $16.87½ cash; carload lots, 16.50; Electrolytic, 1 to 3 casks, 16.75; carload lots, 16.37½; Casting, 1 to 3 casks, 16.50; carload lots, 16.25. San Francisco: 18. Mill copper plates, 20c; bars, 22@23c.

LEAD.—New York, $4.37½; Salt Lake City, $4.20; St. Louis, $4.27½; San Francisco $5.00, carload lots; 5¾c 1000 to 4000 lbs.; pipe 6¾, sheet 7¼, bar 6c; pig, $4.70 @5.10. London, £17 2s 6d=3.83½c per ℔.

SPELTER.—New York, $4.10; St. Louis, $3.95; San Francisco, ton lots, 5½c; 100-lb lots, 5¾c.

ANTIMONY.—New York, Cookson's, 10½c; Hallett's, 9½c; San Francisco, 1000-lb lots, 12c; 300 to 500 lbs., 13@14c; 100-lb lots, 15@18c.

IRON.—Pittsburg, Bessemer pig, $13.25; gray forge, $13.00; San Francisco, bar, per lb., 2¼c in small quantities.

STEEL.—Bessemer billets, Pittsburg, $17.25; open hearth billets, $20; San Francisco, bar, 7c to 12c per lb.

TIN.—New York, pig, $27.50; San Francisco, ton lots, 30c; 1000 ℔s., 31c; 500 ℔s., 31¼c; less, 32c; bar tin, ⅌ ℔, 34c.

QUICKSILVER.—New York, $51.00; large lots: London, £9 2s 6d; San Francisco, local, $48.00 ⅌ flask of 76½ ℔s.; Export, $45.

NICKEL.—New York, 50@60c ⅌ ℔.

MAGNESIUM.—New York, $3.00 ⅌ ℔.; San Francisco, $4.00.

ZINC.—San Francisco, 5¼c; slab, 5¾c; bar, 7c.

BABBITT METAL.—San Francisco, No. 1, 10c.

ASSAY LITHARGE.—San Francisco, 10c ⅌ ℔, small lots.

BISMUTH.—New York, ⅌ ℔., $1.60 50-℔ lots; San Francisco, $2.50 to $2.75 ℔ lots.

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 30c to 35c.

PHOSPHORUS.—F. o. b. New York 50@60c ⅌ ℔.

TUNGSTEN.—New York, ⅌ ℔., 95c; San Francisco, $1.15.

FERRO-TUNGSTEN.—New York, 37%, 35c; San Francisco, 65c (60%).

FERRO-MANGANESE.—Pittsburg, 80%, domestic, $85, large lots.

PLATINUM.—San Francisco, crude, $17 ⅌ oz.; New York, $18.20 per Troy oz.

POWDER.—F. o. b. San Francisco: No. 1. 70% nitro-glycerine, per ℔., in carload lots, 15½c; less than one ton, 17¼c. No. 1*, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1** 50%, carload lots, 11¾c; less than one ton, 13¾c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9½c; less than one ton, 11½c. No. 2** 30% carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9, in lots not less than 1000.

FUSE.—Triple tape, $3.60 per 1000 feet; double tape, $3.00; single tape, $2.65; Hemp, $2.10; Cement No. 2, $3.00; Cement No. 1, $2.65, in lots of 3000 feet and up.

CANDLES.—Granite 6s, 16 oz., 40s., 11¾c ⅌ set; 14 oz., 40s., 10½c.

CHEMICALS.—Cyanide of potassium, 98%-99%, jobbing, 32½@33½c ⅌ ℔.; carloads, 30@31c; in 10-℔. tins, 40c; sulphuric acid, 66% B, 2c ⅌ ℔.; soda ash, $1.60 ⅌ 100 ℔s. 58%; hyposulphite of soda, 2¾@3c ⅌ ℔.; blue vitriol, 5½@6c ⅌ ℔.; borax, concentrated, 7@8c ⅌ ℔.; chlorate of potash, 12@13c; roll sulphur, 6c; alum, $1.90@2.00; flour sulphur, French, 2¼@2½c; California refined, 1¾ @ 2c; nitric acid, in carboys, 8c ⅌ ℔.; caustic soda, in drums, 3@4c ⅌ ℔.; Cal. s. soda, bbls., $1.00; sks, 95c ⅌ 100 ℔s.; chloride of lime, spot, $2.50@2.60; nitrate of potash, in kegs, 8c; caustic potash, 10c in 40-℔. tins.

OILS.—Linseed, pure, boiled, bbl., 75c; cs., 80c; raw, bbl., 73c; cs., 78c. Deodorized Stove Gasoline, bulk, 15c; do., cs., 21c; 86° Gasoline, bulk, 21c; do., cs., 27c; 63° Naphtha or Benzine, deodorized, in bulk, per gal., 14c; do., in cs., 20c; Lard Oil, Extra Winter Strained, bbl., 70c; cs., 75c; No. 1 bbl., 50c; cs., 55c; Neatsfoot Oil, coopers' bbls., 60c; extra bbls., 65c; cs., 60c; No. 1 bbl., 52½c; cs., 57½c.

COAL.—San Francisco, coast, yard prices: Wellington, $9; Seattle, $7.00; Coos Bay, $5.50; Southfield, $9.00. Cargo lots, Eastern and foreign: Wallsend, $8.00; Brymbo, $7.50; Pennsylvania, hd., $14.00; Scotch, $8; Cumberland, $12; Cannel, $9.50; Welsh Anthracite, $12.00; Rock Springs, $8.50; Colorado Anthracite, $14.50. Coke, $16 per ton in bulk; $18 in sacks.

San Francisco Stock Board Sales.

SAN FRANCISCO, Oct. 25, 1900.

9:30 A. M. SESSION.

200 Belcher	14c	300 Overman	08c
100 B. & B.	27c	200 Savage	19c
200	26c	250 Sierra Nev.	26c
600 C. C. & V.	$1 10	100 Silver Hill	30c
200 G. & C.	70c	200 Union Con.	20c
1100 Mexican	32c	200 Y Jacket	17c
500 Ophir	82c		

2:30 P. M. SESSION.

300 Ophir.	83c	200 Crown P't.	12c
1000 Mexican	34c	500 Potosi	15c
200	33c	500 Sierra Nev.	26c
300 G. & C.	70c	100 Utah	09c
250 C. C. & V.	$1 05	200 Bullion	02c
100 Savage	20c	200 Overman	08c
500 Chollar	17c	200 Silver Hill	32c
300 H. & N.	26c	200 Andes	08c

ALPHABETICAL INDEX TO ADVERTISERS.

(—) Indicates every other week or monthly advertisements.

A — PAGE.

Adams, W. J ... 13
Ainsworth & Sons, Wm ... 13
Aitchison Perforated Metal Co., Robert ... 15
Akers, Wm. A ... 13
Allis Co., Edward P ... 5
American Copper Mining & Extraction Co ... 14
American Diamond Rock Drill Co ... 9
American Injector Co ... 2
American Oil & Refinery Co ... 17
Ames, A. T ... 3
Atlas Pipe Wrench Co ... 11

B

Baird & Co., Henry Carey ... 17
Baker, E. D ... 1
Baker, F. D ... 1
Baker & Hamilton ... —
Balliet, Letson ... 13
Barnhart, Geo. W ... 11
Bartlett & Co., C. O ... 16
Bell, J ... 13
Bell, Newton M ... 15
Benjamin, E. H ... 13
B. F ... 1
Birch & Co., W. H ... 3
Boesch Lamp Co ... —
Bowes & Co ... 9
Box 376, Mining and Scientific Press ... 1
Box 4, Virginia City, Nev ... 1
Bradley Pulverizer Co ... 6
Braun & Co., F. W ... 5
Bucyrus Company ... 16
Bullock Mfg. Co., M. C ... 9
Burlingame & Co., E. E ... 13
Burt Mfg. Co ... —
Burton, Howard E ... —
Butters & Co., Ltd., Chas ... 13

C

California Anti-Caloric Co ... 2
California Borax Co ... 17
California Debris Commission ... 1
California Perforating Screen Co ... 15
California Vigorit Powder Co ... —
California Wire Works ... 19
Canton Steel Co ... 9
Cary Spring Works ... 16
Colorado Iron Works Co ... 8, 10
Colorado & Southern Ry ... 16
Compressed Air Machinery Co ... 12
Con. Cal. & Virginia Mining Co ... 17
Copper King, Ltd ... 8
Cory, C. L ... 13
Crown Gold Milling Co ... 7
Cummings & Co., J. J ... 14

D

Davidge & Davidge ... 13
Davies & Co., D. Campbell ... 18
Dearborn Drug & Chemical Works ... 14
Denniston's San Francisco Plating Works ... 11
Denver Engineering Works Co ... 15
Denver Fire Clay Co ... 14
Denver & Rio Grande R. R ... 16
Deseret News Office ... 1
Detroit Lubricator Co ... 18
Dewey, Strong & Co ... 13, 16
Doble Co., Abner ... 9
Donaldson & Co., A. M ... 1
Dow Pumping Engine Co, Geo. E ... —

E

Eby, Jno. D ... 11
Elkins, John T ... 13
Ericsson Telephone Co ... 2
Eureka Co ... 1
Evans & Co, C. H ... 2
Excelsior Redwood Co ... —

F

Fairbanks, Morse & Co ... 4
Falkenau, Louis ... 13
For Sale ... 1
Fowler, G. C ... —
Fraser, E. J ... 1
Fraser & Chalmers ... 15
Frue Vanning Machine Co ... —
Fulda's Planing Mills ... —

G

Galindo, Elias ... 1
Garratt & Co., W. T ... 2
Gates Iron Works ... 4
General Electric Co ... 5
General Photo-Engraving Co ... 5
Gibson, Chas. B ... 13
Globe Engineering Co ... 14
Globe Iron Works ... 12
Gold & Silver Extraction Co. of America, Ltd ... 14
Goodell, Albert I ... 13
Goodyear Rubber Co ... 3
Gutta Percha Rubber & Mfg. Co ... —

H

Haff, Edward L ... 13
Hallidie Ropeway ... 19
Hamilton Mfg. Co., Wm ... 5
Hanks, Abbot A ... 13
Harrigan, Jno ... 13
Harvey, F. H ... 13
Hauser, M. S ... 1
Hayden & Co, J. M ... 16
Heald's Business College ... 14
Hendrie & Bolthoff Mfg. & Supply Co ... 6
Hendy Machine Works, Joshua ... 10
Hercules Gas Engine Works ... 18
Hersey, Clarence ... 13
Heyl & Patterson ... 2
Hirsching, H ... 14
Hoskins, W ... 16
Hooper & Co, C A ... —
Hug, D ... 12
Hunt, A M ... 13
Huntington, F. A ... 2
Huntley, D. B ... 13

I

Independent Assay Office ... 13

J

Jackson Drill & Mfg. Co ... 9
Jackson, Geo. G ... 12
Jackson Machine Works, Byron ... 8
Jeanesville Iron Works Co ... 14
Jeffrey Mfg. Co., The ... 16
Jessop & Sons, Ltd., Wm ... 9
Jewett, Daniel G ... 13

K

Kent Mill Co ... 8
Keuffel & Esser Co ... 2
Keystone Driller Co ... 2
Knight & Co ... 12
Koppel, Arthur ... 17
Krogh Mfg. Co ... 3
Kyle & Co., T. D ... —

L

Leffel & Co., James ... 12
Leschen & Sons Rope Co., A ... 4
Lexow, Theodor ... 9
Leyner, J. Geo ... 9
Link-Belt Machinery Co ... 11
Lloyd, Benj. T ... 1
Luckhardt Co., C. A ... 13
Ludlow-Saylor Wire Co ... 12
Lunkenheimer Co ... 18

M

Macdonald, Bernard ... 13
Madison, Bruce & Sellers ... 16
Main Belting Co ... 11
Mammoth Garfield Gold Mining Co ... 17
Mandell, Frank C ... 13
Marina Marsicano Gold Mining Co ... 17
Mariner & Hoskins ... 14
Marion Steam Shovel Co ... 11
Marshutz & Cantrell ... —
McFarlane & Co ... 8
Meredith, Wynn ... 13
Mine & Smelter Supply Co ... 4
Miners' Assay Office ... 13
Montgomery Machinery Co., J. H ... 11
Moore & Co., Chas. C ... 6
Morris, H. D. & H. W ... 10

N

National Iron Works ... —
Nevada Metallurgical Works ... 13
New Process Raw Hide Co ... —
Nicholson, Hudson H ... 13
Novelty Mining & Milling Machinery Co ... 6

O

Ogden Assay Co ... 13
Oregon Railroad & Navigation Co ... 15
Oriental Gas Engine Co ... —
Osceola Con. Mining Co ... 17

P

Pacific Coast Smelting & Refining Works ... 8
Pacific Tank Co ... 7
Paraffine Paint Co ... 16
Parke & Lacy Co ... 9, 19
Paul, Almarin B ... 13
Pelton Water Wheel Co ... 12
Penberthy Injector Co ... 18
Pennington & Sons, Geo. W ... —
Perez, Richard A ... 13
Peterson, L ... 1
Phillips & Co., Alvin ... 14
Pneumatic Cyanide Process Co ... 14
Postlethwaite, R. H ... 13
Powell Co., Wm ... 18
Price & Son, Thomas ... 13

Q

Quick, Jno. W ... 15

R

Rand Drill Co ... 9
Rank, Sam'l A ... 13
Reade, Frank ... 13
Reckhart, D. W ... 13
Redington & Co ... 1
Richards, J. W ... 13
Risdon Iron Works ... 19
Robins Conveying Belt Co ... 11
Roebling's Sons Co., John A ... —
Roessler & Hasslacher Chemical Co ... 14
Runkle, H. E ... 1

S

San Francisco Novelty & Plating Works ... 16
San Francisco Pioneer Screen Works ... 15
Schaw, Ingram, Batcher & Co ... 18
Schilling & Sons, Adam ... 18
School of Practical Mining ... 13
Selby Smelting & Lead Co ... 8
Shaw, Willis ... 9
Shepard & Searing ... 15
S. H. Supply Co ... 1
Sierra Nevada Silver Mining Co ... 17
Simonds, Ernest H ... 13
Simonds & Wainwright ... 13
Situations Wanted ... 2
S. M. D ... 1
Smidth & Co., F. L ... 17
Smith & Co., Francis ... 5
Smith & Thompson ... 14
Snedaker, James Angus ... 13
S. O ... 1
Star Drilling Machine Co ... —
State Ore Sampling Co ... 16
Stevens, Ralph E ... 13
Stillwell-Bierce & Smith-Vaile Co ... 18
St. Louis Sampling & Testing Works ... 14
Sturtevant Mill Co ... —
Sullivan Machinery Co ... 9

T

Tallon, C. J ... 1
Tatum & Bowen ... 11
Taylor Iron & Steel Co ... 16
Taylor & Co., John ... 14
Taylor & Co., P. T ... 3
Thomson & Boyle Co ... 10
Trenton Iron Co ... 15
Truax Mfg. Co ... 2
Tyler, S. W ... 13

U

Union Gas Engine Co ... 7
Union Iron Works ... 3
Union Photo-Engraving Co ... 12

V

Van Der Naillen, A ... 13
Van Dieren, Hermann J ... 13
Van Slooten, Wm ... 13
Van Wagenen, Theo. F ... 13
Volger, Wm. B ... 11
Vrchota, John M ... 1
Vulcan Iron Works ... 11

W

Wade & Wade ... 1
Walter, R. J ... 13
Weber Gas & Gasoline Engine Co ... 18
W. C. Co ... 1
Weigele Pipe Works ... —
Western Chemical Co ... 2
Western Machinery & Supply Co ... —
Westinghouse Electric & Mfg. Co ... 10
Wetherill Separating Co ... 14
Wigmore & Sons, John ... 10
Wimmer, Geo ... 15
Witte Iron Works Co ... 18
Wohler, Bartning Suc's ... 2
Wolff & Zwicker Iron Works ... 8
Wood, Henry E ... 14
Woodbury, Geo. E ... —
Woodin & Little ... —
Wynkoop, W. C ... 13

Y

Yawger, I. C ... 9

SITUATIONS WANTED.

WANTED.—POSITION AS ASSAYER AT cyanide plant or mine. Have had considerable experience and hold good references. Address "B," care of Wade & Wade, 115½ N. Main St., Los Angeles, Cal.

SITUATION WANTED BY MILLMAN. Have had 20 years of practical experience. Understands thoroughly pan or battery amalgamation, concentration, belts and machinery. Able to take charge of a mill or any job in a mill anywhere. Best of recommendations. Address Box 4, Virginia City, Nevada.

GRADUATE MINING ENGINEER, five years field work, surface and underground, familiar with cyaniding, surveying and draughting, desires position after Nov. 1st as Assayer and Chemist or Ass't Supt. A1 references as to ability and character. Salary small object; opportunity to prove ability considered more important. Address B. F., care this office.

MINING ENGINEER (technical training), twenty years' experience as surveyor, assayer, superintendent and manager of mines and mills; business qualifications; linguist; at present general manager mining and milling proposition in Mexico; desires to make a change on account of health; best references. Address S. O., Mining and Scientific Press.

Quicksilver

For Sale in Lots to Suit.

REDINGTON & COMPANY, Wholesale Druggists, 23-25-27 Second Street, San Francisco.

Quicksilver

—FOR SALE BY—

The Eureka Company,
OF SAN FRANCISCO.
ROOM 1, - - 320 SANSOME STREET,
SAN FRANCISCO.

WE BUY very rich Ores, Dental Scraps, Tellurium Ores, Mill Wastes, Jewelers' Sweeps, Gold Retorts, Old Iron Retorts, Base Amalgam, Quicksilver, Amalgamated Plates, Gold and Silver, Old Slags.

A. M. DONALDSON & CO.,
ASSAYERS AND WASTE PRODUCT SMELTERS,
1661 Larimer St., Denver, Colo.

Donaldson's Assayers' Slag Hammer { 1 lb.....$1.10 / 1 lb. 3 oz. $1.25 }

MILL PLANS.
Cyanide, Concentration, Smelting, Sampling.
F. D. BAKER, Mech. Eng., DENVER.

WANTED.

CHROME IRON ORE WANTED.

State price and quantities that can be furnished. Send samples and all information to W. C. CO., 3214 Twenty-fifth St., San Francisco, Cal.

WANTED—A VERY LARGE PRODUCING gold or copper mine—at least two millions. Must be presented in A1 shape; title absolute; ample time required for examination. Address S. M. B., Mining and Scientific Press.

INFORMATION WANTED

regarding whereabouts of John R. Williams, about 70 years old. Last heard of as Supt. of a mine in Copper's Hill, Vermont, in 1866. Has an adopted son about 32 years old. Supposed to be placer mining in the West, possibly California. $25.00 reward at Deseret News Office, Salt Lake City, Utah.

WANTED.

Experienced Promoter and Stock Operators

to handle the sale of stock for an oil company. State previous experience.

For particulars, address

C. J. TALLON,
308 Market Street,........San Francisco, Cal.

REFRACTORY ORES WANTED.

1000 TONS or more which will assay $75.00 Gold per ton and over, delivered free of charge at San Francisco, Cal. Correspondence solicited.

C. J. TALLON,
308 MARKET STREET, SAN FRANCISCO, CAL.

SPIRAL SAND PUMPS.

For Pumping Sand, Slimes, Tailings and Crushed Ores.

The Cheapest and Most Durable Pump on the Market. Manufactured by J. H. Frenier & Son.

Represented by M. S. HAUSER,
12 Front Street,............San Francisco, Cal.

BENJAMIN T. LLOYD,
STOCKS, BONDS AND MINES.

Have immediate customers for well-developed Gold and Copper Properties.

P. O. Box 608, **SALT LAKE CITY, UTAH.**

INVENTORS, Take Notice!
L. PETERSON, MODEL MAKER,
544A MISSION STREET, bet. First and Second Sts., SAN FRANCISCO. Experimental machinery and all kinds of models. Tin and brasswork. All communications *strictly confidential.*

FOR SALE.

Two Second-Hand PUNCHING MACHINES,
SUITABLE FOR PIPE MAKING.

FRANCIS SMITH & CO., 46 Fremont St., San Francisco, Cal.

For Sale or Bond---Very High Grade Copper Property Located in Arizona.

JOHN M. VRCHOTA, La Crosse, Wis.

FOR SALE.

A high grade Gold Mine of free milling ore near Grass Valley, Cal. Ore runs from $10 to $30 per ton. It is well developed but not equipped. U S. Patent covers 3000 feet of ledge. Is surrounded on all sides by large dividend-paying mines. A rare bargain offered. Apply to E. J. FRASER, agent for owners, No. 522 Parrott Building, San Francisco, Cal.

FOR SALE.

A JACOBS CONCENTRATOR, been used about four months.

Also a fine O. & S. ENGINE, 25 H. P.

25 H. P. BOILER, used about six months, in good order and condition

Also a 40 H. P. ENGINE, now running and can be seen in motion.

Address E. D. BAKER, YREKA, CAL.

Hoist on Hand for Immediate Shipment.

A first-class Steam Hoist, double 10x12 cylinders, drums 48″ dia. by 30″. For specifications, price, etc., address Mining and Scientific Press.

FOR SALE.

Hydraulic Pump and Press.

Watson & Stillman Pump and Caking Press. Nearly new.

THE S. H. SUPPLY CO.
WRITE FOR CATALOGUE OF MINING MACHINERY AND SUPPLIES.
22nd and Larimer Sts., DENVER, COLO.

FOR SALE,

Lease or Bond, 6 Months' Time.

80,000 acres of timber lands at La Tesca Municipality, Ahuacatlan, Tepic, with mineral deposits—gold, silver, zinc and lead. Water power close to the mines. Address to

ELIAS GALINDO, Box 26, Tepic, Mexico.

A group of 12 Colorado high-grade gold mines are now offered for sale for the first time. Wide veins of rich, free-milling ore. Plenty of wood and water. Good roads, and near R. R. station. Title U. S. Patents. Capitalists or their special agents only need apply. Buyer and seller brought together for negotiations. Address E. J. FRASER (sole agent for owners), Room 522, Parrott Building, S. F., Cal.

FOR SALE.

Lease and Bond, Eighteen Months, Easy Terms, Copper Property, New Mexico.

High grade ore with good gold values. Accessible. Plenty wood and water. Strong vein. Three shafts. Will pay from start. Adjoins large producing mine. **H. E. RUNKLE, El Paso, Texas**

FOR SALE.

One 10″x12″ Double Cylinder, Double Drum Mine Hoist.

One 14″x30″ Duplex Air Compressor, Corliss Steam ends.

Two 54″x16′ Return Tubular Boilers.

One No. 6 Llewellyn Feed Water Heater.

One 36″x9′ Air Receiver.

One Duplex Boiler Feed Pump.

All in good working order and nearly new. Also Rock Drills, Sinking and Station Pumps, Air Pipe, Ore Cars, Skips, Wire Rope, Blacksmith and Carpenter Tools. A bargain for anyone wanting an up-to-date mine equipment. Address Box 376, this office.

THE CALIFORNIA DEBRIS COMMISSION, HAVING received applications to mine by the hydraulic process from the Cataract and Wide West Gravel Mining Co., in the Wide West Gravel Mine, near Eho. Calaveras Co., to deposit tailings in North Outlet and Prospect Gulch; from H. Sleighter and Thomas Harper, in the San Francisco Mine near Todd, Placer Co., to deposit tailings in Dardanelles Canyon; from Chas. S. Deisem, in the Riffle Point Mine, at Grass Flat, Sierra Co., to deposit tailings in Grass Flat Ravine; from Geo. Fitzgerald, in the Lone Star Mine, near Cromberg, Plumas Co, to deposit tailings in Jackson Creek; from G A. and F. W. Bruckerman, in the Renaissance Mine, near Howland Flat, Sierra Co., to deposit tailings in a worked-out pit; from J. R. Bell and A. B Jacks, in the Badger Hill Mine, near Spanish Ranch, Plumas Co., to deposit tailings in Whitlock Ravine; from W. T. Sherman and O. F. Caya, in the Last Chance Mine, near Port Wine, Sierra Co., to deposit tailings in French Ravine; from C. N. Kingsbury, in the Conger Gulch Gravel Mine, near Igo, Shasta Co., to deposit tailings in Dry Creek; from John McGrath, in the Independent Mine, near St Louis, Sierra Co., to deposit tailings in Sears Ravine; and from J. F. Cowdery, in the Chandlerville Mine, near St. Louis, Sierra Co, to deposit tailings in Sackets Gulch, gives notice that a meeting will be held at Room 59, Flood Building, San Francisco, Cal., on November 12, 1900, at 1:30 P. M.

DEWEY, STRONG & CO.
SCIENTIFIC PRESS PATENTS PATENT AGENCY
330 MARKET ST. S.F.

CALIFORNIA STATE LIBRARY

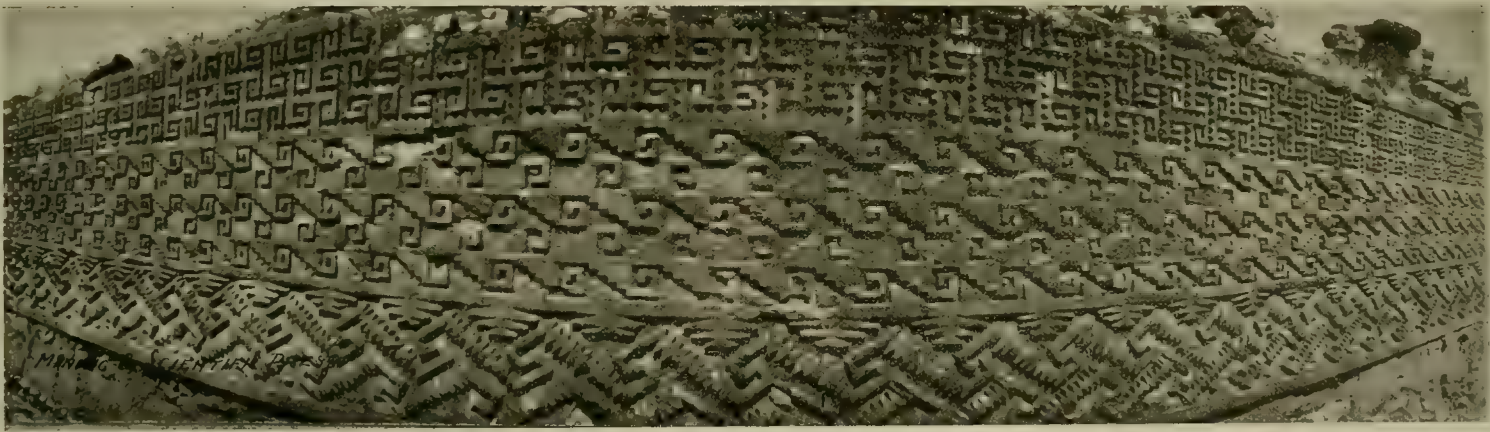
This Paper not to be taken from the library.

MINING AND SCIENTIFIC PRESS.

AND PACIFIC ELECTRICAL REVIEW.

Whole No. 2102.—VOLUME LXXXI. Number 18. SAN FRANCISCO, SATURDAY, NOVEMBER 3, 1900. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

Prehistoric Ruins of Mitla, Oaxaca, Mexico. (See Page 507.)



Detail of Mosaic Wall, Ruins of Mitla. (See Page 507.)

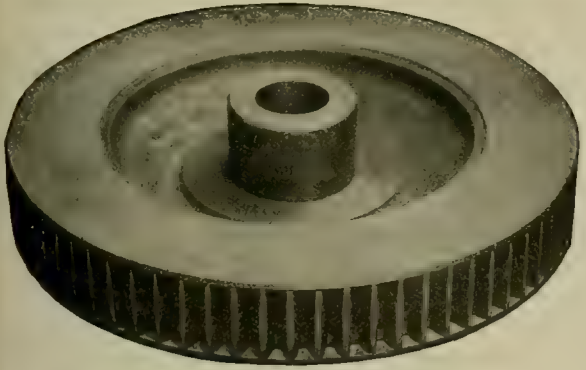


FIG. 3.—The largest Raw Hide gear wheel yet made; 33¾-inch pitch diameter, iron shrouds and center.

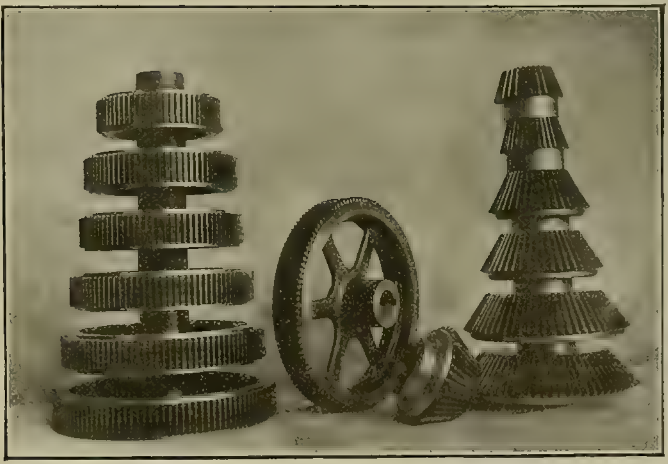


FIG. 5.—Spurs and bevel pinions with iron centers.

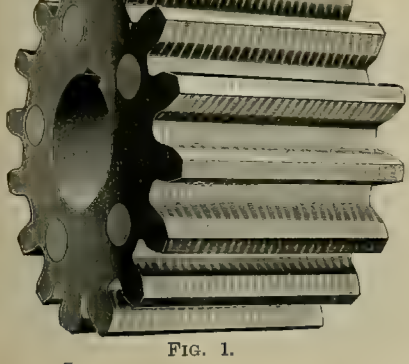


FIG. 1.

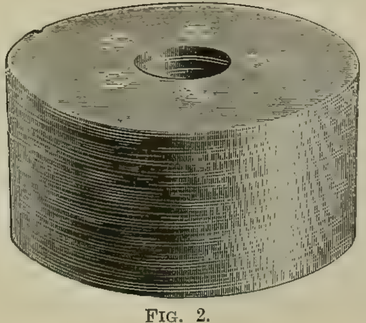


FIG. 2.

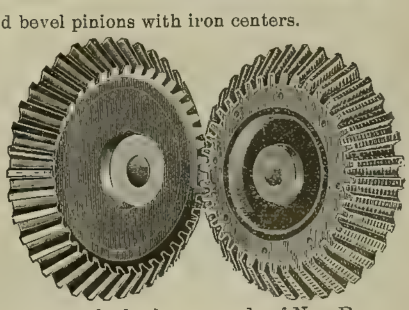


FIG. 4.—Pair of 19-inch bevel wheels, one made of New Process Raw Hide, the other cut cast iron. Made for U. S. Gov't.

RAW HIDE GEARS AND PINIONS. (See page 507.)

MINING AND SCIENTIFIC PRESS.

ESTABLISHED 1860.

Published Every Saturday at 330 Market St., San Francisco, Cal.

ANNUAL SUBSCRIPTION:

United States, Mexico and Canada..........$3 00

All Other Countries in the Postal Union.......... 4 00

Entered at the S. F. Postoffice as second-class mail matter.

J. F. HALLORAN..........Publisher.

Special Representatives:

EASTERN.

E. H. HAVEN..........150 Nassau St., New York City.

MIDDLE WEST.

CHAS. D. SPALDING..........153 La Salle St., Chicago, Ill.

INTER-MOUNTAIN.

W. A. SCOTT..........43 Jacobson Building, Denver, Colo.

SOUTHERN CALIFORNIA.

W. D. CURTIS..........223 W. Second St., Los Angeles, Cal.

San Francisco, November 3, 1900.

TABLE OF CONTENTS.

ILLUSTRATIONS.—Prehistoric Ruins of Mitla, Oaxaca, Mexico; Detail of Mosaic Wall, Ruins of Mitla; Raw Hide Gears and Pinions, 502. The Rand Drill; The Ingersoll-Sergeant Drill, 505. A Labor-Saving Device, 506. Mining and Metallurgical Patents, 508.

EDITORIAL.—A Proud Record; A Standard Necessary; Miscellaneous, 503.

MINING SUMMARY.—510-511-512.

LATEST MARKET REPORTS.—513.

MISCELLANEOUS.—Concentrates, 504. Machine Mine Rock Drills on the Pacific Coast; New Concentration Method, 505. A Labor-Saving Device; California Quicksilver Mines, 506. Nome and Northern Alaska; The Ruins of Mitla, Mexico; Raw Hide Gears and Pinions, 507. Mining and Metallurgical Patents, 508. How to Build Good Roads; Artificial Fuel; Manufacture of Circular Saws; Rights of Employes to Their Inventions, 509. Personal; Commercial Paragraphs; Catalogues Received; Books Received; Recently Declared Mining Dividends, 513. List of U. S. Patents for Pacific Coast Inventors; Notices of Patents, 514.

THE increase in the business of manufacturing electrical appliances in this country is illustrated by the growth of the export trade. During the first eight months of 1898 the United States exported electrical machinery to the value of $1,439,743; during the corresponding period of 1899, $1,828,048; and during the first eight months of the present year the exports have increased in value to an aggregate of $3,590,419.

AT a recent meeting of the Southwest Miners' Association at Los Angeles, Cal., resolutions were adopted setting forth the value to the mining industry of the topographic, geological and hydrographic work of the U. S. Geological Survey, the small amount of the annual funds available therefor, the consequent need of larger federal appropriation, and urging that the States and Territories interested make effort through their officials and Congressmen to secure larger federal allotments for such purpose.

IT is to the advertisers in this paper that its efficiency is largely due. Were it not for their patronage this paper could not be weekly furnished as it is for less than 6 cents per number. It is, of course, because of the thousands of probable customers among our readers throughout the west half of America that so many firms have their business announcements in our advertising columns, and it is because of both facts cited that suggestion is made that whenever our readers make purchases they buy of those whose advertisements they see herein.

GOLD is constant at $20.67 per ounce, but other metals are appreciating in value. Silver is steadily appreciating, and may close the year at a figure higher than it has been since 1896. Copper in that year was worth but 10 cents and lead 2¾ cents. The present prices make a silver-lead-copper ore of greater value than at any time since 1893. It is a noticeable fact that when silver goes up, ordinarily lead and copper drop, and when silver goes down the two base metals appreciate in value. The copper production of the country is in a particularly prosperous condition. The copper product for the first ten months of the year aggregated 4,950,000,000 pounds, valued at about $80,000,000; figuring 8 cents per pound for all expenses, would leave a profit or net earning so far this year of $40,000,000. The Calumet & Hecla of Michigan pays 8.1 cents per pound produced profit; the Boston & Montana of Montana, 9 cents; the Quincy M. Co. of Michigan, about 6.7 cents per pound.

A Proud Record.

The California Miners' Association will hold its ninth annual session on the 19th inst. It is an organization that has done a great deal of good, has been of inestimable value to California's mining industry, and is not generally credited with its deserts. If it does not receive the praise it deserves it might at least be spared some of the unfair criticism bestowed upon it. It is not pleasant to those acquainted with the facts to read in a Shasta county paper that the California Miners' Association is too busy taking care of the hydraulic miners' interests to give any attention to northern California; to read in a Placer county paper that the California Miners' Association neglects the hydraulic miners and devotes too much attention to other sections; to read in a San Francisco paper that politics enters into its purposes, or to read in a Los Angeles paper that southern California is not in its purview. Probably the State is too big; perhaps each mining district or even each mine would do better to have a little association of its own. But, as Fred Zeitler of Nevada county said at the last convention, "in union is strength," and the remark is quoted because it can not be improved. The California Miners' Association has been extraordinarily fortunate in having been able since its organization to command the splendid services of men who freely gave their time and experience to the common good, bestowing effort that, like many of the best things of life, could not be paid for in money. Were all the service so freely devoted to the association charged for, it would have bankrupted any treasury. As it was and as it is, anyone serving the association has been proud to place such service at the call of the committees, and thus, so far as in him lay, to advance and aid the cause of the California miner. It is but due to those men that this be said, and it is but the simple truth that is here stated.

It is unique in the history of mining in any State that for nine years men in every walk of life, unawed by influence and unbribed by gain, men the value of whose hours are counted in dollars, should have given gratuitously of their time and effort in successful advancement of the mining industry, no officer or member drawing a dollar in salary.

If it be deemed advisable to descend from so high a plane; if it be considered of greater good to split up and stray into little sectional coteries; if such secession conduce to greater value to the mining industry of the State, then perhaps it were well to give such idea consideration. But if the same spirit shall prevail that pervades and animates such organizations everywhere, the spirit of union and solidarity, then it were well not to be too hasty in condemning a result not wholly understood, and to stand by the only organization of the kind that has been run with such singleness of aim, such loftiness of purpose and such successful result to the general mining prosperity of the commonwealth.

"WHY is not more said about revision of mining laws and a department of mines and mining in your columns?" asks a Utah subscriber. There are several reasons why; the principal one is that no public journal can afford to keep talking of one thing continuously. This paper originated the ideas, advocated them, got them indorsed, and so did its duty in advancing the interests of the industry it represents, but it is neither our province nor our purpose to weary our readers with any subject, however important it may be. Besides, it argues a poverty of mental resources to be always talking about the same thing; there are other topics of equal present importance to be discussed. Then, too, this paper has no special personal interests to serve. Meanwhile, whenever the American miner makes up his mind he needs those things he will have them. It would be worth $100,000,000 annually to the mining men of this nation to have proper revision of the mining laws and a department of mines and mining, with a cabinet officer. The need for both of these things is even greater than when this paper began their advocacy years ago. It is a national loss that the great basic industry of the nation is so unrepresented, and that the rights of miners should continue to be at the mercy of some little hundred-dollar-a-month clerk in Washington, who can make more contradictory rulings in a week than can be straightened out in a year. The only present suggestion that occurs to us is for mining men everywhere to show the power of their votes and require from Congressmen pledges of support to these measures, and of legislative candidates that they shall require from senatorial candidates satisfactory assurance that they will advocate these most necessary measures.

A Standard Necessary.

The need of an American Standardizing Bureau is manifest to all who have the advancement of science at heart, and it is hoped that during the coming session of Congress a bill authorizing the establishment of such a bureau will be passed. A bill for this purpose was introduced last winter and was favorably reported by the House committee having it in charge; the Senate committee on commerce, however, failed to give it consideration. Its present necessity arises principally from the electrical field. In the latter, while there is a standard volt and a standard ampere (although not fixed by law), we have no one standard for the unit of resistance—the ohm. An editorial in the issue of March 10th pointed out that there are at the present time four standards for the ohm extant, namely, the "legal" ohm, the "British Association" or "B. A." ohm, the "International" ohm, and the "Siemen's" ohm.

The "legal" ohm, adopted at Paris in 1884, was made equal to the resistance offered to flow of electricity (unit flow under unit pressure) by a column of mercury one square millimeter (0.03937 inch, or a small fraction less than $\frac{1}{25}$ inch) in section and 106 centimeters (0.4173+ inch) in length, the temperature being at the freezing point (32° F. or 0° C.) and the pressure of the air being equal to the pressure at the base of a column of mercury 760 millimeters (30 inches) in height. The other units differ from the "legal" ohm only in the matter of length of mercury column, so that in the adoption of a standard ohm the only thing necessary would be to fix upon some uniform and universal standard of length for the latter. In the matter of "candle power" also there is no standard.

The main thing, however, is to adopt invariable standards for the volt, ampere and the ohm, and when this is done the determination of other standards will be made easy.

GOLD DREDGING is proving to be a profitable form of gold mining in California as elsewhere, but extravagant statements are being made regarding the possible returns. The truth is good enough without exaggeration. A prominent dredger operator states that with his dredger in the last year he handled 320,000 cubic yards of material, which averaged 15 cents per cubic yard, at a total cost of 5 cents per cubic yard. This last item included every detail of expense, including interest on the amount invested. This, in round numbers, would mean the handling of 1000 cubic yards per day, at a daily net profit of $100, which is a fair average statement of results, and in this case a truthful one. Dredging is yet an evolutionary form of mining. Its origin was in New Zealand, in 1869, where the first dredging apparatus is described as having consisted of "a strong iron ring, technically known as a 'spoon,' to which was secured an ox-hide bag and a long pole. A rope was fastened to the iron ring and secured to a hand winch on the bank of the river. The bucket and pole were taken out and dropped into the stream by means of a boat, the bucket being pressed by the pole as deep as possible into the wash in the bed of the river." The bucket was then hauled ashore by the winch, and the contents put through a California cradle. The process from such primitive device to the $45,000 gold dredger of 1900, operated by electricity, illustrates mining and scientific advance.

COMMENTING on editorial reference herein in the issue of the 20th ult., to the projected absorption of the Guggenheim smelting interests by the American Smelting & Refining Co., several contemporaries have stated that "this will leave the trust in supreme control of all the smelting business of the mining States." The remark does not apply to the Pacific coast, where several large smelting establishments are in active operation entirely independent of any combination.

Concentrates.

"CONCENTRATES" is not acquainted with any method of "tempering" brass.

MACHINERY imported into the Argentine Republic pays a duty of 10% ad valorem.

ANY U. S. town with a population not to exceed 3000 can have a national bank with a capital of $25,000.

AN assay should be of a sample, not a specimen, to be fair to the owner or prospector as much as to the prospective buyer.

THE term "supernatant" is usually understood to apply to a liquid from which a precipitate has been thrown down.

GASOLINE ENGINES are feasible at any altitude. There is one in satisfactory operation near Silverton, Colo., 13,000 feet above sea level.

REFINING COPPER by the electrolytic method costs ½ cent per pound at Eastern refineries and three-fourths of 1 cent per pound at Anaconda, Montana.

GOLD having been deposited as a black or brown powder, by means of electrolysis, will again redissolve if the solution contains free nitro-muriatic acid.

"IT is a constant wonder to me how you can publish and send so valuable a paper fifty-two times for $3," is what an Arizona subscriber says in renewing.

NEW MEXICO'S mining statutes make void relocation of a mining claim to avoid the performance of annual labor, if made within ninety days of the abandonment of the first location.

QUESTIONS cannot always be answered in the issue next published after their receipt. A question that takes but two minutes to ask may take a month to secure correct or accurate answer.

SPODUMENE is a mineral mined near Custer, South Dakota, and is used as a source of lithium carbonate. It is worth about $25 per ton on board the cars at the mine ready for railway shipment.

EASTERN physicians say that many returned Nome gold seekers have developed symptoms of insanity. The fact of their going argued such development in some cases just prior to their departure.

SMOKE from charcoal pits is susceptible of economic saving. Each cord of wood contains 28,000 cubic feet of smoke—2,800,000 cubic feet smoke produces 12,000 pounds acetate of lime, 200 gallons, 25 pounds tar.

"CLIMAX" WIRE is a special wire made by Jno. A. Roebling's Sons, Trenton, N. J., containing about 24% nickel, and intended for use in electrical machines as "resistance wire," instead of German silver.

ROCKS cannot be classed precisely. There is no absolute type. A granite may shade into a syenite and a syenite into a diorite. Butte granite varies between a basic hornblende granite and a quartz diorite.

PERIODICALLY it has to be stated that the market for molybdenum ore is fully supplied. Molybdenite carrying 60% and not impregnated with copper, lead, zinc, etc., would bring about $175 per ton, delivered at Philadelphia.

J. B. HOBSON, manager Cariboo hydraulic mine, B. C., says that the top gravel there carries about 5 cents in gold per cubic yard; the boulder clay little if any; the gravel and bouldery ground on bedrock an average of 67½ cents per cubic yard.

MARCONI is understood to have established perfect independent wireless telegraphy from Poole, England, to St. Catharine's, Isle of Wight, a distance of 30 miles, by means of a pair of metal cylinders elevated 27 feet above the ground at each station.

THE next meeting of the California Debris Commissions to pass upon applications to mine by the hydraulic process will be held at the office of the Commission in San Francisco on the 12th inst., when eleven separate applications will be acted upon.

ANY speed is "dangerous" if the vehicle can not be stopped in a short space. An engine going 5 miles an hour is as dangerous as if it were going 50 miles an hour if the object is so near that the engine or vehicle can not be checked in speed. The question of speed is really one of brakes.

IT is difficult at any time, and ordinarily impossible, to name "the best" of any device. It can not be stated what is "the best" pump, though one may have his preference. Any pump well made by a man who has experience and intelligence would give good work under certain conditions and requirements.

THE simplest arrangement for parting silver buttons is a sand bath, upon which may be placed glass mattrasses containing nitric acid, the sand bath being placed upon a furnace until the acid is hot, then drop in the buttons and boil ten or fifteen minutes. Either Chapman's or Richard's filtering pumps are efficient.

GAS ENGINES may be divided, generally, into two classes—those effecting combustion at constant volume, and those securing that result at constant pressure. The Otto engine is the embodiment of the former principle, the Diesel motor of the latter. Ordinary illuminating gas contains about 650 B. T. U. per cubic foot.

THE Southern California Power Co., Los Angeles, Cal., has a 33,000-volt, 83-mile system. The Standard Electric project in central California involves the transmission of even greater voltage 150 miles. Under favorable climatic conditions there is no insuperable obstacle to successful transmission of 1000 H. P. over a wire 200 miles long.

GEO. F. BECKER of the U. S. Geological Survey says: "In such rocks as I have seen in the quicksilver mines of California wide simple fissure veins are not to be expected at any level, and irregular chambers are not so likely to be met with at great depths as at small ones, though they may occasionally be found at any distance from the surface."

THE Frue is a good type of the vanner; the Wilfley, of the riffle washer. The whole matter of concentration has as its basis the attribute of specific gravity, and, like nearly everything else connected with ore treatment, the quality of the ore and the surrounding circumstances must determine the manner of treatment in each individual case.

TO PREVENT the piracy of foreign copyists of American inventions "design patents" may be secured in foreign countries where patents are issued; or, a trade mark or a trade name may be adopted, registered in the U. S. Patent Office, and then registered with such foreign countries as have treaty relations with this country concerning trade marks.

THE arrangement with the cyanide patentees made by the Australian and New Zealand governments, respectively, was the same in both cases—the government bought all existing agreements for a lump sum of $100,000. The government royalty for use of the patent by cyaniders is 2½% till the purchase money is repaid, when further charge will cease.

A GOOD steam motor or "automobile" should be had for about $600; one in which gasoline furnishes the power, $1000; an electromobile, $1500. A gasoline automobile in some respects is preferable, and gives more power from a definite quantity of fuel than either of the other types. Automobiles are in use in San Francisco capable of going from that city to Los Angeles—600 miles.

TRUE "slimes" consist of the argillaceous portion of the ore existing in it, either as infiltrated clay, or as kaolin from the kaolinization of feldspars, or as hydrous magnesian silicates. This material is best separated from the granular part of the crushed ore by hydraulic classifiers. So long as the particles are granular, no matter how fine, they can be economically treated by leaching.

LOSERS of money in silly oil and copper investments have none but themselves to blame. Making inquiry after the event is in a line with such folly. A little careful inquiry before the investment would save such loss. Usually stock in a mining company is of value directly proportionate with the urgency displayed in offering it to the public—the more urgent the offer the less value to the proffered stock.

THE advantages of a Cornish pump are that it does good work, works well with clean or dirty water, and is so simple that almost any one can attend to it after a little practice. It requires little attention except to change the buckets, clocks, etc. Among its disadvantages are that it takes up considerable room in a shaft, it will not work economically with a throw of more than 250 feet and is of relatively great weight.

EVEN the meager $100 of annual "assessment work" on an unpatented mining claim is sometimes squandered and valueless when done with the idea that it is a sort of irksome Government tax to be perfunctorily performed "to hold the claim," being thus often done not where it would do the most good but where it can be done most easily. The true object of annual assessment work is to develop the property in the best interests of its locator, and thus add to its value.

FOR the treatment of cupriferous ores and concentrates which could not be treated successfully by ordinary cyaniding, Park and others claim to have obtained satisfactory results by first subjecting the ore to a chloridizing roast, and then leaching out the copper chlorides with water. After an alkaline and water wash the gold and silver contents were extracted by cyanide by percolation. During the roasting the silver sulphides present were chloridized to the chloride, which was then dissolved by cyanide.

THE law of Mexico prevents private ownership of mines by either native or foreigner. All mines belong to the Government, and the men or companies which work them do so by paying for a concession, and then paying a tax on the output. Anybody can get a concession if they can find one that is vacated. The holder must keep at least four men at work in useful employment about the mining plant. If he neglects to do so for a period of sixty days he may be denounced, and the denouncer can obtain the concession if he will begin work within sixty days.

SILVER in all its forms requires a stronger solution of cyanide to effect its solution than gold, and occasionally the large relative consumption of cyanide is due to the presence of silver sulphide—Ag_2S. The potassium sulphide resulting from the dissolution of silver sulphide also occasions a loss of cyanide. A trace of alkaline sulphide in cyanide solution does not act injuriously, but an appreciable quantity causes the precipitation of a portion of the dissolved gold in the vats. Some considerable percentage of this precipitated gold is redissolved by the excess of free cyanide present in the solutions, but in such cases as that under discussion it always requires this excess to obtain adequate extractions, thus necessitating the use of comparatively strong solutions.

A RENO, NEVADA, man asks: "Will you please inform me whether an ore containing a large percentage of black oxide of manganese has a market value?" This question is published to illustrate a usual mistake, viz., not giving sufficient data to permit intelligent answer. If the ore is a manganiferous iron ore, containing at least 6% to 8% of manganese, it would have a commercial value as a flux in silver-lead smelting. It might also have a value for steel makers; but, as the Reno inquirer does not state what the other constituents of the ore are, it is impossible to fully answer his question.

HE is not entitled to a patent who suggested the invention in dispute and made an experiment on a small scale, but did no more till another had devised it, obtained a patent and begun the manufacture. All inventions which are patented must be marked "Patented," together with the day and year upon which the patent was issued. In case of failure to comply with this law no damages can be collected. He is the real inventor, and entitled to a patent, who first makes a machine capable of useful operation, though others may have previously conceived the idea and made experiments toward putting it into practice.

TO EXTRACT the fragment of a drill, punch or other steel tool which has broken off while working any metal but iron or steel, the object containing the broken-off piece is immersed in a boiling solution composed of one part commercial alum to four or five parts water. This solution may be held in a vessel of stoneware, porcelain, copper, etc., but not of iron. The object should be so placed that the gaseous bubbles that form as the alum attacks the metal are easily disengaged. At the end of a short time the fragment of the tool is entirely dissolved. A piece of a steel spring .16 inch thick is dissolved in a concentrated solution of alum in three-quarters of an hour.

THERE is nothing illegitimate in bona fide sale or purchase of regularly issued stock in any legitimate enterprise, nor is there, necessarily, any more of a "gamble" in mining stock than in any other kind of stock rightly valued. As with a mine, so with a railroad or a bank or a factory. One could not well cut up the railroad or mine or factory into little bits and sell it in minute sections; but bits of paper called "stock certificates" can be issued, bought and sold, representing the tangible property, shares in which are thus susceptible of transfer. The owner of any number of shares owns just that percentage of the property so represented, and it is just as legitimate to buy or sell such shares as to buy or sell the property itself.

IN the electrolytic extraction of quicksilver from cinnabar the raw material is crushed to a fine powder, and then treated with a hot solution of sodium-sulphide containing caustic soda. The electrolytic vats are of iron, and may be used as cathodes; the anodes are of sheet steel. It is stated that the mercury can be readily separated from the upper part of the cell, and is enriched with equivalent amounts of copper, silver, zinc, cadmium, nickel and iron in the lower or anodic compartment of the cell. The solution on issuing from the cell is then passed through a series of vessels, in which the silver is displaced by copper by simple chemical action. Copper equal to about one-fourteenth of the weight of the alloy used has to be consumed in these in order to effect the desired precipitation of the silver. It is not possible to remove the last traces of silver by this method, but the amount found in the deposited copper should not exceed 0.3% when the process is working satisfactorily. After passing through a series of the sulphide solution, by using a current density of 0.5–0.8 ampere per square decimeter and an E. M. F. of two volts the electrolyte can be used again for extracting fresh ore after addition of sulphur.

IN the issue of Oct. 6th a method was given of making sodium amalgam. Wm. Crookes, the inventor of the alloy, has furnished more detailed directions as to its preparation. The mixture of sodium and mercury is in the proportion of three parts of sodium to ninety-seven parts of mercury. "Place a strong iron flask with a narrow neck nearly up to the mouth in sand on a sand bath kept at a temperature of about 300° F., weigh out the mercury and sodium, and put the former into a flask, and then add the sodium in pieces as large as a pea at a time, waiting for the action to cease before adding a fresh lump. The sodium had better be dropped in with a pair of tongs, and the hand should have a cloth over it. At each addition of the sodium a slight explosion is heard and a bright flame will issue from the mouth of the flask. The action gets less violent as the mercury becomes richer in sodium. When the whole of the sodium has been added, pour the amalgam into a flat dish while still liquid, and when cold break it up and preserve in a stoppered jar. It will not require to be kept under naphtha. The amalgam forms a mass of long, needle-shaped, brilliantly metallic crystals, which interlace in every direction, but have very little cohesion." The inventor recommends the use of the amalgam in coarse powder. By sprinkling it over the wetted surface to be amalgamated, then rubbing it over with a little clean mercury, a firmly adherent and brilliant coating of mercury will be given to the metal. The use of sodium amalgam has a tendency to keep the mercury bright and active, but it cannot be expected to perform any other part in the extraction of gold than in aiding amalgamation.

Machine Mine Rock Drills on the Pacific Coast.

NUMBER IV.

Written for the MINING AND SCIENTIFIC PRESS by by A. F. CHODZKO.

The Rand, Ingersoll and Sergeant drills have been in successful use for so many years, both in this and other countries, and are in consequence so well known, that a brief description of these machines will serve the purpose of this article.

The accompanying illustrations represent the latest forms in which they are found on the Pacific coast.

Each one of these rock drills is typical of a distinct class of valve motion, the Rand having a slide valve positively operated by the main piston through a tappet. The movement of the piston valve in the Ingersoll is controlled by the main piston, which covers and uncovers at the proper time the aperture of posts leading to both ends of the valve chest respectively (Eclipse type).

In the Sergeant drill the piston valve is also operated by pressure, regulated by a curvilinear auxiliary valve, shifted back and forth by contact with the main piston. In all of them the latter is recessed, and carries at its rear end a nut, engaging a rifle bar which imparts to the piston and its rod a twisting motion, by means of a ratchet gear. In the Ingersoll and the Sergeant drills the ratchet head is turned smooth, and carries some swinging pawls, which engage the teeth of a stationary ring in the ratchet box, while in the Rand drill the ratchet head carries the teeth, and turns against stationary pawls.

In all these machines the feed is effected by hand, at least for underground work, and flat or spiral spring buffers are located at the back end of the cylinder.

The shells are secured to the clamps by a conical heel, with the larger base outward in all of them.

Two distinct types of rock drills are manufactured by the Rand drill firm, and, while quite similar in many points, they differ in the arrangement of their valve motion. One of them, known as "Little Giant," may be characterized as follows:

Valve motion: Tappet operating a slide valve from underneath. This arrangement has been reproduced in the Giant drills of local make, previously described.

Rotary motion: Fixed pawls, movable ratchet head.

Feed: Hand.

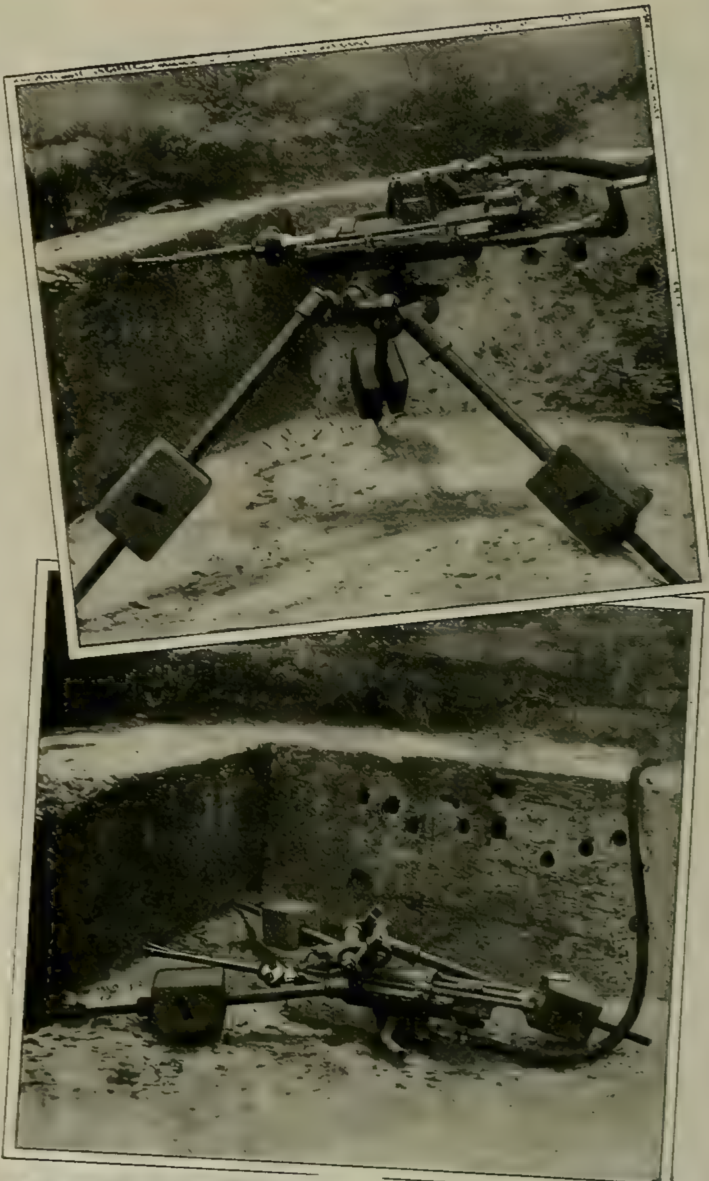
The other type of Rand drill, known as the "Slugger," is characterized by the following features:

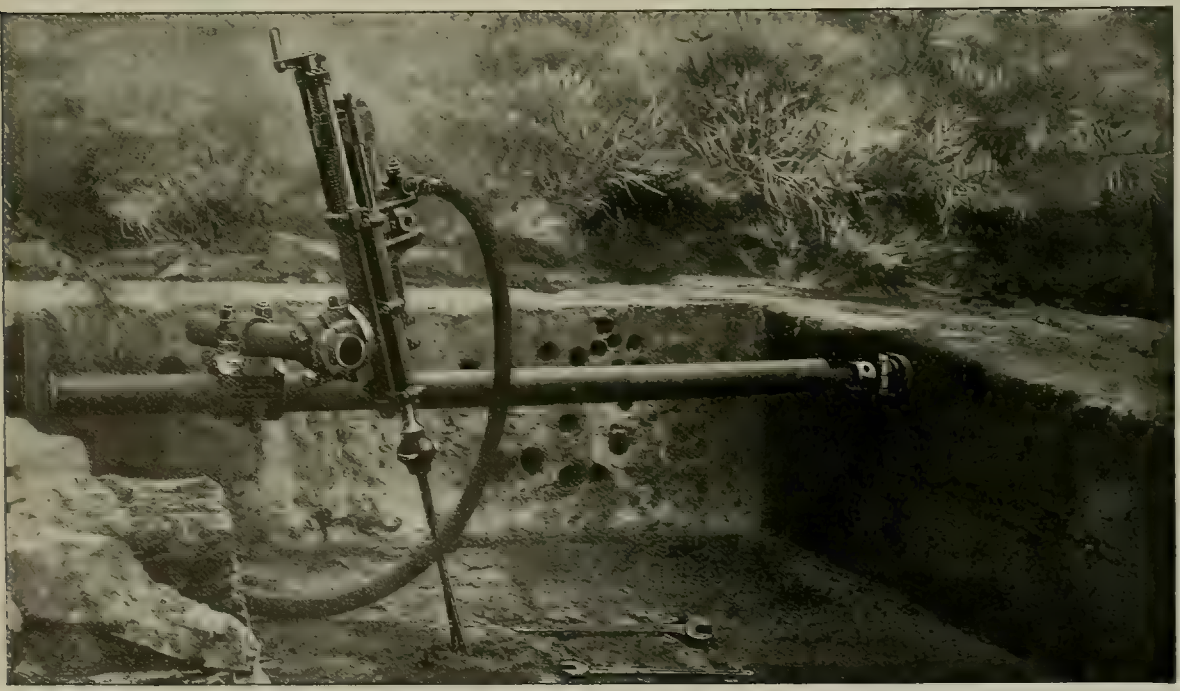
Valve motion: Balanced cylindrical valve, Eclipse type. It will be remembered that this appellation is merely intended to designate a piston valve operated by pressure, through the uncovering or closing of appropriate passages by the main piston of the drill.

These ports operate the valve by closing in the latter types of the Slugger, while they accomplish the same object by opening in some previous designs.

The momentum of the piston on the back stroke is checked by cushioning in all machines of this variety, but this is effected by a premature closing of the exhaust in some machines, and by a convenient amount of lead in others.

One distinctive feature of this type is the possibility of adjusting the point of cut-off so as to work expansively.





The Rand Drill.

Rotary motion: Stationary pawls and movable ratchet head.

Feed: Hand.

Several patented devices are found, namely, in the piston rod and chuck, in the attachment of the rifle to the ratchet and to the back head, in the split crank and feed nuts, in the adjustable shell slides, and in the throttles. These points can only be mentioned in this brief review.

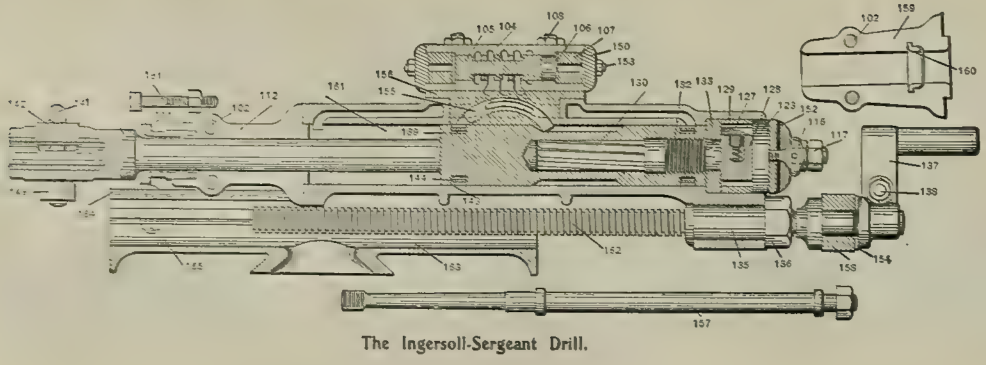
Some intermediate varieties of Rand drills are found in the market, combining the salient features of the two types just described. Such is the "Little Terror," which has a piston valve* in the exhaust nozzle, to vary the length of stroke when starting a hole.

All these machines can be operated by steam or compressed air at will, the change involving only a difference in the quality of stuffing-box packing.

The clamp used to secure the shell to a tripod or to a shaft bar or arm operates, in principle, by holding the boss of the shell with a movable dovetailed hook, secured in position by a nut.

* Operated by tappet and a restrictive valve.

(TO BE CONTINUED.)



The Ingersoll-Sergeant Drill.

New Concentration Method.

At a new tailings plant just erected at Kellogg, Idaho, it is intended to give practical test to what is considered a new principle in concentration of ore. The idea in practice is a movable table with either a wooden or a metal top, covered with a screen of wire or cloth, the latter being considered by the inventor preferable for very fine pulp. The feed runs onto the top of the screen while clean water is fed on the table from the sides, entering below the screen. The table is then given a reciprocating motion, the stroke being given by a cam while the return depends on springs. The quicker stroke of the cam forces the metals to the high end of the table, as in the bumper concentrator, while the water and lighter waste runs off at the lower end. The tables can be made any size, but those in use are 39 inches wide by 8 feet long, and the stroke can be made of any length required, depending on the weight of the metal being saved.

The water running directly onto the table below the screen has a free outlet; but the screen, instead of sagging beneath the weight of the feed on top, begins to rise in the middle as soon as the machine starts. Onto that the feed runs, the finer parts working down through the screen onto the table while the coarser runs off on top of the screen. The metal works to the high end of the table along the edges, while the waste is carried off. The metal which passes through the screen onto the table is forced back through it again when it approaches the high end of the table and follows the end of the canvas screen down to the settling tank under the table.

It is desirable that the pulp should be reasonably even. The manufacturers say that by the use of screens of different sizes any size pulp from two to eighty mesh may be handled, and a complete plant would carry tables with different screens, while a classifier would separate the feed into grades of the same coarseness. The motion of the machine makes the top of the water take a wave form, one wave pursuing another continually, and the rolling motion thus given the surface carries the floating particles down, and, once submerged, it is claimed that they sink to the bottom "as soon as the water is still enough."

A Labor-Saving Device.

In mining and metallurgical work the present constant effort is to reduce cost of operation. So effective is this tendency that in many instances the cost is less than one-half what it was ten years ago.

More especially is this ever-present effort at economy manifest in handling materials. Among other labor-saving equipments are reciprocating conveyors, one system of which is portrayed in the accompanying illustrations, which show the device in successful operation at the plant of the Eureka Cyanide Co., Mound House, Nevada, put in about two years ago by Hey & Patterson, 51-53 Water St., Pittsburg, Pa. The illustrations make little explanation necessary; regarding the driving mechanism, it will be noted that one main crankshaft moves all the machinery. In their reciprocating conveyor the only moving part in contact with the material is the flight, which is inexpensive and easily replaced. Detailed particulars will be sent to any one interested.

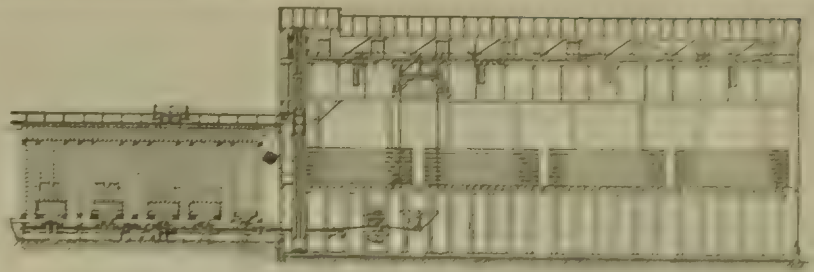


FIG. 1

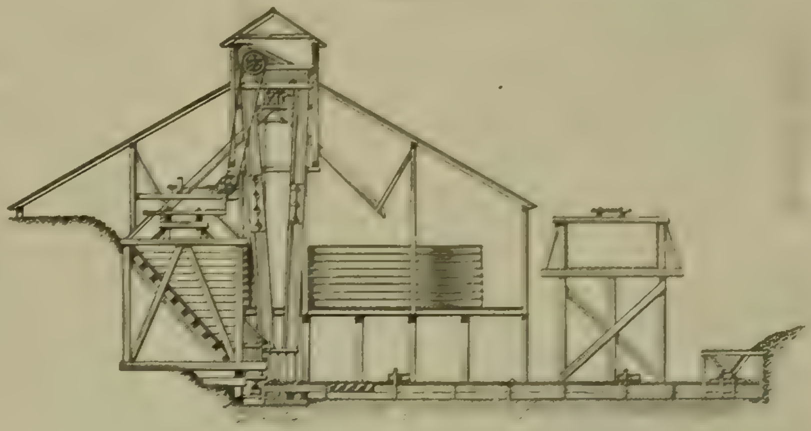


FIG. 2.

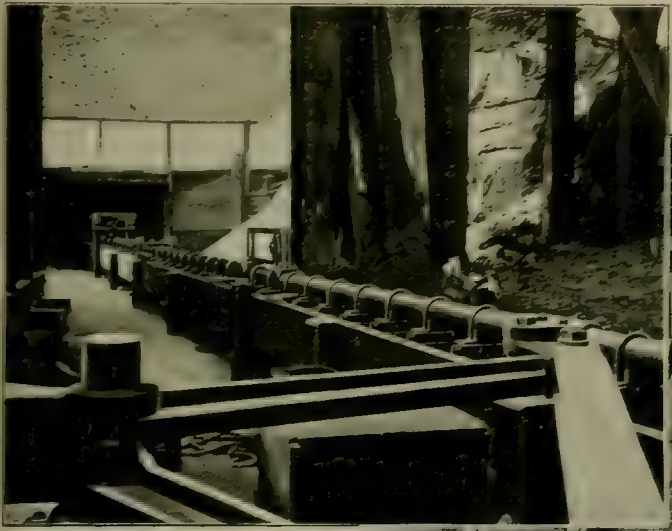


FIG. 3.

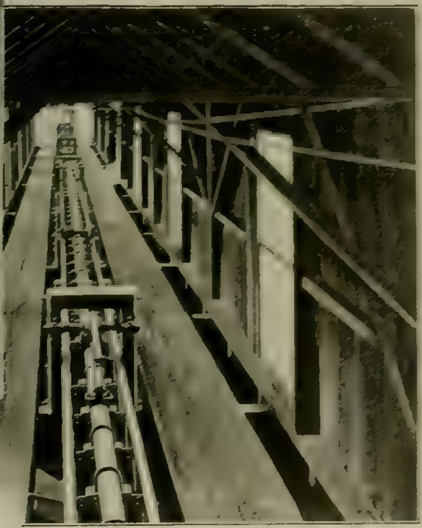


FIG. 4.

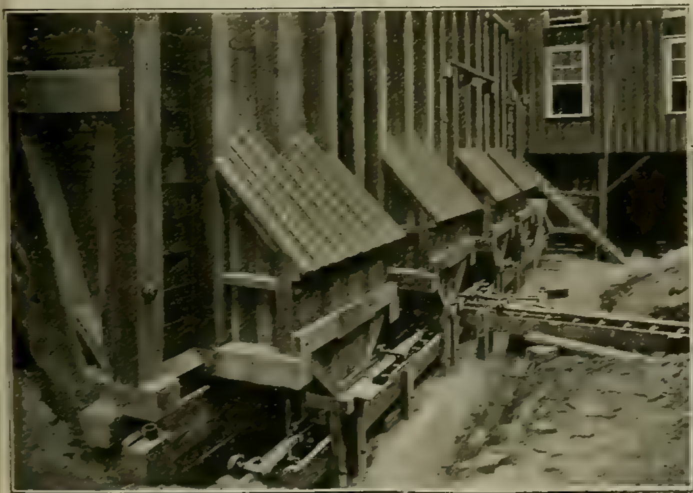


FIG. 5.

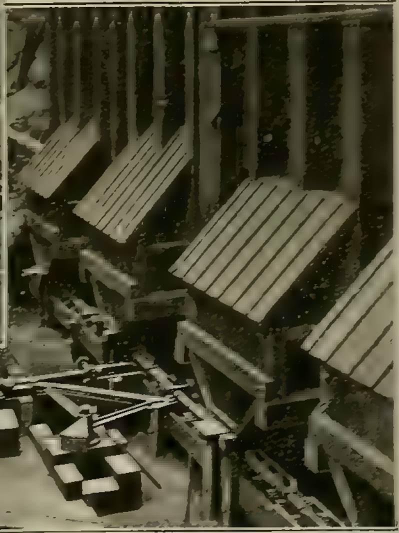


FIG. 6.

California Quicksilver Mines.

At Savonas, B. C., Douglas county, Or., and Terlingua, Texas, are reported quicksilver deposits commercially profitable, but the only continuously profitable deposits of cinnabar in the United States have occurred in California, and in that State about all the mercury used in America or exported is produced. The ore is usually of a deep red color, soft, easily scratched with the nail, and its streak is of a bright vermilion hue. There are two other varieties, one a selenide of mercury. Tiemannite looks like a telluride of lead, its streak being dull grey, the same as galena. The other, metacinnabarite—black mercury sulphide—looks somewhat like graphite or black lead, but is hard, with a fracture similar to grey copper and streak the same color as the mineral itself. These latter are of rare occurrence and are seldom found in quantities of any commercial value. The ores of quicksilver usually occur in or near to dykes of serpentine, although one of the best mines in California—the Oat Hills mine, Napa county—is almost entirely in a soft, white sandstone. The deposits seem to be strongly allied to mineral springs, it being not uncommon to note volumes of hot water charged with sulphur, salt, magnesia, iron, lithia, lime and soda. The gases accompanying are marsh gas, sulphuretted hydrogen, chlorine and carbonic acid, which sometimes occur simultaneously. Consequently the water is unfit to use in boilers, and is hard on pumps or any iron machinery. In these mines when any hot water exists the temperature is from 120° to 150° F. Artificial ventilation with power and fans is resorted to. The temperature goes down to about 85° when connected with the surface by air shafts and tunnels. In mines where there is no hot water the temperature seldom rises above 100°. The artificial ventilation is also used there until two or more openings to the surface are made. In some of these mines petroleum in considerable quantities is found, and a hair-like growth of epsomite grows from the walls and floors in great quantities, sometimes attaining a length of 10 to 12 inches. It is a beautiful white and gives the old and abandoned workings a most striking appearance. Occasionally large bodies of nearly pure sulphur are found. The ore is mined by the same general processes as silver and gold—with hammer, drills and Giant powder—the ordinary quartz miner doing the work at $3 per day of ten hours. The ore is dried, either on steam tables or on top of the main furnace, and is then dumped into the top of the furnace, which has two airtight coverings, each moved by levers, independently of the other. The top cover is removed and a charge of about one-quarter of a ton is dumped in on the lower cover, then the top cover is closed and the lower one opened, allowing the charge to drop into the furnace.

which is not very hot. A heat of about 700° F. is needed in the hottest part of the furnace, which is at contact with the fires, the mercury becoming vapor between 600° and 700°. The firing is done with wood, it being cheaper than coal in California. With some of the ores little wood is needed, as the sulphur in the ore when burning maintains nearly enough heat to reduce the quicksilver. The discharging of the roasted or burned ore occurs at the same regular intervals as charging, so that an even quantity of ore is constantly exposed to the fires for about thirty hours. The entire fumes from the furnace, consisting of mercury, petroleum, wood oils, creosote, sulphur, acids and water, are carried through tight flues into condensers, either built of brick with many compartments or of cast iron connected by flues, from which perhaps 60% of the mercury will flow into catch basins. The residue is called soot and contains mercury, charcoal (wood ashes), oil, sulphur, salt, etc. This residue is first treated with a bath of strong alkali to remove oil and grease, then mixed with four times its bulk of quicklime, which is allowed to slack in contact with the soot. It is then put into shallow iron pans and charged into cast iron retorts which hold from 600 to 700 pounds. This is treated at a low red heat for twelve hours, when no mercury should be left in the residue. From the retort there is an exit pipe, which is water jacketed, through which the fumes pass and are recondensed. The mercury is recovered in a pure state and is put into wrought iron bottles or flasks containing 76½ pounds (a Spanish measure) and shipped to market.

There is little danger, ordinarily, of the miners getting salivated. If the mechanical condition of the furnace, draught and condensers is good, and no leaks are allowed, there is no danger at the furnace. White men have charge of the furnaces, but considerable of the work of handling ores, soot and quicksilver at the furnaces is done by Chinese.

Ores of mercury containing one-half of 1% mercury can be treated at a profit. Its uses are for plating, for making Chinese vermilion, for medicines, as calomel and other preparations, for making fulminate of mercury, the high explosive used in Giant caps and other detonators, and for amalgamating gold, silver and copper in quartz mills and placer sluices.

Nome and Northern Alaska.

Written by a Returned Prospector.

While the Nome rush, on the whole, was a failure, it is manifestly unfair to condemn the region on that score, as several things conduced to that result.

Although too much stress was laid upon the beach diggings, the latter, undoubtedly, drew the majority of those who went to Nome this spring, and the fact that it would play out was not figured upon. The beach was worked until late in December, 1899, and again early this spring; consequently, there was little left for the vast majority of new comers, a great many of whom were inexperienced and unprepared for such an emergency. As a result, "cold feet" became prevalent and demoralization generally ensued.

Those who had arrived a short time before with high hopes, returned to the States with those hopes shattered and thoroughly disgusted with the region.

Outfits on all sides were sold and prices nearly touched bedrock. To those who went up to prospect and locate river and creek claims, additional difficulties presented when it was found that the whole country within a radius of from 150 to 200 miles from Nome had been staked during last winter.

Notwithstanding these drawbacks, considerable prospecting and new work were done during the season.

While results so far, outside of Snow Gulch, Anvil and Dexter creeks, in the Nome district, and at Tapkok, in the Bonanza district, have not been phenomenal, they have been sufficient to show that there is gold in paying quantities in the region, which, when litigation is settled and things are put on a sound basis, may turn out to be a large producer.

GOLOVIN BAY DISTRICT, ALASKA.—The Golovin Bay district, comprising the Inland, Big Four, El Dorado, Discovery and Blake mining districts (now merged into one, with recording office at Council City), is drained by the Fish, Keuchablock, Neukluk and Casa de Paga rivers and tributaries. Mining operations have been carried on principally around Council City (now called Golovin City), for the past two or three seasons. This season principal work was done on Willow, Ruby and Banner creeks, in Inland district; on Dixon creek, Big Four district; on Ophir, Sweetcake, Elkhorn, Warm and Crooked creeks, in El Dorado district, and on Melsing creek, in Discovery district. Results were good—yield averaging about $30 to the shovel per day.

Ophir and Sweetcake are the banner creeks to date, some of the cleanups having run from thirty to forty pounds this season.

A two days' run on Ruby returned $400, four men working claim.

Council City, with a population of about 1000, is about 80 miles from Nome overland and 120 miles by water. It is on the Neukluk river, 9 miles above the Fish river, and 40 miles above Chenik, on Golovin bay.

Council lies in a belt of spruce, making fuel and building material at that point comparatively cheap.

Wages this season were $5 per day and board.

Bedrock, principally mica schist and shales, is variously found from 1½ feet down. Values in some cases are found from surface down, but generally a foot or two of stripping is required before pay is struck.

While comparatively unknown at the present time, Anvil and Dexter creeks, Snow Gulch and Tapkok having occupied the attention of the outside world as good producers, those owning claims in the district figure on an active season.

The Ruins of Mitla, Mexico.*

Written for the MINING AND SCIENTIFIC PRESS.

Oaxaca, Mexico, is not only a rich country from a mineral standpoint, but is one of the most attractive to the tourist. In the valley of Tlacolula, 20 miles southeast of the city of Oaxaca, are to be found the ruins of Mitla, looked upon by all scientists who have visited them as the crowning achievement of an ancient and vanished people. Just when Mitla was built or by whom nobody knows. The ruins were discovered by the Spaniards who invaded Mexico in 1521, when all records found were destroyed. They are now just as they were then; 379 years has not made the slightest change. The building of the Mitla had its birth so far back in the twilight of time that naught but tradition remains. Among the Indians who inhabit the hamlets adjacent to the ruins traditions are rife. The inhabitants of these villages are descendants of the Zapotec Indians, and they claim that at one they were a great and powerful people, and that Mitla was the dwelling and burial place of the Zapotec kings.

The ruins of Mitla are peculiar to themselves, being of stone; they partake of no known civilization and have no likeness either to the ruins of Yucatan, which lie to the northeast, or of those in central Mexico, lying to the northwest. Situated as they are between these historic points, it is supposed by some to be a connecting link. Travelers and explorers who have visited all these old relics of by-gone days, and have spent weeks and months in their study, find that Mitla stands alone, conspicuous for its singularities of architecture and ornamentation.

Bancroft, the eminent antiquarian, says in "Native Races of the Pacific Coast:" "Mitla is probably the finest group in the whole Mexican territory. Here was a great religious center, mentioned in the traditional annals of the Zapotecs, the original name of which seems to have been Lioba, or Loba, the place of tombs; called by the Aztecs Miquitlan, Mictlan or Mitla, (place of sadness), dwelling of the dead, often used in the sense of hell. The gloomy aspect of the location accords well with the dread significance of the same. A stream with parched and shaded banks flows through the valley; no birds sing or flowers bloom over the remains of the Zapotec heroes."

The ruins are in five groups; three of them are well preserved and attract the most attention. One group is about 120x100 feet, with walls standing 15 to 18 feet high, enclosing a large court, or patio; around this patio the walls are laid off in oblong panels, built in the most unique designs in bas-relief, mosaic in character. The largest group is about 300 feet long by 110 feet wide. The walls are about the corresponding height as those described above, and about 6 feet thick. They have the same character of mosaic decoration, but different in design, each panel being unlike any other in the ruins. Sculptured columns or frieze are conspicuous by their absence, and that is one of the marked differences between these and other ruins in Mexico. The walls of Mitla are built of a most peculiar design, being formed of small pieces of stone from 1 to 6 inches in length, 1 inch in depth and 2 inches in breadth, very accurately cut and built into the face of the wall, forming most complicated patterns that baffle description. These mosaics, all the figures of which are rectangular or diagonal, give the distinctive character to Mitla that distinguishes it from all others. The engraving on the front page, giving the detail of appearance of this wall, built of mosaic, is the first time any such picture was ever published.

At Yucatan the hand of the sculptor has left its imprint, that has lasted from time immemorial to the present, and makes them attractive to the tourist, who makes long pilgrimages to view them. Palenque is visited by thousands to view the relics of the ancient sculptor, made famous for its odd designs in stucco in bas-relief. Copan is visited by scientists, archæologists and tourists to study its idols and altars—upon the discovery of which and the stupendous work achieved by a people now extinct volumes have been written. But, after a careful study and investigation of them all, Mitla stands out in bold relief in the minds of all who visit them.

In 1802 Don Luis Martin and Col. De le Languna visited these ruins and gave to the world the first sketch ever made of them, from which the illustrations used in the past have been made. In one of these ruins is an underground passage or chamber, and referred to by the guide as the "subterraneo." In shape it resembles a cross. Leading from this passage, somewhere in the ruins, great treasures are hidden; and it is claimed that their exact location is known to one old Indian, who occasionally, when unobserved by his neighbors, extracts therefrom sufficient to maintain an humble existence. It is also said that in one of these ruins is a large room filled with mummified bodies of the Aztec kings. Whether this be true or not it would be hard to say, but such explanations from the guide who accompanies all visitors are not disputed, as it would be in keeping with the general surroundings, and one feels as though it were true. Tourists in visiting Mitla in the past have disfigured the beautiful walls by chipping off pieces. The Government has taken the matter in hand, and now no one is allowed to enter the ruins without a guide, who sees that no further destruction occurs. The lintels of some of the doorways are of mammoth blocks of stone, one of which is 19 feet long, 3 feet thick and 6 feet wide. Just how these monster blocks were raised to their present positions is a matter of conjecture. Like the massive blocks found in the pyramids of Egypt, no one can form a theory that will satisfy the inquiries of to-day as to the method used.

In one of the large rooms is a long row of columns, standing in perfect line; these columns are about 14 feet high and 3 feet in diameter, and are peculiar in themselves, having no base or pedestal, capital or architrave. In the patio, at the entrance of this room, stand two of these large columns. In September, 1899, Martin Gonzales, the present Governor of Oaxaca, removed one of these columns and placed it in the Passao, to add to the attractive features of this drive. The removal was accompanied with no end of objections from the inhabitants of Mitla, and to maintain order it was necessary for the presence of a batalion of soldiers under stern leadership to effect the desired object.

All tourists are beset by a score of little Indian girls offering for sale pieces of Aztec pottery, faces of idols and beads, said to be found in the ruins and unearthed during the excavations done there some years ago under permission from President Diaz. It is remarkable how keen the sense of business is in these forlorn Indian children, who evade close questioning as to where they were found or how they came into their possession, as nothing that would lead one to believe they were genuine can be seen in the surroundings; nowhere is there the semblance of the handiwork of the sculptor to be found in these vast ruins; which makes it suspicious. These articles are often bought by visitors as mementoes of the trip, regardless of their genuineness as antique relics.

---

*See illustrations on front page.

Raw Hide Gears and Pinions.

The New Process Raw Hide Co. of Syracuse, New York, are the patentees and sole manufacturers of new process raw hide noiseless, solid raw hide spur, bevel and friction gears, bushings, washers, bound mallets, etc., their goods being the result of ten years of experience and experiment. To any one having use for their products the illustrations on the front page are of interest. Fig. 1 represents a raw hide spur pinion, complete, which the makers claim is "so made as to wear as long as metal or any other composition now known." It is noiseless—a special feature in their gear. Fig. 2 is of a solid raw hide blank, for those who prefer to cut their own raw hide gears. Fig. 3 portrays the largest raw hide gear wheel yet made, 33¾ inches pitch diameter, iron shrouds and center. Fig. 4 shows a pair of 19-inch bevel wheels, one of new process raw hide, the other of cast iron, made for the U. S. Government. Fig. 5 illustrates a number of large spur and bevel pinions which the New Process Raw Hide Co. of Syracuse, New York, recently made for one of their customers. Most of these, it will be noted, are made with iron centers, a form of construction which they adopt for gears of large size. In mining and electrical operations these goods are of value, and any one interested can have full particulars and testimonials from pleased customers on application.

IN a recent issue was noted the rise in the price of the "diamonds" used in diamond drills. Such rise is occasioned by increase in the demand and decrease in the supply. A drought in the province of Bahia, Brazil, caused paralysis of the industry there. It is probable that there will be a further rise, and diamond drill manufacturers have been trying to find a substitute for the expensive carbons.

AT the Paris Exposition the mill engine is not in evidence, and appears to be ceasing to exist on the continent. There is not a main driving belt nor a driving rope at work in the Exposition. All the large engines, without exception, are employed in driving dynamos, for the most part of the flywheel types, and these supply power where it is wanted through cables led in various directions.

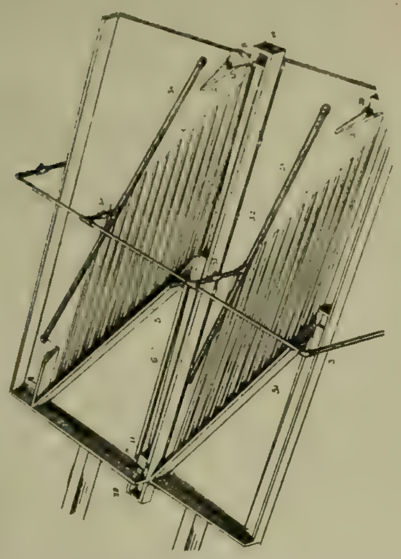
THE cost of electrical power in large Philadelphia machine shops averages 1.2% of the shop pay roll.

Mining and Metallurgical Patents.

Patents Issued October 23, 1900.

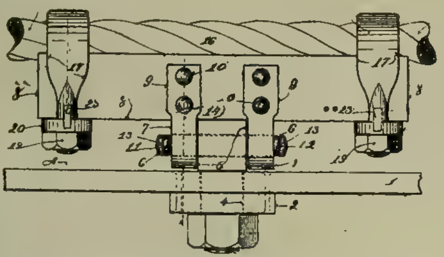
Specially Reported for the MINING AND SCIENTIFIC PRESS.

ORE SEPARATOR.—No. 660,342; J. P. Smith, Denver, Colo.



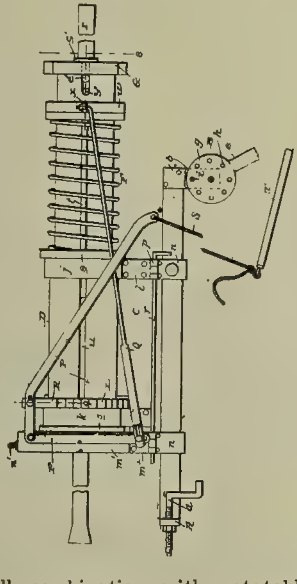
An ore separator, transversely inclined tables with longitudinally disposed guides, diagonally disposed slime conveyors, intermediate return conveyor by which slimes and heavier separated material are transferred from first to second table, mechanism consisting of advancing cam and return spring by which tables and conveyor are reciprocated, second spring interposed between mechanism and tables, compressible by inertia of tables during forward movement, plane section of cam just previous to offset which allows return movement of tables, whereby forward movement of tables ceases and second spring is allowed to expand just before return of tables.

WIRE ROPE AND BUCKET CLIP.—No. 660,395; B. C. Riblet, Nelson, B. C.



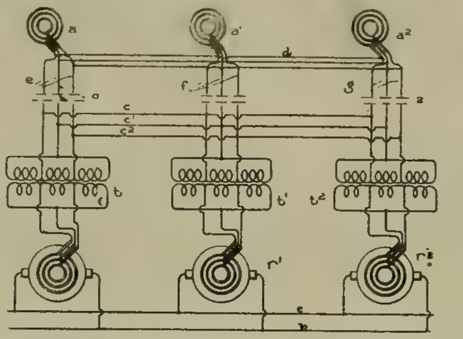
In rope and bucket clip for aerial tramways, combination of rope and cross bar of bucket, rope bar, clips, straps, dowel pins, two lugs provided with strap portions adapted to be secured to bar, pin extending through lugs secured thereto, bolt pivotally mounted on pin arranged to swing in vertical plane, stops on bolt arranged to engage bar, adapted to define vertical movement of bolt above and below horizontal center of pivotal pin, shoulder on bolt, round portion adjacent to shoulder, bucket cross bar pivotally mounted on round portion, nut threaded to end of round portion adapted to secure cross bar bolt.

ROCK DRILL.—No. 660,409; C. E. Young, Fremont, Wash.



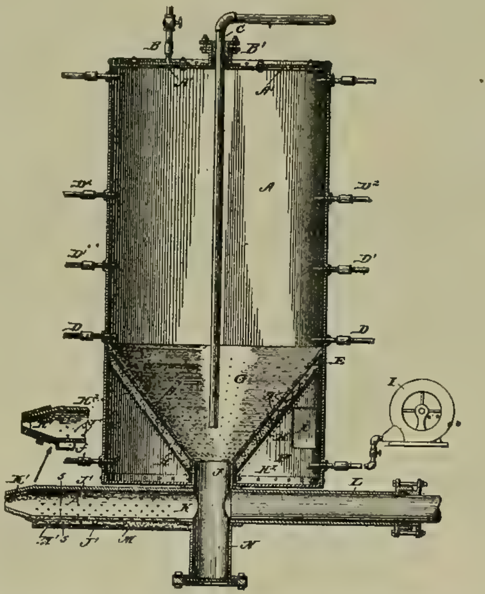
Rock drill combination with rotatable drill-rod holder comprising tubular section held against endwise movement, endwise movable tubular section arranged in and connected to first-named section so as to turn therewith and move endwise with respect thereto, having longitudinal slots, slotted guide pieces connected to endwise movable section of holder, having inwardly directed and recessed arms at inner ends, outwardly directed arms at outer ends, collar loosely mounted on endwise movable section, having offsets; of drill rod arranged in holder, having lateral arms arranged in slots in endwise movable section thereof, also in slots of guide pieces.

TRANSMISSION OF POWER.—No. 660,483; E. J. Berg, Schenectady, N. Y., assignor to General Electric Co. of New York.



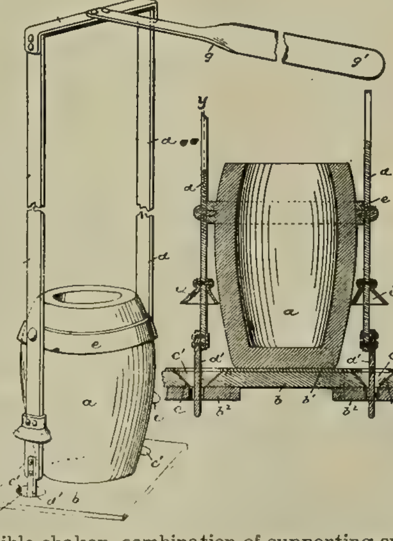
Combination of source of alternating current, plurality of rotary converters fed through separate transmission lines running back to source, conductors connecting together direct-current terminals of converters, and conductors connecting together alternating-current terminals of converters.

APPARATUS FOR LEACHING ORES.—No. 660,498; J. A. Fleming, Globe, Ariz.



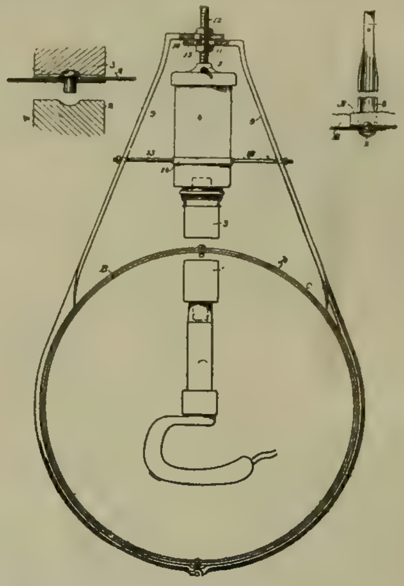
In ore leaching apparatus, combination with leaching tank having pulp discharge of conical perforated filtering hopper therein having discharge for pulp, means to maintain air pressure below diaphragm whereby to control flow of solution through it, means for introduction and withdrawal of chemicals to and from body of tank above filtering diaphragm, and devices for controlling discharge of pulp from tank.

CRUCIBLE SHAKER.—No. 660,387; W. S. Mather, Newark, N. J.



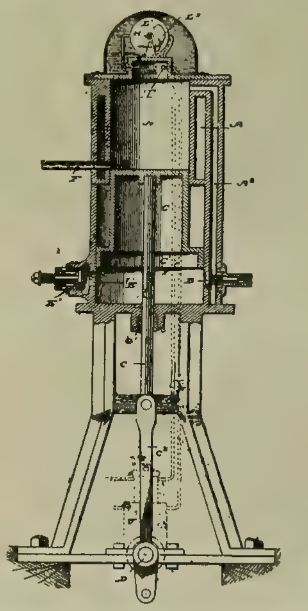
Crucible shaker, combination of supporting surface for crucible, upright legs at sides of crucible, carrying between themselves means for grasping crucible and being pivoted at a point away from grasping means, jointed handle connected to legs for oscillating them.

PIPE RIVETING MACHINE.—No. 660,542; S. Foreman, Sacramento, Cal., assignor to the Schaw, Ingram, Batcher & Co., same place.



Combination in riveting device for pipe sections when being laid, pneumatic hammer, tool carried thereby adapted to form heads upon ends of rivets interior to tube, holder exterior to tube, anvil carried thereby chambered to fit exterior head of rivet, support for holder consisting of band, channeled to inclose circular line of rivets around joint, with edges of band resting upon surface of pipe, joint whereby band sections may be opened or closed, converging extensions of band opposite to joint tangential with pipe, bent and overlapped, having openings therethrough, bolt passing through opening fixed to holder, locking nuts by which it is adjustably secured to ends through which it passes.

VALVE GEAR FOR EXPLOSIVE ENGINES.—No. 660,090; C. P. Blake, Chester, Pa.



Explosive engine combination with cylinder, piston and crank shaft, of cam shaft, valve controlling cam carried by shaft, circumferential groove in cam governor lever pivoted on axis parallel with axis of cam, branch groove into which controlling lever may be deflected, governor lever carried by cam, longitudinally movable slide connected with governor lever projecting into circumferential groove for deflecting controlling lever into branch groove.

METHOD OF TREATING TELLURIDE ORES.—No. 659,670; C. J. Head and R. C. Wild, London, England.

Process for extraction of tellurium from telluric ores, consisting of lixiviation and digestion of ores for from four to six hours in a solution containing about 5% caustic potash or soda; removal of filtrate; acidifying of filtrate; precipitation of tellurium from filtrate by protochloride of tin.

THIS oblate spheroid, the earth, has been measured by the U. S. Coast and Geodetic Survey. This is the first time such work was accomplished. It was begun in 1871. The equatorial diameter is 7926 miles; pole to pole 7899 miles. In U. S. territory the 39th parallel of north latitude, from Cape May, N. J., to Point Arena, Cal., is 2625.6 miles in lateral extent.

How to Build Good Roads.

In the issue of the 20th ult. appeared an editorial on the necessity for good roads as a business investment in mining districts. A California county supervisor in a discussion on that subject says:

In building a road the first thing to be considered is its location, a mistake in locating a road may cost the taxpayers large sums of money and never get a satisfactory road. I hope this discussion will lead to broader views on the subject.

I think we are sometimes so anxious to have the road located where it will benefit us most at present, or do us the least damage, that we overlook the importance of locating it on the best ground. Some one has said that no ground is too good for a road. As a result of mistakes in locating roads we have now in the fourth road district in my county (San Diego) three roads leading to Palomar mountain, or rather from the base to the top of the mountain, two of which ought to be vacated; one to the Escondido reservoir, one to Guejito and two out of the San Pasqual valley ought also to be vacated. The cost of these grades must have been thousands of dollars, but they are so steep and narrow as to render them dangerous. I think the people ought to get together and coöperate to get the road in the best place.

Those steep grades before mentioned are not cited to find fault with any of my predecessors, for I do not know who built them; it is roads we are discussing, not men. There is one thing evident to me, that is, we have too many roads or not enough money, I suppose both are true.

In my opinion we should have a law classifying the roads into three classes. Class one should be State roads, built and kept in repair with State funds. Class two should be county roads, built and kept in repair by a tax levied on all the property of the county. Class three should be district or neighborhood roads, built and kept in repair by a direct tax levied on the property of the district and a road poll tax which may be worked out if preferred. Class one should be under the supervision of the county surveyors of the counties through which they pass. Class two should be under the supervision of the board of supervisors, and class three should be under the management of a road overseer or some other local management.

I think there will be no disagreement as to classes one and three, but there may be some objection to taxing incorporated cities for road purposes. But I should place the cities in a catalogue with districts which must help to build and keep in repair both State and county roads, and in addition must build and care for their own roads. It would seem but fair that cities should help in like proportion on the State and county roads and in addition keep up their own streets. I think a system of good roads leading to a town or city tends to build up business of all kinds; then I believe that it is as much to the interest of the cities that country people should come to their places of business as it is important that country people should have a market and a good road to get to it. And by thus doing away with sectionalism, and city and country uniting heart, hand and purse we could bring about such a revolution in road building and care as to result in great improvement. I feel greatly indebted to the cheerful kicker's protest against present conditions. Continue still to point out the mistakes and blunders and "show us the more excellent way."

Returning to the subject of locating roads, it appears from the records that deeds to right of way for roads had never been recorded until within the last five years, and in some instances we have been compelled to buy the right of way for roads that we thought the county owned, at least they had been declared public highways by the board of supervisors and worked with public funds, and sometimes we are obliged to pay an exorbitant price or enter into an interminable lawsuit to condemn the right of way. One instance I have in mind, which was begun four or more years ago, was recently dismissed, and still no road. Now, in my opinion, there should be a maximum price established by the Legislature, based upon the assessed valuation of the land (say two or three times as much as it is assessed for), and the damage assessed as now by disinterested appraisers or viewers sworn to faithfully and impartially perform their duty.

Roads have in some instances been laid out without the least regard for the necessity for their construction, the number of people they would accommodate, the sums of money they would cost, or the territory they would develop.

Considering the subject of funds for road building, the tax we are now permitted by law to levy for road purposes is little more than enough to keep in repair the roads as they are now, and to contemplate any radical reform or build any Macadams or Telfords would require funds far in excess of any sum the board of supervisors has ever at any one time had its disposal; hence, before any of these great improvements are made there will have to be some methods adopted to supply more funds. We have voted bonds in the past upon which we are still paying interest. I should certainly not favor bonds until every other or at least some other plan had been tried. I think permission should be granted by the Legislature to counties to issue scrip, based on the assessed value, not to exceed 1%.

I am sorry that the Legislature repealed the "wide-tire law." I think it ought to have been amended so as to exempt old wagons and refer only to new wagons and those built or sold in the State after the law took effect. Ten States in the Union have at different times enacted wide-tire laws, and some of them have been in operation for a long time, at least long enough to thoroughly test their utility. I refer particularly to New York, Ohio, Indiana, Kentucky, Vermont, Michigan, Pennsylvania, Massachusetts and California. I admit that there are instances, perhaps, where a wagon with a wide tire will draw heavier than one with a narrow tire—for instance, where the ground is soft enough for the wide tire to cut through; but in all other places, except those referred to, the wide tire draws lighter than the narrow. If there were no difference in this respect the benefits to the roads are such as to urge their use. Indiana, Kentucky, Vermont, Pennsylvania and Massachusetts all make distinction in favor of the wide tire. Experiments made in New York are very much in favor of wide tires. Experiments have been made in Ohio, Missouri and Vermont, in each instance with the same result. Austria, France, Germany, Switzerland and Canada (according to Consular reports), all favor wide tires, and some of them have laws enforcing their use, France in particular. I quote from a report: "Every freighting or market cart here is a road maker; its tires are from 4 to 10 inches wide. With the few four-wheeled freight vehicles used the tires are rarely less than 6 inches in width and the rear axle is about 14 inches longer than the fore, so that the rear or hind wheels run in a line an inch outside the level rolled by the fore wheels." Whether we have a wide-tire law or not every person ordering a new wagon should insist on having wide tires.

E. H. CLEAR, a New York "promoter," is gravely announced in an electrical journal as "organizing a company to operate automobiles along the Yukon river to convey miners and machinery to the Klondike." To any one with the slightest knowledge of the facts the statement is ridiculous.

A STRIKING EXAMPLE of the extent of the advance in prices of iron and steel last year is afforded by a statement made in the annual report of the Chicago Great Western Railway for 1899. It seems that this road has actually exchanged old rails for new at a profit. They purchased 10,000 tons of 75-pound steel rails at $19 per ton. While they were being laid and the old ones taken up the iron market advanced to such an extent that the old rails were sold for about $10 per ton more than the new ones cost.

Artificial Fuel.

Regarding the manufacture of patent fuel in Wales, U. S. Consul Phillips can see no reason why a pound of bituminous or anthracite coal dust should be wasted, nor why the industry should not succeed in the United States. He says the agglomite process of manufacturing patent fuel from anthracite and bituminous minerals is entirely different from any other. By this method the coal and agglomerates are chemically mixed while under the influence of heat and pressure, in a sealed vessel, by which a new fuel compound is produced. The process is as follows: The coal and agglomerates are mixed and ground in a dry state. If tar or pitch or other liquid substances are used they may be subsequently added; then the prepared material is put into a hopper attached to the end of a horizontal tube. The opposite end of this tube is connected with a briquette press. A worm is kept constantly revolving in the tube, conveying the material through the tube and feeding it into the pressing ram chamber. The tube passes through a small furnace, which enables the machine to become heated to a temperature of 500° or 600° Fahr. The gases evolved cannot escape, hence the pressure produced within the tube is shown on an attached gauge to be about ten pounds per square inch. Practically, the tube is an automatically sealed vessel, for the closely packed mass of coal materials fed from the hopper into one end of the tube by the revolving worm and the hot plastic mass fed out by the same worm into the pressing chamber at the other end of the tube is so closely blocked up by the passages as to overcome the internal pressure of ten pounds per square inch created by the hot gases. These gases, under pressure, permeate the hot plastic mass, which is turned over and over as it travels slowly along the sealed tube. Millions of tons of anthracite coal dust now thrown away can be successfully utilized in this manner. It will not take long for our quick-witted Americans to master details.

Manufacture of Circular Saws.

Circular saws are made of cast steel specially manufactured for the purpose. A steel ingot heated to the requisite temperature is reduced to the proper thickness in powerful rolls. The plate is then centered and a circle scribed upon it, after which it is passed to the shearer, who reduces it to a circular form. The center hole is then bored; it is handed to the toother, who punches out the teeth around the edge, after which they are rough filed or ground on an emery wheel, to take off the burr left for punching. The rough saw is now again heated in a large furnace until it is of bright red color, then plunged into a bath of sperm oil, which makes it hard and brittle. The oil is then partly cleaned off, and the rest burnt off in a furnace to give the saw the required temper. When cold the saw is hammered on a steel-faced anvil until it is straight. It is next ground between vertical grindstones revolving in opposite directions, and then polished with emery on a large disk. Once more the hammer men take it and strike it with smooth-faced hammers on an anvil as before, until it is absolutely straight and true and has acquired the proper tension, which allows for expansion while the saw is revolving at work. The teeth are now set, alternately right and left, to allow for clearances when sawing timber. They are then sharpened by being filed on the front and tops of the teeth, which operation completes the manufacture.

THE Sultan of Johore, in the southern part of the Malay peninsula, has ordered $750,000 worth of American electrical machinery.

Rights of Employes to Their Inventions.

By a recent decision of a German court an employe in that country has no right to any invention he may make so long as he remains an employe. The following statement of the relations between employers and men in the United States as regards inventions made by the latter is of interest:

"In general, the law secures to every man the ownership of his own inventions and of the patent granted therefor. But this general principle is much modified by the special relations existing between the employe and his employer in particular cases. A wide distinction is made between the person who is employed merely as a skilled workman and the person who is employed as an inventor.

"As to the former: If a skilled workman, while in the employ of another, but in his own time or after working hours, conceives an invention and constructs it at his own expense, using his own tools and materials, and doing the work after hours or in time his employer does not pay for, then the invention, as well as the patent granted therefor, is the exclusive property of the workman. The employer has no rights in it, nor any right to use it in his business, even though it is adapted to that business. The employer in this case can obtain the right to use the invention only by contracting with the workman for it and paying the price agreed upon. But if the workman conceives the invention in the time his employer pays for, and constructs it with his employer's tools and materials and in the employer's time, then the employer obtains certain rights in the invention and patent granted therefor.

"If the invention is a machine, then the machine belongs to the employer, and he has a license to use it in his business and to keep it in repair, and without paying any royalty to the workman therefor. If the employe obtains a patent for the invention and sells it, that sale will be subject to the license to the employer, and the purchaser of the patent cannot prevent the employer from continuing the use of the machine.

"If the invention is not a machine, but is an article of manufacture, as a tool in which the employer deals, then, in the circumstances supposed, the employer has a license to make and sell such tools without paying royalty, even after the patent is granted, and neither the inventor nor the purchaser of the patent can stop him from continuing to do so. In each case the employer's license continues over to any corporation into which the employer's business is converted.

"If the invention is a process, then the employer, or the corporation which continues his business, has a license to use that process without paying royalty, even after the patent is granted to the workman.

"In these cases, however, the license to make and sell the machine or the article and to operate the process is not exclusive—that is, it does not give the sole right to the employer; it only secures to him a right to the invention in connection with his particular business; and the inventor, or those to whom he sells the patent, can make, use and sell the invention, and license others to do so, without let or hindrance from the employer.

"As to persons employed to invent: If a person is employed by another to make inventions to be used in the employer's business, and is paid salary or wages on the understanding that his services are to be those of an inventor in improving the machines, tools or processes which relate to the employer's business, then the inventions which the employe makes relating to that business and the patents granted therefor are the exclusive property of the employer. In such cases the court says that the employe, in making and perfecting inventions, is merely doing what he was hired to do.

"Should the employe leave that employ, he cannot use, or make, or sell the invention, or convey any rights to others under it, except with the consent of the employer."

MINING SUMMARY.

ALASKA.

The superintendent's report of the Alaska-Treadwell G. M. Co., Douglas Island, is to hand for the year ending May 31st, 1900. It shows the earnings and expenses for the year as follows, averages based on 557,960 tons ore mined and milled:

	Total.	Per ton.
Bullion sold	$1,153,368	$2.0671
Store and miscellaneous profits	34,696	0.0622
Total receipts	$1,188,064	$2.1293
Mining ore	$ 278,194	$0.4986
Milling and concentrating	110,903	0.1988
Sulphuret expense	79,385	0.1423
Bullion charges	7,022	0.0126
Office and legal expenses	11,014	0.0197
Totals	$486,517	$0.8720
Less excess credit, general expenses	2,451	0.0044
Balance	$ 484,067	$0.8676
New construction	30,036	0.0538
Total costs	$514,103	$0.9214
Net working profit	$673,961	$1.2097

Details of the work done at the two mills are as follows:

	240-stamp.	300-stamp.
Total time run, days of 24 hours	312.40	270.24
Shoes worn out	500	600
Dies worn out	470	395
Stems broken and replaced	150	....
New cams put in	20	1
New cam shafts	6	....
Mortars broken	7	1
Ore crushed, tons	225,722	332,238
Sulphurets saved	3,898	5,927
Proportion of sulphurets to total ore	1.58	1.56
Ore crushed per stamp per day, tons	3.01	4.07

The 240-stamp mill was run 154 days by water power and 158 days by steam power. The 300-stamp mill started May 6th, 1899, and was hung up from Jan. 3d to March 21st, 1900.

Wages paid were as follows, the company providing in addition board and lodging for all workmen except Indian laborers: Machine drillers, $2.50 per day in summer, $3 in winter; machine helpers, $2.25; mine laborers (white), $2; amalgamators, $90 a month; feeders, $70; vannermen, $65 to $100; machinists and helpers, $2 to $6 per day; blacksmiths, $4; drill sharpeners, $3.50; blacksmiths' helpers, $2. Indian laborers receive $2 per day without board.

The report of Supt. J. P. Corbus says: "Exploration and development work for the year includes 1807 feet drives, 465 feet crosscuts, 1103 feet raises, 60 feet pump station and 20 feet sump, a total of 3455 feet. Of this 50 feet was on the adit level, 470 feet on the 110-foot, 1297 feet on the 220-foot, 1104 feet on the 330-foot, and 597 feet on the 440-foot. On the adit level a 50-foot crosscut was run, connecting No. 2 main shaft at surface with the adit tunnel, which greatly facilitates the transportation of ore from the shaft to the 240-stamp mill.

"On the 110-foot level No. 1 east drift was extended 137 feet to our end line, connecting with workings of 700-foot claim. An intermediate drift, 75 feet in length, was run above this No. 1 east drift, and 195 feet of raises were put in to connect with intermediate drift and also with No. 1 and No. 4 pits. Samples taken gave assay returns of $2.08 per ton. On the 220-foot level No. 6 east drift was run 177 feet, connecting with old No. 5 east, which has a connection with No. 1 shaft of 700-foot claim; 525 feet of intermediate drifts were run on this level, and 515 feet of upraises for chutes. Assay returns from samples taken along No. 6 east drift show that ore from this section of the mine carries very good values. A pump station, 12x15x40 feet, was cut, and a sump 10x10x20 feet deep was sunk for the Riedler pumping engine. On the 330-foot level the main crosscut was driven ahead 415 feet, and the face is now into the slate footwall a distance of 25 feet. This crosscut measures 442 feet from No. 2 main shaft to face, or 492 feet from end to end. On this level we find much the same condition of affairs as exists on the 440-foot level; the vein is about the same width as on the upper levels, but averages less, owing to the vein being mixed with slate and granite. There is a width of about 190 feet on this level that will pay to stope. The 330-foot level is connected to the 220-foot level by a raise along the footwall at the end of the main crosscut, measuring 125 feet. There is also an intermediate drift on this level measuring 95 feet in length, 120 feet of upraises for chutes and 349 feet of drives. On the 440-foot level development work during the year was 118 feet along No. 4 east and west drift, 301 feet along No. 5 east and west, 105 feet of upraises for ore chutes, and 73 feet of a 7x9-foot raise to connect with 330-foot level. The ore developed by this work proves to be of a payable grade. There was no sinking done during the year. It is proposed to resume sinking at No. 2 main shaft early during the coming year.

"Exclusive of pits, the approximate total development in mine May 15, 1900, is as follows: Drives, 7802 feet; crosscuts, 3260 feet; raises, 2629 feet; shafts, 778 feet; total, 14,469 feet. The location of the above is as follows: Adit level, 910 feet; 110-foot level, 4394 feet; 220-foot level, 6110 feet; 330-foot level, 1217 feet; 440-foot level, 1060 feet; No. 1 shaft, 272 feet; No. 2 shaft, 506 feet; total, 14,469 feet.

"The ore mined and sent to mill May 16, 1899, to May 15, 1900, was 557,960 tons. The estimate of ore in sight and available for mill May 15, 1900, is as follows: Adit and 110-foot levels, 1,514,408 tons; 220-foot level, 2,115,708 tons; 330-foot level, 226,849 tons; 440-foot level, 274,675 tons; total, 4,131,640 tons. On the 330 and 440 levels account is taken only of ore developed to the ends of drifts east and west. With each additional foot of drift run on these levels the ore reserves increase very largely.

"On May 12 a slide containing over 100,000 tons of quartz and slate came into No. 3 and No. 4 pits from footwall. This will not interfere with mining operations, and carries sufficient value to warrant milling entire quantity.

"The total run for the year at the 240-stamp mill was 312 days, 9 hours, 41 minutes, during which time 225,722 tons of ore were crushed, the duty per stamp per twenty-four hours being 3.01 tons, as against a run of 353 days, 2 hours, 50 minutes, and a duty of 2.95 tons per stamp for previous year. The large loss of running time at this mill was due to the following causes: Holidays, 2 days; shortage of battery water, 2 days; shortage of rock due to scarcity of laborers at mine, 42½ days; broken water wheel shafts, 1½ days; clean-ups, 2½ days; various other causes, such as repairs to batteries, changing from water power to steam power and vice versa, splicing ropes, etc., 2⅛ days; total loss of time for the year, 52⅝ days. On May 15th, after a run of over 15 years, this mill was closed down for extensive repairs, it being the intention to renew the ore bins, ore-bin foundations, battery foundation and battery framework throughout. No work will be done on the mill building, as that still remains in good condition. Timber for reconstruction work is Washington fir, and was purchased and framed at Seattle, Wash. To complete first section (forty stamps) will require until about July 15. Half of the mill should be finished and dropping on ore by August 15, and the full mill of 240 stamps should be running not later than October 1, 1900.

"An excellent record was made at the 300-stamp mill during last year, both as to running time and crushing capacity. The running time was 270 days, 5 hours, 45 minutes; the amount of ore crushed was 332,238 tons, or a duty of 4.07 tons per stamp per 24 hours. Last winter was an exceptionally short and mild one, consequently the water season for this mill was much longer than usual. Under ordinary conditions, I believe it will not be possible to run this mill by water power for more than 7½ months per year, or say the mill has a capacity of 285,000 tons per year.

"The total amount of ore crushed at both mills last year was 557,960 tons. The yield of sulphurets amounted to 9825 tons, all of which was shipped by barges and steamers to Tacoma for treatment by Tacoma Smelting Co. The total cost of shipping and treating sulphurets last year was $79,385, or $8.10 per ton. This high rate was due principally to the fact that parties who contracted to carry our concentrates in bulk from the mill to Tacoma failed to place at our disposal a sufficient number of barges to properly care for our product; consequently, we were forced at times to ship by other means at an increased rate of freight, besides having to stand the additional cost of sacking the sulphurets so shipped. Given proper shipping facilities, our sulphurets should be shipped in bulk and treated at a cost not to exceed $7 per ton."

Reports say that Koyokuk district is rich in some parts. An eight-ounce nugget was recently found on Emma creek. Gold from Ophir creek, Golovin Bay district, assays $18.26 to the ounce.

The tunnel of the Alaska G. M. Co. on the Darrow & Snyder, Berners Bay, near Juneau, is in 1100 feet.

The latest monthly report of the Alaska Treadwell mine, Douglas island, gives the result of a run of 300 stamps for 29½ days as 38,491 tons, yielding $51,660; 661 tons sulphurets are valued at $19,197; bullion product for month $76,006, ore averaging $1.97 per ton; expenses for month, $31,000.

The new 10-stamp mill of the Windham Bay G. M. Co., Juneau, W. Denby Supt., is completed. Stamps are 1000 pounds each.

ARIZONA.

GRAHAM COUNTY.

Suit is brought by J. Leszynsky against the Medler C. M. Co., the Morenci copper mines and C. A. Ross to recover title and possession to the Indiana and Medler mines, near Clifton, in the Copper Mountain mining district.

MOJAVE COUNTY.

The main shaft at the Occident, at White Hills, is down 700 feet. D. B. Murphy, engineer, is in charge.

PINAL COUNTY.

(Special Correspondence). — The Ray Copper Mines, Ltd., will shortly shut down. It is the intention of General Manager R. U. Turman to put in an up-to-date steam plant, using crude oil for fuel. They have at Kelvin a 300-ton concentration mill, which they will increase to 500 tons.

Kelvin, Oct. 29.

Supt. Parry of the Milwaukee, Florence, is pushing work.

YAVAPAI COUNTY.

The shaft on the Treasure Vault, near Prescott, is down 100 feet.

The Verde Queen, Jerome, smelter is in operation.

The Verde King Copper Co., capital $1,000,000, is incorporated to work property near Jerome.

CALIFORNIA.

AMADOR COUNTY.

The Lincoln, E. C. Voorheis Supt., Sutter Creek, employs thirty-five men. Shaft is down 1200 feet.

CALAVERAS COUNTY.

W. W. Cook and W. W. Weatherwax, of Campo Seco, are putting up a hoist and sinking a new two-compartment shaft at the Birdena, near there.

The stamp mill on the Lillie, Sandy gulch, Mokelumne Hill, will be put up on C. McCloud's mine, on Anderson Flat, Licking Fork, near there.

The vein at the Lew Wallace, near San Andreas, shows a width of 48 feet between well-defined walls. The rock is decomposed quartz and requires no blasting.

The Greek will soon resume.

Work at the Lucky Boy will soon start; U. J. Hussy, Supt.

The Shenandoah has a 10-stamp mill, rock breaker, etc. It will resume soon.

The mill at the Mountain Lion will start next week.

L. Sanguinetti is washing gravel near Vallecito.

The compressor and machinery at the Duchess will start this month.

The Osborne may resume under new management.

The Sheep Ranch M. Co., Murphys, is considering building an electric line to Sheep Ranch, 6 miles, and expects to run mine plant by electricity.

E. Huffman and J. Glassly are working the Virginia, at Wolf Hollow.

The Big Horn, on San Domingo, is showing up well.

Work at the Ozark is being pushed.

COLUSA COUNTY.

Oil has been struck at the Gorrill well, near Arbuckle.

EL DORADO COUNTY.

W. H. Husband, Supt. Gopher-Boulder, Kelsey, has men at work getting things in shape to resume.

The Gopher, Kelsey, will resume. The mill for the St. Clair will soon be in place and running.

The Larkin shaft, Placerville, is down 652 feet.

FRESNO COUNTY.

The Confidence Oil Co., at Coalinga, will soon be pumping well No. 1, which is down 800 feet.

The Blue Goose Oil Co., at Fresno, is pumping water from its well, struck at the 2000-foot mark.

The Venus Oil Co., Fresno, is still drilling.

HUMBOLDT COUNTY.

Near Petrolia, at McNutt Gulch, oil has been struck at depth of 1700 feet; yield, about ten barrels per day.

KERN COUNTY.

The Cantua, Bakersfield, is down a little over 1000 feet and expects to strike oil at between 1200 and 1500 feet.

E. C. Johnson has sold to the Fairview M. Co. interest in the Fairview mining claim for $20,000.

The Kern Canyon, Bakersfield, drilling on east line of 25, 28, 27, dropped into a pocket of gas that carried up a stream of oil and sand nearly to top of derrick and continued storming for half an hour. After sand had ceased blowing, gas discharged all night and into next day.

The Great I Am mine is leased to Lacon & Short. Of every $100 worth of rock or ore placed on the dump, the owner is to receive 65% of the proceeds, but must haul the water and ore, furnish timber and reduce the ore.

T. N. Stebbins is putting up a new stamp mill on the O Be Joyful, Tuba canyon, Randsburg.

The Red Dog mill, at Randsburg, Manager Griffiths, is to be in continuous operation.

MARIPOSA COUNTY.

Work at the Virginia, Mariposa, has resumed. A recent strike of ore in the Pumpkin Hill, Coulterville, is said to run $100 to ton; vein 3 feet thick. A new stamp mill goes in on the Yankee Jim, near Bagley.

MADERA COUNTY.

(Special Correspondence).—The Standard Co. is working the Independence mine and have a body of ore. Their mill is running constantly.

The Mud Springs mill is running. The ore bins are full and there is a large daily output from the stopes of the 400-foot level.

The Waterloo is running five of its ten stamps and work is actively prosecuted in the mine.

The new mill of the Magnet Co. is ready to run. The ore is carried from the tunnel to the mill, 500 feet, by a three-truck tramway.

Gold, Oct. 30. W. F. ARAM.

NEVADA COUNTY.

The population of Grass Valley is 4719, of Nevada City 3250.

E. Tilley, on the Midnight, near Nevada City, has opened up a body of ore 125 feet from surface; ledge 2 feet wide.

Union: E. Tilley, Supt. Tilley mine, will erect new machinery on the property.

The case of Langdon vs. the Mountaineer M. Co., in the U. S. Court at San Francisco, has been compromised.

PLACER COUNTY.

G. T. Miller, owner and Supt. Last Camp (hydraulic), Blue Canyon, is repairing ditch, etc., preparatory to starting up.

The Blue Canyon M. & D. Co.'s tunnel is in 2700 feet.

Work on bedrock tunnel, on American river, has been suspended for the winter.

It is locally reported that the Westinghouse Electric Co. is considering the project of putting in an electric plant to furnish power for mines in Humbug canyon, near Colfax.

The tunnel at the Mayflower, near Forest Hill, now in over 1500 feet, will probably be continued another 500 feet.

The Hidden Treasure, near Colfax, produces about 250 carloads blue gravel daily from a channel 250 feet wide.

RIVERSIDE COUNTY.

The Riverside-Fullerton Oil Co., Riverside, is putting in new machinery near there. Drilling is resumed.

The Desert Oil Co., Indio, has begun operations near there.

SAN BERNARDINO COUNTY.

The Edna mine, southeast of Randsburg, is sold by H. T. Duff to the Edna M. & M. Co., for $36,000.

Work at the Gold Mountain, near Bear Valley Lake, is being pushed.

At Gold mountain there are seventy-five men employed in the mine and mill; the latter is in continuous operation. The mine is worked by one shift; all the ore is taken out that can be handled by the mill. J. D. Spargo is Supt. The forty stamps have a capacity of three and one-half tons each—a total of 140 tons—running $5 a ton. It is expected that the mill will be increased to 100 stamps. There are 189 people in the camp.

SAN DIEGO COUNTY.

The stamp mill at the Escondido mines is running day and night.

SANTA BARBARA COUNTY.

Drilling on the Sycamore canyon oil well, near Santa Barbara, is resumed.

SHASTA COUNTY.

Keswick reports that the strike at Iron Mountain is declared off by the miners, some of whom are now willing to return to work at the old wage scale and hours. The strike did not affect the operation of the smelter.

Several carloads steel rails for narrow-gauge railroad from Bully Hill to Pit river, now being built by De Lamar's Bully Hill mines, recently arrived in Bella Vista. Work is being pushed.

C. J. Hammond of Oakland has bonded his Crown Point mine, Igo district, to A. J. Wright for twelve months.

The King copper group, Flat creek district, near Redding, is reported sold to D. C. Galvin for $10,000.

H. A. Cohen, general manager De Lamar properties, Redding, expects to have smelters and converter running before Jan. 1st.

The Golden Jubilee M. Co., Redding, will put in an upright boiler.

SIERRA COUNTY.

Ore has been struck in the Osceola, near Alleghany.

J. Byrne has leased the Morgan, near Grizzly Peak, Downieville.

The Keystone, Sierra City, is getting in gasoline, sixteen tanks having arrived recently.

The Illinois, near Kingston, will resume, after lying idle for fifteen years.

Tunneling is in progress on the Argentine, near Alleghany.

Six men are working at the York.

The Mineral Mountain M. Co., under the laws of Colorado, capital stock $1,000,000, will operate the Frost mine near Downieville. Directors: E. R. Rabb, J. T. Robinson, A. H. Pipenberg, C. Stanley, R. B. Myers, W. O. Frost, J. L. White.

SISKIYOU COUNTY.

J. O. Welch will erect a stamp mill on his gravel mine near Gazelle.

A 40-stamp mill is projected on the Sterling, near Coles, next spring, in place of 10-stamp mill now in use there.

The La Flesh and Jillson & Co. mines, near Yreka, are running day and night.

The Greenhorn No. 2 (blue gravel) has suspended temporarily owing to breakage of pump cable. Repairs are under way and operations may soon resume.

The Dewey, near Gazelle, has stopped shipping to Keswick, as company intends to put up 20-stamp mill and do its own crushing.

Mr. Welch is erecting an 8-stamp mill on his gravel and quartz claim near Gazelle.

A. C. Brokaw is working the old R. H. Campbell, Quartz valley.

TRINITY COUNTY.

C. D. Galvin of Weaverville has his dredger for use on Weaver creek about finished.

The Union Con. M. Co., capital $50,000, is organized to work 240 acres patented land near Abrams.

The mill at the Yellow Rise is running steadily. Operations will continue during the winter.

The mill at the Loftus is completed and running.

It is reported that the Knownothing, on South Fork of Salmon river, has closed permanently, vein being exhausted. Machinery has been taken out and is announced for sale.

The Trinity Copper Co. has incorporated in New Jersey, capital $6,000,000, to take over the Shasta King property and revive it as a copper mine.

TULARE COUNTY.

Work at the Minnie-Ellen mine, Porterville, is progressing. The shaft, present depth 115 feet, will be sunk an additional 100 feet.

TUOLUMNE COUNTY.

After a shut down of sixty days many of the quartz mills on the mother lode in Tuolumne county resume operations. The Tuolumne Water Co. turned water into its main ditch Oct. 31st; the Phœnix lake power plant is furnishing electric power to several mines.

The new mill at the Clio, near Jacksonville, is running on ore from a new shoot. Steam power is being used, water not being available.

The 20-stamp mill at the App is running and additions to the 60-stamp mill will soon be completed.

Near Jacksonville, at the Williette mechanics are repairing the old mill. J. Gleason is Supt.

S. S. Bradford of Sonora is getting in lumber at the Riverside, near Columbia, for the rebuilding of the mill, etc.

The machinery and other improvements being put on the Starr King, Carters, will be ready Nov. 10th.

Work on the New Year, an extension of the Providence, near Carters, has resumed.

The Golden Gate M. Co., J. Fischer president, will enlarge their chlorination plant and add twenty stamps to the twenty now running, making a total of forty stamps.

A. A. Harris will work his gravel claim near Matelot.

The Mazeppa will be unwatered.

Independent: Water is turned into the ditch to start up the 20-stamp mill at the App mine. Progress is being made on the new addition to the mill of sixty stamps.

New Era: The Little Laurel, Carters, has closed down for repairs.

After two months' shutdown, the quartz mill on the Mother Lode, near Jamestown, has resumed.

Mine managers report a scarcity of miners in the district.

YUBA COUNTY.

Campbell & Martin, opening the Stiles, Nevada City, are laying a mile of pipe, connecting with Summit M. Co.'s pipe, near Town Talk.

At the Golden Trout, 6 miles west of Strawberry Valley, men are erecting a 40-stamp mill.

The Good Hope, near Cabbage Patch, is bonded to R. Vincent of Grass Valley. He will erect a mill and expects to have men at work soon.

COLORADO.

BOULDER COUNTY.

The Haywood (coal), near Lafayette, E. Scholes, Supt., is being put in shape to resume. Forty men will be employed.

The Grand Junction Coal M. Co. is sinking near Lafayette. At 116 feet, a 10-foot vein opened up, supposed to be an extension of the Louisville vein. Hoisting will begin and more men put on.

The Midget mill is making a test run on wolfram ore from the mines of G. Wanamaker. They have twelve tons of concentrates that go 60% tungstic acid.

The St. Louis M. Co. of Caribou have bought the McMaster mill at Moon gulch, Rollinsville, and will remove building and machinery to Caribou. H. Wohlke has charge.

E. Welzer, Supt. North Pole mine, says development work is being pushed. Fifty men are employed. A Hallidie tramway is being constructed from the mine to the mill, 7750 feet, to be completed next spring.

CHAFFE COUNTY.

Should new smelter at the Tasmania, Winfield, prove a success, it will be enlarged.

Ore from the Atlantic, Winfield, a sulphuret, runs high in gold.

Pres. Erisman, of Practical G. M., M. & T. Co., will work ten men on Independence group, Winfield, this winter. The erection of a concentrator is contemplated.

The Little Annie, in Freshwater district, 6 miles from Buenavista, has resumed. The mine has a Huntington mill in place and work will be pushed.

CLEAR CREEK COUNTY.

Driving of the Newhouse tunnel, Idaho Springs, is progressing.

The Jackson and Newton mills, Idaho Springs, are working day and night.

The Mixell 20-stamp mill, Idaho Springs, is running constantly.

At the Anderson, Idaho Springs, the 10-stamp mill and two crushers are in operation. Ore averages $12 per ton, while smelting product runs about $100 to the ton.

Eighty tons of ore from the Fraction, on Spring creek, near Idaho Springs, produced seventeen ounces of gold and a carload of concentrates worth $50 per ton.

The new mill of the Senator & Blue Ridge Co., Idaho Springs, is running and work is being pushed.

The Inverness, Yankee, R. Burns, owner, has resumed.

More men will be put on at the Ohio.

The Manhattan shaft will be sunk.

It is reported that men are scarce in Yankee camp.

It is reported that active operations will be carried on near Empire this winter.

The Empress has put in new 80 H. P. boiler and larger compressor.

The Pioneer, operated several years ago by late D. J. Ball, will probably resume.

EL PASO COUNTY.

The largest chlorination mill planned in Colorado is to be built by the Portland M. Co. of Victor at Colorado City. There will be three 60-foot furnaces, twelve chlorination barrels, rolls 18x42 inches, with eight sets of driers, and necessary screenings.

GILPIN COUNTY.

Bruhl, Cody & Co. are working the Flynn Mammoth, near Central City. Two shafts are working at the West Notaway. Sinking is progressing at the Good Luck; shaft is down 125 feet. The shaft of the Argosy, present depth 283 feet, will be sunk an additional 35 feet. The Cook is working 140 men.

The Perigo, Perigo, employs fifty men. Two shifts are working at the Gold Dirt, J. Bowden Supt. The Wizard M. Co. will drive a 300-foot tunnel on War Eagle hill.

H. E. Eastman is pushing work on the O'Neil, on Gregory hill.

GRAND COUNTY.

(Special Correspondence).—The Touraine placers, which were sold to Boston parties through the efforts of H. H. Daniels of Denver, are to be equipped with flume and hydraulic apparatus, and it is expected the property will be operated next season. These placers are on Willow creek, a tributary of the Grand river. The holdings of this concern comprise about 500 acres, which includes the Gold Run placers, along same creek, on which there is now a hydraulic plant.

Another Boston company is putting in a ditch for placer work on Willow creek, 12 miles above the Touraine, and a Denver concern is doing similar work in same locality, preparing for business next season.

Some work on the gilsonite beds at the head of Willow creek is in progress.

This locality is usually reached by wagon, stage or horseback from Georgetown, over Berthoud pass and via Sulphur Springs, the distance from Georgetown being about 60 miles.

Sulphur Springs, Oct. 20.

GUNNISON COUNTY.

Three shifts are driving the big tunnel at the Silver Basin, near Pitkin. The compressor and drills will soon be at work.

Ogden & Scott of Aspen have leased the Black Queen and Fargo and will put in new hoist and other machinery during the winter.

Shaft on the Chloride, Pitkin, is down 192 feet. Crosscutting on this level shows vein to be about 3 feet wide with 6-inch paystreak.

Pitkin Miner: In the Sacramento, Pitkin, work is continued in crosscut.——On the Reynolds group, on West mountain, water pipe line has been completed; compressor is being set up; two shifts are employed; three will be put on shortly.——On the Big Seven diamond drill has been driven over 200 feet below the bottom of shaft, making total depth 400 feet. Management will go down a few hundred feet further.——The Mackenzie shaft No. 2 has reached depth of 70 feet, at which point water has become so strong that management will place an entirely new plant, including pumping machinery, on property. Manager Lejune expects to have new plant in operation next month.

HINSDALE COUNTY.

Tunneling is progressing on the Vermont group, near Lake City. Machine drills are used.

It is reported that the Czar Co., Capital City, will put in a mill on the Czar next year.

Denver Republican: The San Cristobal M. & M. Co. will put in a large water power plant at Lake City, having capacity for generating 500 H. P.

HUERFANO COUNUY.

The Stone-Ripley, Grayback district, near Walsenburg, is sold to Eastern men for $60,000. The new management contemplates developing and will put on fifty men.

There are thirty placer mines in operation near the towns of Placer and Russell.

LAKE COUNTY.

(Special Correspondence).—The representative of the Vieille Montague Co., a zinc smelting concern of Belgium, has been in Leadville for the purpose of obtaining information as to the grade and quantity of zinc ores in this district, it being given out that this company may erect a zinc reduction plant at some point in the United States.

Leadville, Oct. 29.

The A. M. W. Co. has built a large mill in Big Stray Horse gulch, Leadville, to treat its low grades at the rate of 100 tons per day.

In Taylor Park, Leadville, the Enterprise has forty men working; the Star has thirty-seven, and expects to put on more as development permits. The Forest Hill has nine men crosscutting, and will probably add more.

S. L. Fox, manager Philadelphia M. Co., has leased 860 acres of land near Turret from the Colorado Iron & Fuel Co., and will begin development.

At the Rubie, on Iron hill, Leadville, ore body has been developed along strike for 15 feet on 707-foot level, and shows no signs of giving out. A pump will probably be put in to keep shaft clear of water.

At Leadville the shaft on the Rose Emmet is down 525 feet.

Supt. Connors is pushing work on the Canterbury shaft, Leadville.

Sinking is in progress on the Fanny Rawlings.

A larger boiler is being put in on the Little Bob; G. F. Campion, manager.

A new engine and boiler room are being built at the Hummer.

LARIMER COUNTY.

It is reported that a strike of copper-gold ore has been made on shore of Island lake, near Owl.

MINERAL COUNTY.

Roe & Lamb are working two shifts on the United Mines, near Creede. They intend to put on additional men soon.

At the Judson tunnel, Spar, miners report a strike resembling sulphurets; also one of crystallized lime.

Work on the Hidden Treasure, at Sunnyside, is suspended.

C. H. Abbott is pushing work on the Holy Moses, Solomon and the Ethel, Creede.

PARK COUNTY.

The Andesite Gold M. & Town Co., of Colorado Springs, is incorporated to work property near Guffey. E. G. Morath, general manager.

SAGUACHE COUNTY.

After lying idle for ten years the Stem Winder, Bonanza, has resumed.

SAN JUAN COUNTY.

At Silverton, the Kendrick-Gelder smelter is sampling ore from Notaway M. Co.'s Champion No. 2.

Seven tons gold-silver-lead ore shipped to Durango recently from the Diamond Cunningham gulch netted $30 per ton.

Recent carload ore from the Queen City, Ohio gulch, gave returns of $205.75 silver, 28.20% lead and 7.04% copper.

The new compressor at the Iowa, Arrastra gulch, will soon run.

Additions to the Gold King's mill are completed; forty stamps were added, besides tables, jigs, etc.

The Emma tunnel, now in 828 feet, will be driven several hundred feet farther.

Work on the Sunsite, Ice Lake basin, is being pushed.

In 178-foot tunnel on the Mazeppa, Twin Sister's mountain, body of galena was opened up recently, carrying high percentage of lead, besides gold and silver values.

SUMMIT COUNTY.

The Rapidan G. M. & M. Co., Patterson manager, has bought the Cœur d'Alene, on Academy hill, Black Hawk, and is getting it in shape for regular shipments. After rearranging steam pump in main shaft, and replacing worthless water pipe with new pipe, the lower workings will be unwatered and sinking resumed. Ore from bottom of shaft yielded five ounces gold per cord, while that from the lower west level gave returns of over seven ounces gold per cord.

At the Little Elkhorn, on Little mountain, two tunnels are being driven on the vein. The upper is in about 40 feet and the lower is in 100 feet. Conrad & Foot are the operators.

The Gold Pan M. Co. has suspended work for the season. Two drills, however, will be kept at work prospecting in Blue river valley until very cold weather sets in. An elevated track is being put in and work at the machine shop is progressing favorably.

The Blue river excavators (Lambing pattern) are reported a success.

TELLER COUNTY.

The Juniata Co. has received patent for its Silver Bell claim, Cripple Creek. Considerable development work will be done, now that title is assured.

The Hattie W., consisting of five claims on Squaw mountain, Cripple Creek, has been bought by the New Century Co. for 225,000 shares treasury stock.

At Victor block No. 3 of the Christmas is leased to E. Sharpe, who will resume operations.

The Johanna will resume next month.

The new hoist at the Legal Tender will be put in next month.

Sinking on the Atlanta, Cripple Creek, is in progress.

The Atlantis Mines Corporation is setting timbers in the new station on the 550-foot level.

The shaft on the Florence, on Bull hill, Victor, has a depth of 320 feet. At that depth crosscutting was started.

Shipments from the Sacramento, Victor, average fifty tons a month, mainly of screenings, worth $40 per ton. A compressor will be put in.

The Arno G. M. Co., operating in the heart of Anaconda, Cripple Creek, will put in a steam plant near there.

The compressor being put in on the John A. Logan, Victor, will drive twenty-five drills.

Work on the Gold Bug, Olive Branch Co., near Cameron, Cripple Creek, is resumed.

A patent has been issued to the Free Gold M. Co. for the Northeastern lode, on Squaw mountain, Cripple Creek, consisting of seven and three-quarter acres.

Work at the Elkton, Cripple Creek, is progressing. At the 700-foot level the ore body is 5½ feet thick. The new pump, capacity 1000 gallons per minute, is running and the new hoist will soon be started up.

At Cripple Creek the shaft of the Wide Awake is being timbered as sinking progresses.

Drifting is in progress on the 500-foot level at the Jennie Sample. One shift is working. The new 6-drill compressor is in.

W. A. Ramsay of Colorado Springs has bought an interest in the Lucky Thought for $2000.

A 12-drill compressor will be placed on the Rubie and a 15-drill compressor will be added to equipment of Hull City placer Co.

Miners at the Independence, Victor, have quit work owing to personal search plan put in operation by the company.

It is announced that the shaft at the Lillie, Victor, will go down 300 feet more.

Development is progressing at the Unexpected. Shaft is down 60 feet.

The plant on the old Eclipse shaft of the

New Haven Co., Cripple Creek, has been moved to new workings on same property.

The Amanda Co. is sinking.

Drifting on the 120-foot level is in progress on the Twin Sisters. A steam plant and hoist have been put in. Steam drills will soon be running.

The Golden Cycle, Cripple Creek, has resumed.

J. Barbee is crosscutting on the Cripple Creek, Columbia.

All work at the Lillie, except sinking for 1500-foot station, has been suspended.

The Clyde shaft, Cripple Creek, is down 675 feet, and will be sunk to 800-foot level. New pump, 150 gallons per minute, is running. Diamond drills will soon be running.

The Illk Co., Victor, will put new plant on its Mineral Hill property.

Crosscutting is now in progress on 150-foot level at the Abe Lincoln.

Shaft at the Anaconda is down 400 feet.

The Chicago & International Dev. Co. are drifting on 135-foot level at the Draper, Victor.

The Marie M. Co., Cripple Creek, will put in another air compressor, capable of driving three ¾ drills; present one drives six small drills. Shaft will be sunk 300 feet additional, making total depth of 885 feet.

The new sampling plant of the Cripple Creek Sampling & Ore Co. will be finished Dec. 15th. It will be the largest in the State. The crushers will have jaws 15x24, with estimated capacity of twenty-five tons per hour, and rolls, of which there are two sets, have capacity of fifteen tons per hour each. Bin capacity, 2500 tons. The plant will be run by electricity.

It is reported that the Clyde, Cripple Creek, has closed down; also, that Supt. De Masters has resigned.

It is reported that shafts on the American Eagle and the John A. Logan will be sunk to depths of from 2000 to 3000 feet. The greatest depth in the vicinity at present is 1200 feet on the John A. Logan.

IDAHO.

OWYHEE COUNTY.

The Wagener arrastra is working ore from the Steuben, Silver City.

Hedum, Bishop & Stevens have completed air pipe in the Addie and are stoping.

Williams, Eisenhart, Reel & Fleming have an eighteen months' lease on the South Central and are pushing development.

SHOSHONE COUNTY.

On Oct. 26th a defective light wire at No. 4 tunnel on the Mammoth, Wallace, set fire to drier and exploded 7000 pounds dynamite, resulting in loss of $4000.

The Victor M. & D. Co. has incorporated at Murray; capital, $100,000.

The Standard M. Co., Wallace, is putting in new settling tanks on lower side of concentrator to make a closer saving in slimes. It is one of the most complete slime plants in the Cœur d'Alenes.

Work on the Wonderful group, near Wallace, will be continued during the winter.

A new plant is to be put in on the Amador, near Wallace. It will include a 16-drill compound 22x26 belt-driven air compressor and new hoist, to be operated by compressed air. The plant will be driven by water power, a head of 211 feet being available at that point. It is expected to run by Dec. 1st.

The Stevens Peak M. Co., near Mullan, will not ship ore until next spring. The tunnel, now in 750 feet, will be driven during winter.

WASHINGTON COUNTY.

The Blue Jacket mine has suspended operations at Cuprum.

MISSOURI.

Joplin zinc men anticipate advance in price of ore. Managers of zinc properties are not anxious to dispose of their ore at the present price—$28.50 a ton—and are storing their output in bins. The reason for the expected advance is the strength in the metal market. Spelter is now quoted in the St. Louis market at $4.10 to $4.15. The demand is active, and, on account of it, there is a good inquiry for ore.

WRIGHT COUNTY.

The Dodson Co. of Bethlehem, Pa., who have complete concentrating plant near Mansfield, expect to resume. Lead Hill, it is said, has shipped over 400,000 pounds free lead.

MONTANA.

CASCADE COUNTY.

The Boston & Montana Co. of Butte may use Rainbow Falls to run its smelter at Great Falls. It will enlarge its electrolytic plant; 4,000,000 pounds refined copper are shipped monthly from Great Falls.

JEFFERSON COUNTY.

The Lee Mountain, near Basin, may be opened up soon. W. Tatham of Philadelphia is one of the owners. The mine has a vein of silver-lead concentrating ore 80 feet wide between walls, with bodies of high-grade ore, and is developed to a depth of 700 feet by system of tunels and raises.

MADISON COUNTY.

A new mill is projected on the Leviathan, near Mammoth, next season.

J. Carter and P. Vinyard are working the Klondike Lode, at head of Boulder basin.

SILVER BOW COUNTY.

The Peck experimental plant at the old Centennial mill, Butte, for treating low-grade ores of that district, is a failure, and it is said that the machinery will be sold.

The Anaconda, Butte, will probably resume latter part of this month. Average monthly output for last five years has been 10,000,000 pounds. Production in 1897 averaged 11,000,000 pounds per month. At the Parrott work is progressing. It is expected new plant will be completed and running by Jan. 1st, when force will probably be put on.

NEVADA.

CHURCHILL COUNTY.

Report that the Bellmare group had been sold to a Colorado company for $300,000 is denied by Vice-President Somer of the Bellmare Co.

ESMERALDA COUNTY.

The Silver Peak mines, Hawthorne, are reported sold to the Silver Peak G. & S. M. Co. of New York; consideration $600,000—$100,000 cash and balance secured by mortgage.

EUREKA COUNTY.

O. J. Smith has refused receivership of the Whalen Con. C. M. Co.'s properties at Alpha. Mr. Whalen proposes to resume work on the properties.

The Eureka Con. mine has resumed. Thirty-five men are at work.

LINCOLN COUNTY.

The greatest depth reached in the Searchlight mines is 300 feet.

A strike of rich ore is reported on the seventh level of the De Lamar mine. Three tons assorted from the discovery averaged $1200 per ton in gold.

The New Era M. Co. is incorporated to operate in the Searchlight district.

STOREY COUNTY.

With the advent of electric power at the Comstock the outlook is promising. The Nevada mill at the Chollar and several others will probably be started up in the near future, and increased forces put to work.

The main south drift from the Gould & Curry tunnel, Virginia City, is in on the 425-foot level 172 feet. The face is in vein porphyry, with small seams of low-grade quartz through it.

At Virginia, work on 2150-foot level at the Con. California & Virginia will soon resume. In the Sutro tunnel, on 1700-foot level of the Ophir, nature of ground requires timbering. Tunnel at the Hale & Norcross is in over 1840 feet. Shaft at the Sierra Nevada is being timbered.

WASHOE COUNTY.

Nine men are working on the Reno Star, Reno.

Clark & Curry are driving a 1000-foot tunnel on the Peavine, Reno.

Fourteen men are employed at the Cold Springs, Reno, and the force may be increased.

Ore from the Cabin No. 2, Reno, is being put through the Slip mill. It runs $80 to the ton.

It is said that 100 men are now employed in mining in vicinity of Reno. It is reported that Donduro, Rosasco & Dellipiaza recently cleaned up nearly $1700 from a seventy-ton run at the Proctor & Slip mills, Wadsworth. Two shafts are being sunk on the Piute to tap lead running through Cabin No. 2. The Washeim mill in White Horse canyon is running; capacity about eight tons per day.

NEW MEXICO.

COLFAX COUNTY.

The Gold & Copper Deep Tunnel M. & M. Co., Elizabethtown, is incorporated; capital $200,000. Work on the Free Gold and the Emerald is progressing.

GRANT COUNTY.

It is reported that damage by fire at the Philadelphia, at Hanover, was not as great as first thought; estimated loss now, only $500 or $600. Plant will be repaired and operations resumed about Jan. 1st.

SANTA FE COUNTY.

The smelter of the Santa Fe G. & C. M. Co. at San Pedro will be started up Nov. 15th.

Work on the Old Rusty, near Golden, Pigeon gulch, is being pushed.

The Gold King is being developed by a 100-foot tunnel. Vein is said to be 40 feet wide and that ore assays from $7 to $40 per ton.

In the Mace Maceo, ner Cerrillos, in 90-foot drift, a 20-foot ledge has been opened up, showing gold, silver and copper values.

SIERRA COUNTY.

A concentrating plant of 100 tons daily capacity will be erected on the El Dorado group, near Hillsboro, Neil & Buchanan owners.

H. Steele has an extension of bond on the Price and Patrick claims, Hillsboro, and will push development. Sixteen men are at work.

The Torpedo, in the Organs, near Hillsboro, has resumed.

SOCORRO COUNTY.

Development at the Graphic, near Kelly, is progressing.

Machinery at the Cavern, Magdalena, Manager J. Stephenson, will soon be placed.

TAOS COUNTY.

The Strawberry, Tres Piedras, R. Cole Supt., has five men sinking and drifting. A 4-foot vein of copper-gold ore runs about $48 to the ton. The mine is well equipped, having 40 H. P. boiler, steam hoist, good buildings, etc. The group of claims in Cunningham gulch, Tres Piedras, is reported sold to the Mexican King G. & C. Co. of Milwaukee, Wis.

J. M. Moad is working the Bitter Creek (placer), near Red river.

Supt. G. B. Paxton has put on more men at the Red River copper mine, near Red river.

OREGON.

BAKER COUNTY.

The Cracker Summit G. M. Co. of Spokane, Wash., is incorporated, capital $250,000, to work property in the Cracker Creek district; general manager, H. W. B. Smith. Two shifts will be put on and development continued during the winter.

After ten days' run of 10-stamp mill at the Gold Ridge, Baker City, $800 worth of amalgam was scraped from plates.

A 4-foot vein of cobalt is locally reported as having been recently opened up on property of the Standard M. Co., on Dixie creek, near Baker City.

The Gold Bug Grizzly Co., Baker City, will sink shaft to 500 level.

The Bald Mt. M. Co., Manager M. Callum, is putting in a 20-stamp mill and electric light plant at the Bald Mountain, Sumpter.

A 5-foot Bryan mill is being put in on the Belle of Baker, Baker City.

GRANT COUNTY.

At Granite the tunnel at the South Cougar is in 120 feet.

SOUTH DAKOTA.

LAWRENCE COUNTY.

Repairs on the De Smet mill, Deadwood, are completed and it will run on De Smet and Deadwood–Terra ores.

The Mayflower is bonded, and if sampling now being made is satisfactory it will be reopened.

The new Cleopatra mill has a capacity of 100 tons for amalgamation and 50 tons for cyaniding.

A new shaft will be started on the Homestake.

The Portland cyanide plant is running.

Work on the Lena, Manager Haskell, will be pushed.

The Shawmut G. M. Co. of Deadwood reports earnings for the twenty-seven days ended Oct. 16th of $2241. This is an improvement of more than 50%.

UTAH.

GRAND COUNTY.

The Davis–Thompson stamp mill, near Moab, will begin this month.

JUAB COUNTY.

Manager Geddes of the Swansea, Silver City, is sinking. At 970 feet carbonates were opened up.

A new mill for the May Day, Eureka, is expected to be up early next year.

SALT LAKE COUNTY.

The Dewey mill, Bingham, has resumed.

The Chloride Point cyanide plant, on Lion Hill, Salt Lake, will close down for the winter. Outside work will continue.

It is reported that the Centennial-Eureka and the Eureka Hill companies, Tintic, have an agreement by which the latter's mill will be used in treating former's ores.

SUMMIT COUNTY.

H. G. Milland, of Salt Lake City, has secured controlling interest in the Crescent Hill M. Co., Park City. Active development is contemplated.

At Park City, the California M. Co. is incorporated, capital $75,000, to work the California, Independence, White Rock and other claims near there. The Anchor has resumed. The new aerial tramway for the Silver King is well under way. The new smelter for the Valeo will be running this month.

J. A. Kirby, Supt. Daly–West, at Park City, is making connection with main chute on 1200-foot level.

TOOELE COUNTY.

The new 1800-foot steam line at the Honerine, near Stockton, will be completed this month. Upon completion sinking will be resumed.

WASHINGTON.

FERRY COUNTY.

G. L. Hedges, Supt. Wanconda, near Republic, has men timbering 400-foot tunnel, now in 160 feet. Sinking will be done on the Clackamas.

It is reported that the Mountain Lion and the Tom Thumb, Republic, will be consolidated and controlled by British and Canadian men.

Preliminary tests of the new Republic mill, Republic, show a saving of 93% from $25 ore.

C. T. Porter, Supt. Golden Lion and Little Four Con. G. M. Co., Republic, has men at work sinking a new shaft to be 4x6 feet in the clear, and to be sunk 500 feet.

Recently five samples of ore from the Hawkeye, Republic, gave respective assays of $33.18, $33.45, $33.58, $45.92 and $64.42 per ton.

The Flag Hill, near Republic, is showing up well. Driving and crosscutting are under way.

Net returns from first shipment of twelve tons from the Morning Glory to Granby, B. C., smelter were $1312.61, or about $109.50 per ton.

OKANOGAN COUNTY.

Palmer Mountain tunnel, Loomis, is in 3800 feet. The Northland Gold & Copper M. Co. will continue operations during winter. The Bridgeport M. & M. Co. will resume operations on Mineral hill. The Golden Zone will run a 500-foot tunnel; extra machinery is being put in mill.

SKAGIT COUNTY.

At Anacortes the Eureka stamp mill is crushing forty tons ore per day.

Sinking is in progress on the Ninety-six. Work will continue during the winter.

The tunnel at the Mammoth is in 700 feet.

THURSTON COUNTY.

Coal discovered at Grandmound is reported over 6 feet thick, and resembling anthracite.

WHITMAN COUNTY.

In the Hoodoo district, near Palouse, the wagon road from the Grizzle to the Mascot, 12 miles, will be finished by January 1.

WYOMING.

CARBON COUNTY.

The Boston & Wyoming Smelting Co. is reported organized to erect a smelter at Grand Encampment to treat ores from the Kurtz–Chatterton (copper) near there.

CROOK COUNTY.

It is reported that a strike has been made at the mines near Welcome. Ore is phonolitic, and assays are said to go from $5000 to $10,000 to the ton. A. D. Ticknor is owner.

FREMONT COUNTY.

Dexter G. M. Co. is incorporated, capital $1,000,000, to work placers near South Pass.

Gravel from the Granier (placer), near South Pass, has run 75 cents and $1 to the pan.

W. H. Baker of Denver, Colo., will probably work the Tabor Grand, South Pass.

The Garfield, South Pass, C. E. Ross manager, is being put in shape for winter work.

Owners of the Queen of the Hills, South Pass, are timbering old shaft and will sink farther.

FOREIGN.

BRITISH COLUMBIA.

The Dunsmuir Wellington mines have closed down, coal having given out. With exception of Esquimalt and Nanaimo workshops, which will be removed next year to Ladysmith, the little mining town established over thirty years ago is deserted.

At the Buckhorn, Greenwood, a crosscut to tap the ledge at 400 feet is being run. Ore is copper-gold.

The None Such group, Smith's camp, Greenwood, will resume this month.

The tunnel on the Crystal Butte, Myers Creek district, is in over 600 feet.

The Standard Pyritic Smelting Co., Greenwood, expect to have their new smelter running by Jan. 1st.

The Old Gold Co., Lardeau, Supt. Westfall, will continue operations during the winter.

Sinking on the Earthquake, Grand Forks, will be continued to the 200-foot level.

Ten men are working at the Estella.

E. W. Beckel, recorder Atlin district, estimates that 400 men will remain in Atlin this winter to work bench claims.

Personal.

J. H. Hammond is in Denver, Colo.

Henry Bratnober is in Butte, Montana.

I. Copeland of Downieville, Cal., is in San Francisco.

H. Wilson of the Chloride, Dedrick, Cal., is in San Francisco.

Menno Unzicker, of Spokane, Wash., is visiting Rossland, B. C.

F. Klepetko has returned from Salt Lake City to Butte, Mont.

F. Snell of the Champion, Maybert, Cal., is in Grass Valley, Cal.

F. S. Roumage has returned to Auburn, Cal., from British Columbia.

W. F. De Camp, Supt. of the Lillie, Goldfield, Colo., has resigned.

E. Luketich of Hermosillo, Sonora, Mexico, has returned from Europe.

F. M. Leland of Risdon Iron Works, San Francisco, is in Baker City, Or.

G. M. Pinney, Supt. Mountain mine, Sierra Co., Cal., is in San Francisco.

E. Boyce, Pres. Western Federation of Mine Workers, is in Baker City, Or.

C. W. Irish, of Coleman Placer M. Co., Gold Creek, Cal., has gone to Chicago.

C. Widmeyer of Bonanza, Colo., has returned there from Durango, Mexico.

T. A. Pearce of Philadelphia, of Black Warrior Copper Co., is in Globe, Ariz.

C. Jacobs, foreman App Con. Co., Jamestown, Cal., is in San Jose, Cal.

Victor M. Clement is examining mining property in Owyhee Co., Idaho.

J. E. Ericson, Supt. Rustler Gulch M. Co., Crested Butte, has gone to Galva, Ill.

E. C. Allen, of the Forrest mine, has returned from New York to Ward, Colo.

E. B. Braden has been appointed manager the East Helena, Montana, smelter.

V. Van Hal and J. R. Phillips of the Banner, Jackson, are in Grass Valley.

Franklin Leonard, Pres. and Supt. Comstock Tunnel Co., is in San Francisco.

W. H. Hile, manager Last Chance M. Co., Weaverville, Cal., is in San Francisco.

A. Breton, Supt. Unity Co., Minersville, Cal., has returned from San Francisco.

R. B. Stanford, a Cripple Creek, Colo., mining engineer, is in San Francisco.

N. Wilson, Manager Reed & Hamlin interests, Cripple Creek, Colo., has resigned.

Clarence S. King of Baker City, Or., is examining mining property near Tepic, Mexico.

Manager B. Gilpin of the Prieta G. & S. M. Co., Parral, Mexico, is in Denver, Colo

J. C. Steele, Supt. Golden Jubilee, Weaverville, Cal., has returned from San Francisco.

Supt. W. P. Scott of the Black Oak, Carters, Cal., has returned from San Francisco.

Chas. C. Derby succeeds Jno. Truscott in the superintendency of the Oneida, Cal., mine.

Waldemar Lindgren, U. S. G. S., is examining the region adjacent to Huntington, Or.

A. C. Watson is in Bakersfield, Cal., superintending construction of five 35,000-barrel tanks.

Manager Wright of the 43rd M. & M. Co., Quesnelle, B. C., has gone to Ottawa, Canada.

F. W. Griffin has the California agency for the Bucyrus Dredger Co., Milwaukee, Wis.

J. Baier, manager Conrey M. Co., Virginia City, Mont., has arrived there from Boston, Mass.

E. S. Wiard of Empire State–Idaho M. & D. Co., Wardner, Idaho, has returned from California.

H. A. Jackson is Supt. of the Rocco-Homestake mine at Hamilton, White Pine county, Nevada.

C. Robinson, managing Bucyrus Gold Dredge Mfg. Co. of Milwaukee, Wis., is in British Columbia.

Oscar Szontagh, who has been conducting copper operations near Ione, Cal., is in San Francisco.

Mr. Gifford has been appointed mine manager of the reorganized Hall M. & S. Co. at Nelson, B. C.

Supt. Tautphaus of the Providence M. Co., Grass Valley, Cal., has returned from San Francisco.

Hayes & Rockwell of Galty Bay group, Silverton, Colo., have arrived there from the East.

F. W. Newell, ore buyer for the Selby Smelting & Lead Works, is convalescent after a severe illness.

Frank H. Clark has taken the position of Supt. Colorado & Oregon mine at Idaho Springs, Colo.

A. G. Randall of Chicago, Ill., has been examining property of the Copper Hill Co., near Rinconada, N. M.

J. M. Anderson, Western manager Gold Hills Exploration Co., Toronto, has gone to Sutton, Ont., for the winter.

C. A. Bronson, foreman British-American M. Co., has returned from Deadwood, S. D., to the mines at Rochford, S. D.

Supt. J. J. Morris of the Mt. Hood mine, Columbia, Cal., has resigned; C. Moyle of Rawhide, Cal., will take his place.

A. H. Oleson, a mine operator of Deadwood, S. D., was recently in Denver to make tests on the various concentrating tables.

L. W. Shinn, Supt. Utica G. M. Co., Angels Camp, Cal., writes that he is operating the new hoist with steam power at present.

Leo Von Rosenberg, a New York mining engineer, who has been examining California mining property, is in San Francisco.

R. Thompson, Treas., S. Montgomery Sec'y and G. L. Hays of the Colorado M. & C. Co. of Pittsburg, Pa., are in Telluride, Colo.

W. G. Stephan, late of Gold Bug M. Co., Georgetown, Cal., has gone to Anaconda, B. C., to take position with British Columbia Co.

W. R. Quinan of California, who superintended the erection of the dynamite factory at Kimberly, S. A., has assumed its entire management.

Manager Kingsbury and Supt. Chamberlin of the Puritan mines, near Loomis, Wash., have resigned. D. E. Jackman is now in charge.

T. J. Hurley, vice-president The Exploration Co., has returned to New York City from a visit to the company's property at Guanajuato, Mexico.

J. H. Emerson, Supt. American Eagles and John A. Logan mines, Victor, Colo., has resigned. John A. Stark of the Independence has succeeded him.

Lee Cochrane, traveling salesman for the Standard Fire Brick Co. of Pueblo and Denver, recently returned from a business trip throughout the Northwest.

C. W. Whitley goes from the East Helena, Montana, smelter to take charge of the electrical department of the new smelter building at Salt Lake City, Utah.

Prof. Dye of Nevada State University will be instructor of Virginia, Nev., mining engineering class, and will reside on the Comstock for next three months to personally supervise work.

J. W. Mercer, Supt. Liberty Bell G. M. Co., Telluride, Colo., has gone to South America to examine mining properties owned by New York men. A. Winslow will be in charge during his absence.

P. G. Mann is assayer for the New Mexican Rosario M. Co. at Nieves, Zacatecas, Mexico. He says that the mines of San Miguel de Mezquital, 15 leagues from Nieves, have been closed down entirely.

Col. Geo. T. Rives, superintendent Toronto Gold Reefs M. Co., Ltd., Lillooett, B. C., is in San Francisco to buy mining machinery, doubling the capacity. He has the only cyanide plant in the province.

F. D. Baker, M. E., of Denver, Colo., recently returned from Chicago, where he went to design the automatic sampling mill at the National smelter, which is one of the properties of the American Smelting & Refining Co.

D. H. Jackson writes from Nome, Alaska, Oct. 8th, that he will spend the winter on one of the tributaries of the Koobyityrun, and takes four men with him via Port Clarence, across the Arctic circle. He says: "We have no fears of the trip, though there will not be any California sunshine nor flowers in it."

Commercial Paragraphs.

The General Electric Co. has the contract to erect and equip the plant for the Guadalajara Tramway Co. at Guadalajara, Mexico. The entire contract is valued at $460,000.

Manager Panting of Burnt River M. Co. has given the Risdon Iron Works of San Francisco an order for five stamps, two Johnston concentrators, and other machinery, for the Gold Hill mine, Baker City, Or.

Under date of Sept. 15, M. F. Ferry, manager Minas Prietas Reduction Syndicate, Ltd., writes from Torres, Sonora, Mexico, to Heyl & Patterson, 51–53 Water St., Pittsburg, Pa.: "We like the conveyor and are taxing it to its utmost capacity, putting through 50% more with it than we estimated. We are handling partially dried sluices and do not think any other conveyor could do the work."

Books Received.

"The Metallurgy of Gold," M. Eissler, 638 pp., price $7.50; published by D. Van Nostrand Co., 23 Murray street, New York City. This is the fifth and latest edition of a book that has had extensive sale, and the additions to former contents add to its value. The book continues to treat the subject almost entirely from a European and colonial standpoint, and, so far as this west half of America is concerned, is not up-to-date.

Catalogues Received.

From Manning, Maxwell & Moore, 85-89 Liberty street, New York City, comes the largest catalogue received this year—704 pages, 2081 illustrations. The book is 10 x13 inches, and is a complete illustrated compendium of description of machine tools and attachments made by that concern.

Recently Declared Mining Dividends.

	Payable.
Standard Con. M. Co., California, 10 cents per share	Nov. 1
Boston Gold–Copper Smelting Co., 2½%	Nov. 15

Latest Market Reports.

San Francisco, Nov. 1, 1900.

SILVER—Per oz., Troy: London, 29⅞d (standard ounce, 925 fine); New York, bar silver, 64¼c (1000 fine); San Francisco, 64¼c; Mexican dollars, 50½c.

The London Statist says India absorbed 50,000,000 ounces of silver in the year ending Sept. 1, and predicts that that country will want nearly one-quarter of the world's production.

Chinese currency and currency regulations present some most peculiar features and the currency customs of the province of Kwang Tung, the province of which we know most, as are remarkable as any. Roughly speaking, the currency of the Kwang Tung province consist of what may be called "chopped dollars," or broken silver, and Canton subsidiary coins of 10 and 20 cents. The dollars in circulation are principally Mexican, but the Japanese yen (silver dollar), the Hongkong dollar and the Kwang Tung dollar are also current. All these dollars are supposed to be of the same weight and fineness—that is, of 416 grains .600 fine. The variation, if any, is very slight. All Chinese merchants and bankers stamp with an iron instrument every dollar that passes through their hands, and in the course of time these coins become defaced and broken, when they are denominated "chopped dollars," or "broken silver." Chopped dollars, Kwang Tung dollars and subsidiary coins are not current in the British colony of Hongkong. "Clean dollars," or dollars not chopped, are usually at a premium of about 2%.

The local currency is in no way guaranteed by the Chinese Government. It is taken on its own merits only, which necessitates examination by merchants and bankers of every dollar that passes through their hands, and the "chop" is to enable them to recognize any dollar they may have paid out. Hongkong bank notes pass freely, being preferred to silver, and are therefore at a premium. The bulk of the merchandise shipped by the foreign merchants is paid for by checks on Hongkong, which can generally be sold to the native banks at a premium varying one-fourth of 1% and sometimes as high as 1½%. The Chinese merchants, in effecting exchanges between themselves, use the taels. This is not a coin, but merely a weight of silver, and is considered the local currency. Seventy-two taels are equal to $100. Among the poorer classes and in the country districts the copper "cash" is used, of which 1000 are about equal to a dollar. The Mexican dollar and the Japanese silver yen are legal tender when not chopped.

From the foregoing it will be observed that the local currency is debased. It is not legal tender in Hongkong—that is to say, the chopped dollars. Kwang Tung dollars and subsidiary coins are accepted by the Government and by the banks and merchants, but shopkeepers will accept such money only in small sums. Nearly all foreigners residing in Canton—particularly the merchants—keep the bulk of their money in the Hongkong bank, and draw against their deposit by check when required.

COPPER.—New York: Lake, 1 to 3 casks, $16.87½ cash; carload lots, 16.50; Electrolytic, 1 to 3 casks, 16.75; carload lots, 16.37½; Casting, 1 to 3 casks, 16.50; carload lots, 16.25. San Francisco: 18. Mill copper plates, 20c; bars, 22@23c.

LEAD.—New York, $4.37½; Salt Lake City, $4.20; St. Louis, $4.27½; San Francisco $5.00, carload lots; 5½c 1000 to 4000 lbs.; pipe 6¾, sheet 7½, bar 6c; pig, $4.70 @5.10. London, £17 2s 6d=3.83½c per ℔.

SPELTER. — New York, $4.10; St. Louis, $3.95; San Francisco, ton lots, 5½c; 100-lb lots, 5¾c.

ANTIMONY.—New York, Cookson's, 10½c; Hallett's, 9½c; San Francisco, 1000-lb lots, 12c; 300 to 500 lbs., 13@14c; 100-lb lots, 15@18c.

IRON.—Pittsburg, Bessemer pig, $13.25; gray forge, $13.00; San Francisco, bar, per lb., 2½c in small quantities.

STEEL.—Bessemer billets, Pittsburg, $19.00; open hearth billets, $22; San Francisco, bar, 7c to 12c per lb.

TIN.—New York, pig, $27.50; San Francisco, ton lots, 30c; 1000 ℔s., 30½c; 500 ℔s., 30c; less, 31c; bar tin, ℔ ℔, 35c.

QUICKSILVER. — New York, $51.00; large lots: London, £9 2s 6d; San Francisco, local, $48.50 ℔ flask of 76½ ℔s.; Export, $45.

NICKEL.—New York, 50@60c ℔ ℔.

MAGNESIUM.—New York, $3.00 ℔ ℔.; San Francisco, $4.00.

ZINC.—San Francisco, 5¼c; slab, 5¾c; bar, 7c.

BABBITT METAL.— San Francisco, No. 1, 10c.

SOLDER. — Half-and-half, 100-℔. lots, 18.70c; San Francisco, Plumbers', 100-℔. lots, 15.85c.

ASSAY LITHARGE.—San Francisco, 10c ℔ ℔, small lots.

BISMUTH.—New York, ℔ ℔., $1.60 50-℔ lots; San Francisco, $2.50 to $2.75 ℔ lots.

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 30c to 35c.

PHOSPHORUS. —F. o. b. New York 50@60c ℔ ℔.

TUNGSTEN.—New York, ℔ ℔., 95c; San Francisco, $1.15.

FERRO-TUNGSTEN. — New York, 37%, 35c; San Francisco, 65c (60%).

FERRO-MANGANESE. — Pittsburg, 80%, domestic, $85, large lots.

PLATINUM.— San Francisco, crude, $17 ℔ oz.; New York, $18.20 per Troy oz

POWDER.—F. o. b. San Francisco: No. 1. 70% nitro-glycerine, per ℔., in carload lots, 15½c; less than one ton, 17½c. No. 1*, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1** 50%, carload lots, 11¾c; less than one ton, 13¾c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9½c; less than one ton, 11½c. No. 2** 30% carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9, in lots not less than 1000.

FUSE.—Triple tape, $3.60 per 1000 feet; double tape, $3.00; single tape, $2.65; Hemp, $2.10; Cement No. 2, $3.00; Cement No. 1, $2.65, in lots of 3000 feet and up.

CANDLES.—Granite 6s, 16 oz., 40s., 11¾c ℔ set; 14 oz., 40s., 10½c.

CHEMICALS.—Cyanide of potassium, 98%–99%, jobbing, 32½@33½c ℔ ℔.; carloads, 30@31c; in 10-℔. tins, 40c; sulphuric acid, 66% B, 2c ℔ ℔.; soda ash, $1.60 ℔ 100 ℔s. 58%; hyposulphite of soda, 2¾@3c ℔ ℔.; blue vitriol, 5½@6c ℔ ℔.; borax, concentrated, 7@8c ℔ ℔.; chlorate of potash, 12@13c; roll sulphur, 6c; alum, $1.90@2.00; flour sulphur, French, 2¼@2½c; California refined, 1¾ @ 2c; nitric acid, in carboys, 8c ℔ ℔.; caustic soda, in drums, 3@4c ℔ ℔.; Cal. s. soda, bbls., $1.00; sks, 95c ℔ 100 ℔s.; chloride of lime, spot, $2.50@2.60; nitrate of potash, in kegs, 8c; caustic potash, 10c in 40-℔. tins.

OILS.—Linseed, pure, boiled, bbl., 86c; cs., 91c; raw, bbl., 84c; cs., 89c. Deodorized Stove Gasoline, bulk, 14½c; do., cs., 20½c; 86° Gasoline, bulk, 21c; do., cs., 27c; 63° Naphtha or Benzine, deodorized, in bulk, per gal., 13½c; do., in cs., 19½c; Lard Oil, Extra Winter Strained, bbl., 70c; cs., 75c; No. 1 bbl., 50c; cs., 55c; Neatsfoot Oil, coopers' bbls., 60c; extra bbls., 65c; cs., 60c; No. 1 bbl., 52½c; cs., 57½c.

COAL. — San Francisco, coast, yard prices: Wellington, $9; Seattle, $7.00; Coos Bay, $5.50; Southfield, $9.00. Cargo lots, Eastern and foreign: Wallsend, $8.00; Brymbo, $7.50; Pennsylvania, hd., $14.00; Scotch, $8; Cumberland, $12; Cannel, $9.50; Welsh Anthracite, $12.00; Rock Springs, $8.50; Colorado Anthracite, $14.50. Coke, $16 per ton in bulk; $18 in sacks.

San Francisco Stock Board Sales.

San Francisco, Nov. 1, 1900.

200 Bullion......02c	200 Mexican.....31c
100 Caledonia....33c	300 Overman....06c
1500 Imperial ...01c	600 Union Con...18c
1000 H. & N.....25c	200 Utah........08c
300 Mexican 30c	200 Y Jacket....17c

List of U. S. Patents for Pacific Coast Inventors.

REPORTED BY DEWEY, STRONG & CO., PIONEER PATENT SOLICITORS FOR PACIFIC COAST.

FOR THE WEEK ENDING OCT. 23, 1900

660,356.—Water Gate—C. H. Baker, Topia, Mexico.
660,178.—Flushing Tank—C. J. Ball, Los Angeles, Cal.
660,362.—Fruit Packing Form—S. L. Casella, Alma, Cal.
660,147.—Fire Hose Nozzle—B. C. Crane, Montesano, Wash.
660,370.—Pitcher Cover—Drennan, Smith & Graham, Bodie, Cal.
660,491.—Car Coupling—C. E. C. Edey, Tacoma, Wash.
660,498.—Leaching Ores—J. A. Fleming, Globe, A. T.
660,499.—Leaching Ores—J. A. Fleming, Globe, A. T.
660,371.—Heater—Kate J. Foley, Berryessa, Cal.
660,542.—Riveting Machine—S. Fore man, Sacramento, Cal.
660,105.—Saw Sharpener—J. W. Green-Portland, Or.
660,373.—Powder Mill—F. A. Halsey, San Rafael, Cal.
660,429.—Boiler—P. W. Hanford, Oakesdale, Wash.
660,507.—Lifting Jack—J. T. Harbin, Condon, Or.
660,108.—Adding Machine—A. Hoch, Alameda, Cal.
660,438.—Window Sash—G. W. Holly, Palo Alto, Cal.
660,342.—Ore Separator—J. P. Smith, Denver, Colo.
660,319.—Tooth Crowns—J. F. Twist, S. F.
660,408.—Hop Drier—A. Wolf, Silverton, Or.
660,409.—Rock Drill—C. E. Young, Fremont, Wash.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s Scientific Press U. S. and Foreign Patent Agency, the following are worthy of special mention:

Locomotive Headlight.—No. 659,795. Oct. 16, 1900. McDonald Elliot of Santa Rosa, Cal. The object of this invention is to provide an apparatus for the production of acetylene gas under such conditions that when the generator is subjected to violent shocks and oscillations, the water contained therein is prevented from splashing about under the violent movements. The gas is manufactured in only sufficient quantities to supply the single light which is used for locomotive headlights and for which this apparatus is especially designed. Means are provided for staying the flow of gas under the conditions of violent movements caused by the high speed of a locomotive, and means for automatically regulating the supply of water to the carbide and disposing of any water of condensation so as to keep it away from the carbide when not wanted. The generator consists of an outer casing having sufficient vertical height and made comparatively narrow in diameter. This is provided with an internal water seal and a rising and falling gasometer moving in the channel which forms the seal. A carbide chamber and ash chamber are removably located in the lower part of the gasometer, the upper edge of the carbide chamber being roughened so as to provide small passages for the gas between the roughened edges without allowing a sufficient space for irregular waves or movements of the gas which might be caused by sudden shocks of the apparatus. The valve by which water is admitted into the carbide containing chamber or basket is operated by a lever or fulcrum that when the gasometer sinks by reduction in quantity of gas within it, it will strike the lever and open the water supply, and when it rises it relieves the lever and the valve is closed by a spring or other suitable means.

Gopher Trap.—No. 659,932. Oct. 16, 1900. Z. A. Macabee, Los Gatos, Cal. The object of this invention is to provide an improved trap for catching gophers and similar burrowing animals. It consists essentially of a spring frame having transverse pointed interlocking arms at one end, loops through which these arms pass, and which when the trap is set by depressing the upper portion will separate the interlocking arms. A plate is fulcrumed upon the framework and a trigger engaging the plate holds the arms separated when the trap is set. The trap is then pushed into the hole so that the plate is in such position that when the gopher pushes out the dirt, as is his custom, it contacts with the plate and disengages the latch, thus allowing the arms which are operated by a stout spring to close together and impale the animal.

Powder Mixing and Incorporating Mill.—No. 660,373. Oct. 23, 1900. F. A. Halsey, San Rafael, Cal. The object of this invention is to provide certain improvements in mills which are designed to mix the ingredients of explosive powders and the like. It consists of an annularly channeled bed with runners and plows, and mechanism by which they are caused to travel around said bed. Means are employed for holding the runner out of direct contact with the bed, and disintegraters are fitted to travel with the runner, these disintegraters consisting of a series of disks or hubs mounted side by side upon a shaft and having radial arms, the ends of which are disposed in spiral lines from side to side so that as they move over the powder on the bed, they will act to break and disintegrate it into small particles. A lever arm is fixed to the shaft upon which these disintegrating arms or disks are carried so that the weight may be adjusted to provide a varying pressure upon these arms as they pass over the material on the bed. The main object of this improved mill is to produce 100% more grain of such dense powders as are granulated in the mill immediately after incorporation, and reducing labor and time 50%, and avoiding the ever-present danger of rubbing the incorporated material through sieves. After the composition has been properly incorporated the runners of the mill are raised sufficient to take the pressure off the cake and the circular cutters (which have been thrown over the plow during incorporation) are now dropped down; with a few revolutions the runners will have rubbed up the coarse cake; they may now be raised entirely while the mill is in motion by grasping the hand wheel on top. The plows and cutters continue in action, causing the rapid formation, with proper moisture, of round grains, this action to be continued until granulation is complete.

Dry Concentration by the Crown Process.

The Salt Lake City, Utah, Herald says: F. A. Flindt and S. W. Mosby have returned to Salt Lake City from San Francisco, thoroughly convinced that at last a practically perfect method of treating ores by dry concentration had been devised, and will call for their lease on the second-class ores of the May Day, equip the property with a plant and get down to business by Jan. 1st.

Before leaving for the coast to investigate the merits of the Crown Gold Mining Co.'s new dry process they shipped a ton of second-class ore with the purpose of seeing it tested, and on his return Mr. Flindt told the Herald that he had "witnessed the most wonderful performance he ever saw in the way of concentrating ore." The ore tested carried 8% lead in its crude form and the concentrates assayed 56% and the tailings contained only .98 of 1%, the closest saving Mr. Flindt ever saw.

Of the practicability of the process Mr. Flindt says there is no doubt, but the company guarantees nothing before demonstrations are made, and will not then sell the machines. When it is shown that the ores submitted can be successfully treated they contract to put in plants of adequate capacity to meet the requirements of each case, bear the cost themselves and charge a royalty for their use. If other arrangements are not made within the next few days, Messrs. Flindt and Mosby will contract with the California company owning the new process to install it at the May Day.

The Salt Lake Tribune quotes F. Enzensperger, who made himself conversant with the new process for the concentration of low-grade ores to be introduced at the May Day of Eureka by Messrs. Flindt and Mosby, as saying that it "promises to revolutionize the handling of that class of mineral, and that repeated tests have demonstrated that it is all which has been claimed for it. In the elimination of the gangue and the concentration of the metals, Mr. Enzensperger says a stream of air is applied to the ores as they pass over a fine silken belt and after they have passed through various meshes until they are practically reduced to a powder. With the aid of air the gangue is eliminated during the movement of the ore and the metals are deposited in the receptacle that awaits them. The new method is known as the 'Crown process.' It was developed by F. W. Wood, a California metallurgist, and is being exploited by Loring B. Doe of San Francisco, from whom Mr. Enzensperger is in receipt of a letter calling attention to the process. The latter as well as the inventor is expected in Salt Lake in a short time, and it is not unlikely that a branch manufactory will be installed at this point." *

ALPHABETICAL INDEX TO ADVERTISERS.

(—) Indicates every other week or monthly advertisements.

A PAGE.
Adams, W. J..........13
Ainsworth & Sons, Wm..........13
Aitchison Perforated Metal Co., Robert..........11
Akers, Wm. A..........13
Allis Co., Edward P.......... 3
American Copper Mining & Extraction Co..........14
American Diamond Rock Drill Co.......... 9
American Injector Co..........—
Ames, A. T.......... 7
Atlas Pipe Wrench Co..........11

B
Baird & Co., Henry Carey..........17
Baker, E. D.......... 1
Baker, F. D.......... 1
Baker & Hamilton..........12
Balliet, Letson..........13
Barnhart, Geo. W..........11
Bartlett & Co., C. O..........15
Bell, J..........13
Bell, Newton M..........16
Benjamin, E. H..........13
Birch & Co., W. H..........—
Boesch Lamp Co..........15
Bowes & Co.......... 9
Box 376, Mining and Scientific Press.......... 1
Bradley Pulverizer Co.......... 6
Braun & Co.. F. W.......... 5
Bucyrus Company..........16
Bullock Mfg. Co., M. C.......... 9
Burlingame & Co., E. E..........—
Burt Mfg. Co.......... 1
Burton, Howard E..........13
Butters & Co., Ltd., Chas..........13

C
California Anti-Caloric Co..........18
California Borax Co..........17
California Debris Commission.......... 1
California Perforating Screen Co..........16
California Vigorit Powder Co..........11
California Wire Works..........19
Canton Steel Co.......... 9
Cary Spring Works.......... 5
Colorado Iron Works Co..........8, 10
Colorado Midland Railway.......... 1
Colorado & Southern Ry..........15
Compressed Air Machinery Co..........12
Con Cal. & Virginia Mining Co..........17
Copper King, Ltd..........19
Cory, C. L..........13
Crown Gold Milling Co.......... 7
Cummings & Co., J. J..........14

D
Davidge & Davidge..........13
Davies & Co., D Campbell..........18
Dearborn Drug & Chemical Works..........14
Denniston's San Francisco Plating Works..........11
Denver Engineering Works Co..........15
Denver Fire Clay Co..........14
Denver & Rio Grande R. R..........15
Deseret News Office.......... 1
Detroit Lubricator Co..........18
Dewey, Strong & Co..........14, 16
Doble Co., Abner.......... 9
Donaldson & Co , A. M.......... 1
Dow Pumping Engine Co., Geo. E.......... 5

E
Eby, Jno. D..........—
Elkins, John T..........13
Ericsson Telephone Co.......... 1
PAGE.
Eureka Co.......... 1
Evans & Co , C. H..........—
Excelsior Redwood Co..........15

F
Fairbanks, Morse & Co.......... 4
Falkenau, Louis..........13
For Sale.......... 1
Fowler, G. C.......... 3
Fraser, E. J.......... 1
Fraser & Chalmers..........15, 16
Frue Vanning Machine Co..........19
Fulda's Planing Mills..........11

G
Garratt & Co., W. T.......... 1
Gates Iron Works.......... 4
General Electric Co.......... 5
General Photo-Engraving Co.......... 3
Gibson, Chas. B..........13
Globe Engineering Co..........18
Globe Iron Works..........—
Gold & Silver Extraction Co. of America, Ltd..........14
Goodell, Albert I..........13
Goodyear Rubber Co..........—
Gutta Percha Rubber & Mfg. Co.......... 1

H
Haff, Edward L..........13
Hallidie Ropeway..........19
Hamilton Mfg. Co.,Wm.......... 3
Hanks, Abbot A..........13
Harrigan, Jno..........13
Harvey, F. H..........13
Hauser, M. S..........—
Hayden & Co , J. M..........15
Heald's Business College..........14
Hendrie & Bolthoff Mfg. & Supply Co.......... 6
Hendy Machine Works, Joshua..........2, 10
Hercules Gas Engine Works..........18
Hersey, Clarence..........13
Heyl & Patterson.......... 3
Hirsching, H..........14
Hoskins, W..........15
Hooper & Co , C. A..........15
Hug, D..........12
Hunt, A. M..........13
Huntington, F. A..........17
Huntley, D. B..........13

I
Independent Assay Office..........18

J
Jackson Drill & Mfg. Co.......... 9
Jackson, Geo. G..........—
Jackson Machine Works, Byron..........—
Jeanesville Iron Works Co..........14
Jeffrey Mfg. Co., The..........16
Jessop & Sons, Ltd., Wm.......... 9
Jewett, Daniel G..........13

K
Kent Mill Co.......... 8
Keuffel & Esser Co..........16
Keystone Driller Co..........18
Knight & Co..........—
Koppel, Arthur..........17
Krogh Mfg. Co..........16
Kyle & Co., T. D..........13
Larkin Mining Co..........17
Leffel & Co., James..........12

L PAGE.
Leschen & Sons Rope Co., A.......... 4
Lexow, Theodor.......... 9
Leyner, J. Geo.......... 9
Link-Belt Machinery Co..........11
Lloyd, Benj. T.......... 1
Luckhardt Co., C. A..........13
Ludlow-Saylor Wire Co..........12
Lunkenheimer Co..........18

M
Macdonald, Bernard..........13
Madison, Bruce & Sellers.......... 1
Main Belting Co..........11
Mammoth Garfield Gold Mining Co..........17
Mandell, Frank C..........13
Marina Marsicano Gold Mining Co..........17
Mariner & Hoskins..........14
Marion Steam Shovel Co..........11
Mariposa Commercial & Mining Co..........17
Marshutz & Cantrell.......... 8
McFarlane & Co.......... 8
Meredith, Wynn..........13
Mine & Smelter Supply Co.......... 4
Miners' Assay Office..........13
Montgomery Machinery Co., J. H..........11
Moore & Co., Chas. C.......... 6
Morris, H. D. & H. W..........10

N
National Iron Works.......... 8
Nevada Metallurgical Works..........13
New Process Raw Hide Co..........12
Nicholson, Hudson H..........13
Novelty Mining & Milling Machinery Co.......... 6

O
Ogden Assay Co..........13
Oregon Railroad & Navigation Co..........15
Oriental Gas Engine Co.......... 1
Osceola Con. Mining Co..........17

P
Pacific Coast Smelting & Refining Works.......... 8
Pacific Tank Co..........12
Paraffine Paint Co..........16
Parke & Lacy Co..........9, 19
Paul, Almarin B..........13
Pelton Water Wheel Co..........12
Penberthy Injector Co..........—
Pennington & Sons, Geo. W.......... 5
Perez, Richard A..........13
Peterson, L..........13
Phillips & Co., Alvin..........14
Pneumatic Cyanide Process Co..........14
Postlethwaite, R. H..........13
Powell Co., Wm..........18
Price & Son, Thomas..........13

Q
Quick, Jno. W..........16

R
Rand Drill Co.......... 9
Rank, Sam'l A..........13
Reade, Frank..........13
Reckhart, D. W..........13
Richards, J. W..........13
Risdon Iron Works.......... 3
Robins Conveying Belt Co..........11
Roebling's Sons Co., John A.......... 8
Roessler & Hasslacher Chemical Co..........14
Runkle, H. E.......... 1

S PAGE.
San Francisco Novelty & Plating Works..........15
San Francisco Pioneer Screen Works..........16
Schaw, Ingram, Batcher & Co..........18
Schilling & Sons, Adam..........18
School of Practical Mining..........13
Selby Smelting & Lead Co.......... 8
Shaw, Willis.......... 9
Shepard & Searing..........15
S. H. Supply Co.......... 1
Sierra Nevada Silver Mining Co..........17
Simonds, Ernest H..........13
Simonds & Wainwright..........13
Situations Wanted.......... 1
Smidth & Co., F. L..........17
Smith & Co., Francis.......... 1
Smith & Thompson..........14
Snedaker, James Angus..........13
S. O.......... 1
Star Drilling Machine Co..........16
State Ore Sampling Co..........—
Stevens, Ralph E..........13
Stillwell-Bierce & Smith-Vaile Co..........—
St. Louis Sampling & Testing Works..........14
Sturtevant Mill Co..........12
Sullivan Machinery Co.......... 9

T
Tallon, C. J.......... 1
Tatum & Bowen..........11
Taylor Iron & Steel Co..........16
Taylor & Co., John..........14
Taylor & Co., P. T..........—
Thomson & Boyle Co..........10
Trenton Iron Co..........16
Truax Mfg. Co..........17
Tyler, S. W..........13

U
Union Gas Engine Co.......... 7
Union Iron Works.......... 2
Union Photo-Engraving Co..........12

V
Van Der Naillen, A..........13
Van Dieren, Hermann J..........14
Van Slooten, Wm..........13
Van Wagenen, Theo. F..........13
Volger, Wm. B..........11
Vulcan Iron Works..........11

W
Wade & Wade.......... 1
Walter, R. J..........13
Weber Gas & Gasoline Engine Co..........18
W. C. Co.......... 1
Weigele Pipe Works..........17
Western Chemical Co..........10
Westinghouse Electric & Mfg. Co..........10
Wetherill Separating Co..........14
Wigmore & Sons, John..........10
Wimmer, Geo..........16
Witte Iron Works Co..........18
Wohler, Bartning Suc's.......... 1
Wolff & Zwicker Iron Works..........14
Wood, Henry E..........14
Woodbury, Geo. E.......... 2
Woodin & Little..........15
Wynkoop, W. C..........13

Y
Yawger, I. C.......... 9

SITUATIONS WANTED.

Technical, practical man wants superintendency of mine; latest methods of economic operating and organization, ore dressing, milling and treating. D. G , this office.

ELECTRICIAN AND MACHINIST would like to get a place in the country or city or in mine; has the best of letters. Box 56, this office.

WANTED. — POSITION AS ASSAYER AT cyanide plant or mine. Have had considerable experience and hold good references. Address "B," care of Wade & Wade, 115½ N. Main St., Los Angeles. Cal.

MINING ENGINEER (technical training), twenty years' experience as surveyor, assayer, superintendent and manager of mines and mills; business qualifications; linguist; at present general manager mining and milling proposition in Mexico; desires to make a change on account of health; best references. Address S. O., Mining and Scientific Press.

WANTED.

WANTED —The address of Thomas Watts, bricklayer and miner, formerly of Butte, Montana, and Denver, Colorado. If dead or alive, any information will be thankfully received by Will B. Cameron, 409 Main St., Seattle, Wash.

Charcoal Burner wanted. Must speak Spanish and be capable of burning 1200 cords of mesquite per month into charcoal for smelting. Healthy part of Sonora, Mexico. Salary $100 gold per month. Only sober man need apply. References and record of experience required. Address C. Coal, this office.

CHROME IRON ORE WANTED.

State price and quantities that can be furnished. Send samples and all information to W. C. CO., 3214 Twenty-fifth St., San Francisco, Cal.

INFORMATION WANTED regarding whereabouts of John R. Williams, about 70 years old. Last heard of as Supt. of a mine in Copper's Hill, Vermont, in 1866. Has an adopted son about 32 years old. Supposed to be placer mining in the West, possibly California. $25.00 reward at Deseret News Office, Salt Lake City, Utah.

REFRACTORY ORES WANTED.

1000 TONS or more which will assay $75.00 Gold per ton and over, delivered free of charge at San Francisco, Cal. Correspondence solicited.

C. J. TALLON,
308 MARKET STREET, SAN FRANCISCO, CAL.

Quicksilver

—FOR SALE BY—
The Eureka Company,
OF SAN FRANCISCO.
ROOM 1, - - 320 SANSOME STREET,
SAN FRANCISCO.

WE BUY very rich Ores, Dental Scraps, Tellurium Ores, Mill Wastes, Jewelers' Sweeps, Gold Retorts, Old Iron Retorts, Base Amalgam, Quicksilver, Amalgamated Plates, Gold and Silver, Old Slags.

A. M. DONALDSON & CO.,
ASSAYERS AND WASTE PRODUCT SMELTERS,
1661 Larimer St., Denver, Colo.

Donaldson's Assayers' Slag Hammer { 1 lb......$1.10 / 1 lb. 3 oz. $1.25

THE COLORADO MIDLAND RAILWAY

reaches all the best mining towns in Colorado—Cripple Creek, Victor, Leadville, etc. It is the only line running Pullman Observation Cars daily through the mountains Daily Standard Pullman to Denver and Weekly Tourist Car. personally conducted, San Francisco and Los Angeles to Chicago.

For further information, address
W. H. DAVENPORT, Gen'l Agt., San Francisco, Cal. (or) W. F. BAILEY, Gen'l Pass. Agt., Denver, Colo.

AUTOMATIC SAMPLING
Mill Plans, Cyanide, Concentration, Smelter.
F. D. BAKER, Mech. Engr., DENVER.

FOR SALE.

Two Second-Hand PUNCHING MACHINES,
SUITABLE FOR PIPE MAKING.
FRANCIS SMITH & CO., 46 Fremont St., San Francisco, Cal.

FOR SALE.

A high grade Gold Mine of free milling ore near Grass Valley, Cal. Ore runs from $10 to $30 per ton. It is well developed but not equipped. U S. Patent covers 3000 feet of ledge. Is surrounded on all sides by large dividend-paying mines. A rare bargain offered. Apply to E. J. FRASER, agent for owners. No. 522 Parrott Building, San Francisco, Cal.

FOR SALE.

A JACOBS CONCENTRATOR, been used about four months.

Also a fine O. & S. ENGINE, 25 H. P.

25 H. P. BOILER, used about six months, in good order and condition.

Also a 40 H. P. ENGINE, now running and can be seen in motion.

Address E. D. BAKER, YREKA, CAL.

FOR SALE.

WROUGHT IRON PIPE.

150,000 Feet Second-Hand, Refitted Pipe. New Thread and Couplings.

THE S. H. SUPPLY CO.
WRITE FOR CATALOGUE OF MINING MACHINERY AND SUPPLIES.
22nd and Larimer Sts., DENVER, COLO.

FOR SALE.

Lease and Bond, Eighteen Months, Easy Terms, Copper Property, New Mexico.

High grade ore with good gold values. Accessible. Plenty wood and water. Strong vein. Three shafts. Will pay from start. Adjoins large producing mine. **H. E. RUNKLE, El Paso, Texas**

FOR SALE.

One 10″x12″ Double Cylinder, Double Drum Mine Hoist.

One 14″x30″ Duplex Air Compressor, Corliss Steam ends.

Two 54″x16′ Return Tubular Boilers.

One No. 6 Llewellyn Feed Water Heater.

One 36″x9′ Air Receiver.

One Duplex Boiler Feed Pump.

All in good working order and nearly new. Also Rock Drills, Sinking and Station Pumps, Air Pipe, Ore Cars, Skips, Wire Rope, Blacksmith and Carpenter Tools. A bargain for anyone wanting an up-to-date mine equipment. Address Box 376, this office.

THE CALIFORNIA DEBRIS COMMISSION, HAVING received applications to mine by the hydraulic process from the Cataract and Wide West Gravel Mining Co., in the Wide West Gravel Mine, near Eho. Calaveras Co., to deposit tailings in North Outlet and Prospect Gulch; from H. Sleighter and Thomas Harper, in the San Francisco Mine, near Todd, Placer Co., to deposit tailings in Dardanelles Canyon; from Chas. S. Deisem, in the Riffle Point Mine, at Grass Flat, Sierra Co., to deposit tailings in Grass Flat Ravine; from Geo. Fitzgerald, in the Lone Star Mine, near Cromberg, Plumas Co , to deposit tailings in Jackson Creek; from G. A. and F. W. Bruckerman, in the Renaissance Mine, near Howland Flat, Sierra Co., to deposit tailings in a worked-out pit; from J. R. Bell and A. B. Jacks, in the Badger Hill Mine, near Spanish Ranch, Plumas Co., to deposit tailings in Whitlock Ravine; from W. T. Sherman and O. F. Caya, in the Last Chance Mine, near Port Wine, Sierra Co., to deposit tailings in French Ravine; from C. N. Kingsbury, in the Conger Gulch Gravel Mine, near Igo, Shasta Co., to deposit tailings in Dry Creek; from John McGrath, in the Independent Mine, near St. Louis, Sierra Co., to deposit tailings in Sears Ravine; and from J. F. Cowdery, in the Chandlerville Mine, near St. Louis, Sierra Co , to deposit tailings in Sackets Gulch, gives notice that a meeting will be held at Room 59, Flood Building, San Francisco, Cal., on November 12, 1900, at 1:30 P. M.

BENJAMIN T. LLOYD, STOCKS, BONDS AND MINES.

Have immediate customers for well-developed Gold and Copper Properties.
P. O. Box 608, **SALT LAKE CITY, UTAH.**

The Carnegie Steel Co.

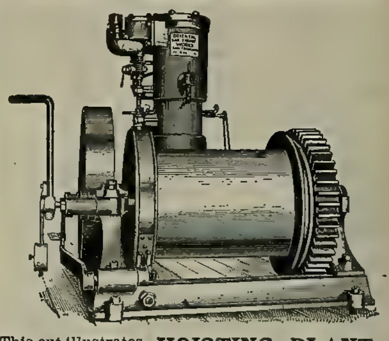
Is one of the big manufacturing concerns which have sent duplicate orders this month for

Cross Oil Filters.

Others as prominent are ordering from all over the civilized world. Only merit counts with these purchasers We guarantee the CROSS to save half your oil bills, and send them on approval at our expense. Catalogue 38.

THE BURT MFG. CO.,
Akron, Ohio, U. S. A.
Largest Mfrs. of Oil Filters in the World.

We also manufacture the BURT EXHAUST HEAD.

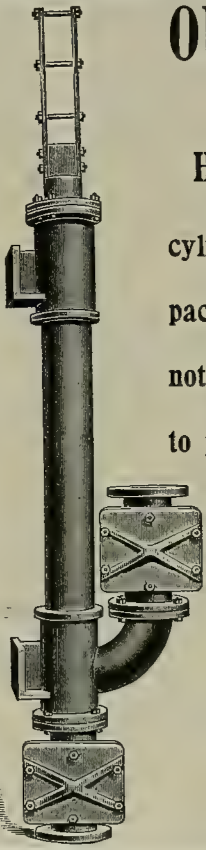


This cut illustrates our 4 H. P. to 8 H. P. **HOISTING PLANT.**

Larger sizes built to suit the demands of our customers.

It is strong and exceedingly simple and durable, being entirely under the control of the operator, by the use of a single hand lever for hoisting, while the lowering is governed by a foot lever and brake. No better device has been designed for this purpose. For prices and further information address the builders.

Oriental Gas Engine Co., 227 Folsom St., S. F.



OUR NEW JACK-HEAD PLUNGER PUMP

HAS THESE POINTS OF EXCELLENCE:

Pumps sand and grit without injury to cylinder.

Seldom requires packing and is easily repacked.

Forces water on the down stroke so does not require balanced bob.

Water column and pump rod can be made to perfectly balance.

Each pump is provided with an automatic air valve which relieves pump of air taken in when suction gets out of water.

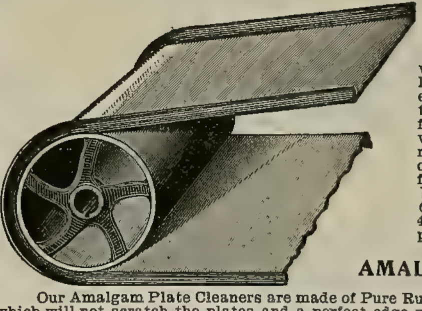
Combines strength with lightness.

We make a specialty of pumps and would be pleased to forward to you our catalogue.

Send us your inquiries.

W. T. GARRATT & CO.,
Cor. Fremont and Natoma Sts.,
SAN FRANCISCO, CAL.

SPADONE'S CONCENTRATOR BELTS.



PATENTED.

This illustration shows the edge flanging outwardly as it passes over the pulley. This relieves the strain from the top and bottom of the edge by directing the strain automatically to the inside face surface of the edges. Heretofore all belts have been so constructed that when they pass over the pulleys or rolls, a direct strain comes upon the top or at the base of of the edges, causing the edges to break away from the body of the belts in a very short time. *We avoid this Mechanical Defect by our Spadone Curved Edge.* Belts made to fit any machine—4, 5 and 6 feet wide. Prices and samples on application.

AMALGAM PLATE CLEANERS.

Our Amalgam Plate Cleaners are made of Pure Rubber in moulds, thus insuring a plate cleaner which will not scratch the plates and a perfect edge which will clean the Amalgam plates evenly. They are made 6 inches long, 3 inches wide and ⅛ inch thick, making a convenient size to handle. Price by mail to any address, each 75 cents. Correspondence solicited.

Send us your order for Water, Air Drill, Steam, Suction and Fire HOSE, RUBBER BELTING, RUBBER PACKING and LEATHER BELTING.

THE GUTTA PERCHA RUBBER AND M'F'G CO ,
30 and 32 FREMONT STREET, Telephone Main 1813. **SAN FRANCISCO, CAL.**

WEST COAST OF MEXICO.

WÖHLER, BARTNING Suc's, Mazatlan (Sinaloa), Mex.

Bankers, Importers, Exporters and Commission Merchants.

Representatives and Agents of the principal Mining Companies in the State of Sinaloa and the dependencies of the Pacific coast in the States of Durango, Chihuahua, Sonora, Lower California and Jalisco.

ORE BUYERS AND EXPORTERS. - MINING SUPPLIES.

SMOOTH-ON TRADE MARK **CASTINGS**
AN IRON CEMENT

For repairing blemishes or blow holes in iron or steel castings. When hard this cement has the same color and appearance as cast iron, and will withstand a red heat, steam, water or oil. Write for catalogue and prices. Sole proprietors and manufacturers: Smooth-On Mfg. Co., Jersey City, N. J., U. S. A.

MESSRS. MADISON, BRUCE & SELLERS,
34-36 STEUART ST., SAN FRANCISCO, CAL......................AGENTS FOR PACIFIC COAST.

ERICSSON SWEDISH TELEPHONES

Seem to possess almost human Intelligence. They respond to every requirement in a smooth, positive fashion that shows what a perfect telephone can do. Besides this they have unequalled strength and durability. Their reputation as *"STANDARD OF THE WORLD"* is built on merit. Is the best too good for you?

ERICSSON TELEPHONE CO. *296 BROADWAY NEW YORK.*

This P[illegible] to be taken from the Library. ++++

CAL[illegible] STATE

MINING AND SCIENTIFIC PRESS.

AND PACIFIC ELECTRICAL REVIEW.

Whole No. 2103.—VOLUME LXXXI. Number 19. SAN FRANCISCO, SATURDAY, NOVEMBER 10, 1900. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

Sunset Oil District, Kern County, Cal. (See Page 520.)

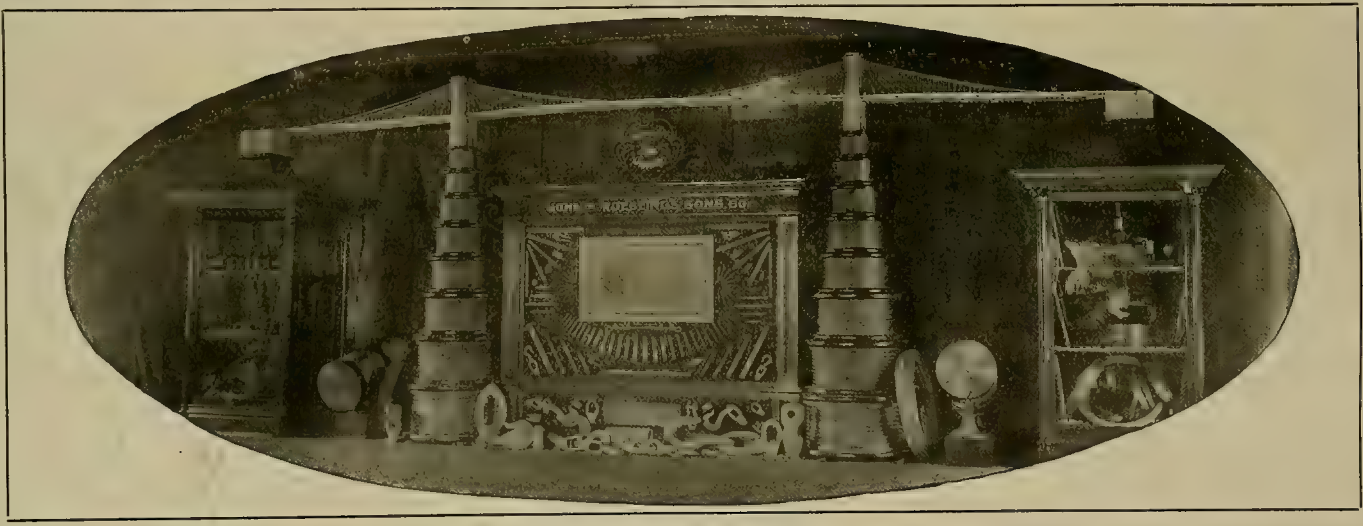


Exhibit of John A. Roebling's Sons' Co. at Paris Exposition. (See Page 519.)

Interior View of Main Works of George W. Pennington & Sons' Steel Works, San Francisco, Cal, (See Page 522.)

MINING AND SCIENTIFIC PRESS.

ESTABLISHED 1860.

Published Every Saturday at 330 Market St., San Francisco, Cal.

ANNUAL SUBSCRIPTION:
United States, Mexico and Canada..........$3 00
All Other Countries in the Postal Union.......... 4 00

Entered at the S. F. Postoffice as second-class mail matter.

J. F. HALLORAN..........Publisher.

Special Representatives:
EASTERN.
E. H. HAVEN..........150 Nassau St., New York City.
MIDDLE WEST.
CHAS. D. SPALDING..........153 La Salle St., Chicago, Ill.
INTER-MOUNTAIN.
W. A. SCOTT..........43 Jacobson Building, Denver, Colo.
SOUTHERN CALIFORNIA.
W. D. CURTIS..........223 W. Second St., Los Angeles, Cal.

San Francisco, November 10, 1900.

TABLE OF CONTENTS.

ILLUSTRATIONS.—Sunset Oil District, Kern County, Cal.; Exhibit of John A. Roebling's Sons' Co at Paris Exposition; Interior View of Main Works of Geo. W Pennington & Sons' Steel Works, San Francisco, Cal., 515. Jackson Drill: Jackson Drill, Sectional View; The Sullivan Rock Drill, Sectional View; The Leyner Drill; Bullock Diamond Drill—Swivel Head Locked in Position Ready to Bore; Bullock Diamond Drill—Swivel Head Unlocked and Swung Back, 518. Duplex Steam Pumps; Exhibit of the Jeffrey Mfg. Co. at the Paris Exposition, 519. Mining and Metallurgical Patents, 521. Hoist and Engine House, Cross Shaft, Angels, Cal.; Boilers for Cross Shaft, Angels, Cal.; View of Engine Room, Cross Shaft, Angels, Cal., 522.
EDITORIAL.—The Leasing System; Men, "Busy" and Otherwise; Miscellaneous, 516.
MINING SUMMARY.—523-524-525.
LATEST MARKET REPORTS.—527.
MISCELLANEOUS.—Concentrates, 517. Machine Mine Rock Drills on the Pacific Coast, 518. Money Saving Power by Application of Blast Furnace Gas; John A. Roebling's Sons' Co.; Duplex Steam Pumps; Exhibit at Paris of the Jeffrey Mfg. Co.; Usual Clumsy Attempt at Swindle, 519. The Oil Fields of Kern County, Cal., 520. Mining and Metallurgical Patents; Some Colorado Metals, 521. The Cross Shaft, Angels, Cal.; Pennington & Sons' Steel Works, 522. Personal; List of U. S. Patents for Pacific Coast Inventors; Notices of Recent Patents; Commercial Paragraphs; Recently Declared Mining Dividends; Books Received; Catalogues Received, 526-527.

Smelting Zinc Ores.

Colorado is considerably interested in the smelting of zinc ore, or the profitable disposition of low-grade ores carrying zinc. It was thought that they might be shipped foreign, but ores carrying less than 45% zinc do not pay to export. Nor are the foreign smelters any better prepared to treat zincy ores than the local plants. Cheap labor, cheap coal and other supplies give foreign smelters some advantage, but there is no metallurgical superiority. Zinc ore has been sent from Leadville to Swansea for $9 per ton, and about as low a rate has been secured to Antwerp, but neither Welsh nor Belgian smelters have shown any superiority in securing returns. They have placed 43% zinc as the limit, and for ore carrying that they pay $4 per ton, deducting 60 cents per unit for each unit under 43, and paying 60 cents for each unit above that figure; but Leadville miners say that at those figures there is no margin over the cost of mining and hauling.

The quantities of ore carrying 30% and less in zinc have been virtually valueless, but it is thought that a suitable system of concentration, and a change in the method of lining zinc furnaces, may result in a more effective and economical system of zinc distillation by excluding the lead and iron. The presence of over 1% of iron or 3% of lead militates against successful zinc extraction, and if a method of lining zinc furnaces could be devised that would resist corrosion, the action of the iron oxides which ordinarily destroys the fire clay of which the retorts are made could be successfully resisted, the idea being to apply such sintering material to the lining as to produce a solidly cohering substance impervious to iron oxide or other corroding ingredient, and capable of sustaining the heat to which it would be exposed.

◆

THE prominence of what is known as "the low-grade proposition" is one of the most noticeable features in the gold mining of to-day. Time was when the "ounce-a-day" placer diggings, or the superficial quartz of high grade, alone found favor. Those days have passed; high-grade mines still attract investment and due attention, but the "low-grade proposition," the big deposit of lean ore, in quantity sufficient to make permanent calculations upon, the large amount that gives promise of small but steady dividends, is that which now attracts the greatest attention.

Men, "Busy" and Otherwise.

At times, as a matter of general benefit, it has been suggested herein that an account of anything of effective value produced in the mining and metallurgical world likely to be of common benefit might, with propriety, well appear in this paper for the common good, on the principle that "everybody is wiser than anybody," and that "my light is none the less for having lighted that of my neighbor." It is manifest to many of those whose opinion is worth having that much of practical value may be told by the men who do things.

It is customary now with technical journals to encourage such interchange of information. The leading London journal of the kind keeps the following constantly at the head of its announcements: "Many of our readers have had experiences in mining and milling, some record of which would be of great interest and value to others. Many have made experiments in different directions, and others have met and overcome difficulties in practice, some of which would help others in like cases and give them practical aid. Such readers would do great service to us and to their fellow workers by sending us from time to time some notes of their experience. They would be welcome, however brief, and, we are sure, would be read and appreciated by many."

Of course, during the forty years of its existence, this paper has probably published more original matter of that kind, namely, how things are done, by the men who do them, than any other journal in existence; but, yet, there are many among its readers who make no record of their successful experiments and experiences in mining and metallurgical practice, and who when they read such suggestions as these, while they silently acquiesce, and, maybe, get so far as to think, "Well, I shall, some time, send the MINING AND SCIENTIFIC PRESS some notes of what I think was a success in this case;" yet, when the regular day's work is done, other duties may come up, or one may feel "too tired" to put his good resolve into execution. The most common excuse or reason that a man gives himself and others for not doing these things and others is, that he is "too busy." No doubt, many of us wish that the days were sometimes more than twenty-four hours long, and, yet, everyone has all the time that there is, and a little exact regulation of hours and duties helps greatly in giving one the necessary time to devote to other things which sometimes embrace the best things of life—things that can not be paid for in current coin, but yet are none the less valuable, not only to the giver, but to the recipients.

This matter of being "too busy" is more of a habit than a fact. As we write we have in mind a leading Colorado miner, who finds time to send many matters of great practical value to this journal. One might think he was a very busy man; he is superintendent of five several mines; makes long journeys over this west half of America as an examiner of mining properties; gives expert testimony in mining litigation; bestows some practical attention on mining problems that come up in his daily life; and, as he was recently elected to the Colorado Legislature, will doubtless be heard from there in aid of the miner this winter. Yet this man is not "too busy" to write articles on mining and metallurgy for this paper—articles whose merits are so manifest that they are copied elsewhere immediately upon their appearance. There also occurs to our mind an almost precisely similar case in California, except that the Californian who is not "too busy" to send results is only superintendent of two mines instead of five. These two mining men are instanced as illustrating that men may be fairly occupied in large enterprises and yet not be "too busy" to accord a little of their information to their fellow miners and metallurgists. As a matter of fact, none but busy men are asked to do these things, as the man competent to give pointers of value is usually in demand to work for himself or others, and the fact that he is busy shows that he amounts to something.

Some may have also in mind gentlemen whose ability is more than commensurate with their energy, who spend their time going round telling others what busy men they are, and, doubtless having said it so much, they believe it themselves. The latter class are not cited for criticism, so much as the two former are instanced as indicative of what men may do, though really busy.

The Leasing System.

In Colorado and other States the leasing system has of late years aided much in mine development, though, so far as the lessees are concerned, their share has not always been commensurate with the effort and expense. The system of leasing deserves commendation; where from inability or other reasons the owner of the ground is unable or unwilling to work it, the lessee offers usually good opportunity to demonstrate its value. Many leases are expiring in Colorado and elsewhere, and business justice to the lessees, as well as a wise system of mutual co-operation, which results eventually in mutual profit, would suggest that a fair division of profit be accorded the lessee. Often he takes all the risk of loss; does most or all of the work, and, where successful, the owner of the claim or the mining company as often gets the biggest share; but in case of failure the loss falls mostly upon him. Few fortunes are made by lessees, though in the majority of cases moderate money has been realized by intelligent effort and diligent prosecution of work. The most of such money has been made by the claim owners or mining companies, many of the latter having reverted to the system of leasing their properties after having tried themselves to make a success.

A high rate of royalties works against the lessee; even with a fairly profitable lease, if nearly all his profits have to go to the property owner in royalties there is little inducement for continuance. He may be able to stand off the railroads and hold things even with the smelters, but with a high royalty there is seldom sufficient or favorable opportunity for the systematic and extended working that would result in common profit to all. Another thing that would help the lessee would be a longer period for which leases were granted. There is rarely objection on the part of those who lease their properties, so long as they are unproductive, to have the lessees diligently develop them, objection to continuance sometimes arising when they have demonstrated their value. A good way to do in connection with such general suggestion of extension of the time for which leases are ordinarily made would be to date those leases from the time of the first shipment of ore. It is bad to attempt to make too hard a bargain with anybody; it is not business to trade upon anyone's necessities in causing him to do that which by force of circumstances he may have had to do.

The relation of this whole system of leasing to the development of the mineral wealth of any region is sufficiently manifest to justify notice. Usually a property that is being worked under lease is economically managed. Of course, it is not advised—nor would any intelligent mine owner consider it good business—to turn his property over to leasers, but in many a case where opened properties have been abandoned by the owner, or by the company, because of the lack of money or intelligent management, the lessee has made money for himself and the claim owner where previously everything lay idle, and in making that money—as also as in all cases where mining is going on—he makes times lively for the surrounding vicinity to the extent of production, for every miner employed gives employment to ten others who are not miners, but who share in the created wealth. And lessees are usually not content with even that, but when they have made a little money they generally use it in opening up other abandoned properties, or in developing new territory, and in this case they constitute just the kind of capital needed in the mining business—intelligent mining with the gambling element left out of it; mining by men who know what they are doing and have nerve enough to put their money into mining operations that take nothing from any one but benefit in common, with all the local advantages that such condition confers.

It is not uncommon to look to "Eastern capital" and "foreign investors" for money necessary for development. Both sources of mining capital are commendable and welcome, but it sometimes occurs that in looking too far afield for the necessary elements of developing, an important factor in the problem may be overlooked, that is, the lessee. This is not a plea nor an argument for the lessee, who is usually able to take care of himself, and is merely intended to indicate in what direction mutual aid and profit may often lie. The subject is an important one.

Concentrates.

THE bottom of the Banner mine shaft, Butte county, Cal., is 500 feet below sea level.

NEXT to mismanagement, the most fruitful cause of failure in mine development is insufficient capital.

THE caving system has been employed in iron ore mines for many years, and is now applied to the mining of copper ore in the Utah Consolidated, Utah.

AT an elevation where the aneroid barometer registers 21 inches, the theoretical height to which a pump will suck is 24 feet; the actual suction would not be over 17 feet.

A 5 H. P. ENGINE ought to run a dynamo to supply forty lights of sixteen candle power each. A gas engine would do if it had a balance wheel heavy enough to run uniformly.

THE Rio Tinto is Spain's biggest copper mine, and from about 1,500,000 tons pyrites annually extracted about 20,000 tons copper are produced. There is an annual profit of about $800,000.

IT is not uncommon to work over the same ore with cyanide two and even three times. Near Wickenburg, Ariz., tailings from the old Vulture mine were recently treated for the third time at a profit.

IF TWO MEN on opposite sides of the earth looked along two parallel lines when the sun was midway between the lines, both would see the sun in the same place, but it would be rising to the one and setting to the other.

A PIECE OF TOOL STEEL should in all cases be left in the water at least as long as it was in the fire. If it takes twenty minutes to heat up a piece it should be left in the water twenty minutes to cool, and longer if necessary.

THE Gwin mine, Calaveras county, has probably as large a pay shoot as any in California—over 1400 feet. An item like this will bring reports for the next ninety days of ore shoots elsewhere from 1500 to 15,000 feet in extent.

A NEW HYDROCARBON—a solid—is made by passing pure dry acetylene gas through a tube containing finely powdered copper. The cuprene thus formed is almost insoluble; neither nitric nor sulphuric acid has much appreciable effect upon it.

CROOKES says that his experiments indicate that iron at high temperature and under great pressure will act as a solvent for carbon, and allow it to crystallize out in the form of the diamond—conditions existent at great depths below the surface of the earth.

THE average piston speed in engines with cylinders 4 to 7 inches diameter is about 400 feet per minute; above 7 inches, about 550 feet. The number of revolutions is found by dividing the required piston speed in feet per minute by twice the length of the stroke in feet.

THE use of coal which contains sulphur will cause deposition of sulphuric acid upon the walls and tubes of the boiler, necessitating frequent cleaning. The more moisture the greater the corrosive action of the acid. Mixing lime with the coal prevents such acid formation.

IN tests made by engines, one pound anthracite coal evaporated 9.7 pounds water from and at 212° F.; one pound bituminous coal evaporated 10.14 pounds water; one pound fuel oil, 36° gravity, evaporated 16.48 pounds. A cord of well-dried white oak weighs 3850 pounds, is considered equal to 1600 pounds bituminous coal.

A FLYING MACHINE is considered feasible, and one capable of sustained flight will undoubtedly be produced. Probably the greatest (and, perhaps, unsuperable) difficulty will, however, be met with in the matter of alighting. Safely reaching the ground after prolonged flight will be the hardest part of the problem to solve.

FOR the Diesel motor or oil engine is claimed a theoretical heat efficiency of 50% for the single cylinder engine, and 70% for the compound type. The heat efficiency of a good gas, gasoline or oil engine is from 15% to 30%. The Diesel motor was described and illustrated in the issue of Nov. 12, 1898.

THE volume of compressed air delivered at sixty pounds pressure at an elevation of 10,000 feet is 72.7% of the volume delivered at the same pressure by the same compressor at sea level. A compressor which, at sea level, would supply power for ten rock drills, would, at an altitude of 10,000 feet, furnish air for only seven drills.

THE principle of the pyrometer is based upon the expansion and contraction of two metals, an iron tube being inclosed in a copper tube, or vice versa, both being connected at their lower ends; the difference in the expansion of these tubes under heat is transferred by a movement to a pointer, which indicates the temperature on a dial.

WOOD, like gaseous coal, distills off volatile or tarry matter, often sticky, and brown in color, and combustible, if sufficiently high temperature is reached. These do not constitute a true "smoke." In the engineering use of the word "smoke" it is to be understood that where the carbon particle does not burn to gas while hot enough to unite with oxygen, it cools to black carbon, lampblack, or soot, and a current of gas carrying such solid black particles in it is called "smoke."

IT is bad practice to overheat a steel tool in hardening and then allow it to cool slowly in the air until it has taken a certain color before plunging into water, since the coarse grain of the high heat will be left in the tool and it will not do good work. Self-hardening steel can, of course, be cooled in air without detriment, but it is not well to heat it too hot.

THEORETICALLY, a cord of dry oak wood is figured to have a value of 40,425,000 British thermal units; one ton—2000 pounds—good coal, 29,400,000 units; one barrel—42 gallons—crude oil, 6,150,000 units. On this basis, 4.78 barrels oil would equal one ton of coal, and 6.58 barrels oil equal one cord dry oak wood. In practice the relative proportions and values differ from these figures.

ORE impregnated with arsenious or sulphuric acid could probably be economically treated by the cyanide process, if, after light roasting, application be made of chlorate of lime. Jos. Smith at Pine Grove, Nevada, claims to have so successfully treated such acid ores, securing an extraction of 90%, with a consumption of potassium cyanide of one and one-fourth pounds per ton of ore.

WHERE a man takes a mining property under a bond and lease, with nothing expressed as to what shall be done with the machinery for exploitation, such machinery belongs to the lessee, and the latter has a right to remove it at any time during the life of the lease; and if the lease be forfeited for any reason, he can remove the machinery within a reasonable time after such forfeiture.

IN connecting a safety valve to a steam boiler, if provided with a flange joint, it should be bolted to the top of the dome; if it is threaded for a pipe, the connection with the top of the dome or its equivalent should be as direct and as short as possible, and of the same size as the opening in the valve. No valve or other fittings, screwed or flanged joints should be placed between the safety valve and the dome.

TO CLEAN rusted tools and instruments of steel, if the rust is heavy, stand the tools in coal oil for a few hours, but if only slightly rusted this is not necessary. Next dip the articles in liquor potassa for a few moments and then put them into a strong solution of potassium cyanide. Remove; clean with a paste of the cyanide, castile soap, chalk and water; rinse, and place in a saturated solution of chloride of tin and leave over night. In this manner every particle of rust is removed and the articles will come out clear and of a silvery whiteness.

THE "banket" of the Witwatersrand district, South Africa, is a siliceous mass, consisting of quartz pebbles embedded in a matrix composed of sand, pyrite and other minerals, all cemented by secondary silica. The large quartz pebbles have all the characteristics of vein quartz, but show under the microscope undulous extinctions and other evidences of dynamic action to which they have been subjected. They are frequently cracked, and then sometimes show veinlets along the fractures. The quartz pebbles often carry pyrite and other sulphurets, as zinc blende and galena.

THE lowest temperature registered in the open air by any thermometer on earth is 90° below zero, F. The lowest laboratory temperature registered is 434° F. below zero. This temperature was obtained by Prof. Dewar by evaporating frozen hydrogen in a vacuum. "Absolute zero" is 459° F. below zero. "Absolute zero" means that degree of temperature at which heat ceases to exist. It is accurately determined by the fact that all gases expand and contract alike at the freezing point, at the rate of $\frac{1}{459}$ part of their volume for one degree. As this contraction is due to loss of heat, it is manifest that when a gas has contracted 459 parts it can contract no further—its heat is all gone and its temperature then is "absolute zero."

THIS from Wallace, Idaho, is one of the hard ones. It was received a month ago, and has been the subject of much unavailing research. "In placing a magnet between the ore bin and the crusher, to catch hammers, steel, etc., what is the arrangement? Must there be a current passing through the magnet all the time, or can a piece of steel or iron be charged from time to time and be effective? Of what are magnets for this purpose usually made, and how are they placed? Will a hammer remain on the flat surface of the magnet or will it have to drop over on the end to be arrested?" Never heard of just such an arrangement. T. A. Edison had some device for using magnets to separate the iron in auriferous sands, fully described and illustrated at great length in the issue of April 30th, 1898.

PROBABLY "spontaneous ignition" is a more exact term than "spontaneous combustion." That action is caused by the absorption of oxygen by any combustible matter so fast that the resultant combination raises the temperature to a point at which it will burst into a flame. The condition that favors such action is the presence of a body readily oxidizable, distributed in a finely divided state over some material whereby considerable surface is exposed to action by the oxygen. Oily rags and greasy waste fill this condition, and both are specially liable to the accident. The more oxidizable the oil the more imminent the danger. Vegetable oils are particularly liable to the accident. In coal dust in bunkers, because of the oxidation of the sulphur in it, also may occur spontaneous ignition.

MAGNESITE is used largely in the steel industry, where bricks made from calcined magnesite are used for lining furnaces and converters. Magnesite bricks of high grade are composed of 94% carbonate of magnesia; they are refractory and last longer than others. Cement manufacturers also line their kilns with those bricks. During the twelve years ending with 1898 California produced 6879 tons magnesite, worth $60,766. In European open-hearth steel works about forty pounds magnesite are used for each ton of steel produced. Greece is the greatest producer of magnesite, annually shipping about 20,000 tons to the United States, where it is landed at a total cost in Atlantic ports of about $4.50 per ton. Magnesite bricks are made therefrom by Fayette Manufacturing Co., Layton, Pa., and Harbison & Walker, Pittsburg, Pa. The imported manufactured magnesite bricks are worth about $175 per thousand at New York or Philadelphia.

URANIUM belongs to the chromium group of elements, which includes also molybdenum and tungsten. It is a white metal, resembling iron or nickel, malleable, nearly as hard as steel, and is capable of a high polish, a specific gravity of 18.7. It is not a very abundant element; and not having superior metallic qualities, it has not found its way into the arts as a competitor to the cheaper metals. It is not found as a natural metal. The chief ore is pitchblende, which consists mostly of an impure uranic oxide. There are various methods of obtaining uranium from this ore. Uranic oxide yields, by the action of acids, uranyl salts, which are highly sensitive to light and are used for photographic purposes. The most important compound of uranium, from a practical point of view, is uranium yellow, a sodium of di-uranate, which is extensively used in painting and enameling glass and porcelain and for preparing uranium glass. Uranium salts are very readily separated from iron compounds and the process is not costly. The world's production does not mount high up into the thousands. Colorado is credited with seventeen tons of ore in 1898, valued at $530 per ton. The oxide fluctuates $2.25 and $4 per pound, while pure uranium is worth about $190 per keg, about two and one-half pounds.

BY the Russian mining laws, which greatly need changing, all the gold extracted must be delivered to the government gold laboratory of the district, where it is smelted and weighed, and an "assignat" delivered to the owner for its value, less the tax (from 3% to 10% upon ordinary mines, and 15% upon the mines which are the Czar's private property), a charge for laboratory fees, the cost of transmission to St. Petersburg, and a margin in case the local laboratory should have made an error of weight or assay in the vender's favor. The rate of purchase is fixed by the government. Six months or so later the head laboratory pays over the balance, but in the meantime the vender can cash his "assignat." Under these rules the private purchase or even possession of gold is a penal offense, exactly as in case of diamonds at the Kimberly, S. A., diamond fields. But as illicit diamond buying exists there, so illicit gold buying flourishes at Irkutsk, and the Chinese merchants are the offenders. They hang a few furs outside of a shop, or put a few chests of tea in the window, but this is merely a blind, for they make big profits by buying gold dust in quantities from a pinch to a bucketful, and smuggling it across the frontier into China. The Irkutsk gold laboratory was founded in 1870, and since then 1,173,456 pounds avoirdupois of gold, worth probably $300,000,000, has been sent thence to Europe.

IN treating slimes in Australia, the slimes are trucked to the works, and there the required quantity of quicklime to neutralize the acid contained in them is added as the trucks are emptied into a hopper discharging into a disintegrator. The lime required per ton of dry slime varies from twenty to sixty pounds. After passing through the disintegrator, the powdered mass is raised by a bucket elevator to a top hopper, which discharges into side tip trucks running over the tops of the vats. Over each vat is a 6-inch centrifugal pump, the suction pipe of which descends at an angle to within 2 feet of the bottom of the vat, while the discharge pipe is continued down to the floor of the vat, where it is terminated by a right angle bend on a swivel point, so that the flow can be directed across to any part of the vat. The vat, being filled with solution of cyanide, the centrifugal pump is started, and in a few minutes the whole mass is in violent agitation. Into this agitated liquor the powdered slime is dropped, truck by truck, until the whole charge, amounting to ten tons, is delivered, the agitation being maintained the whole time. A few minutes after the last truck is dropped in, the pump is stopped and the whole mass allowed to settle; this occupies twenty minutes, the solution being left absolutely clear on top. A pipe, mounted with swivel joint, and connected with the pipe service leading to the zinc extractor boxes, is then gradually lowered until the whole of the supernatant solution is drawn off. The vat is then filled with the weak solution, and the pump is once more set in motion; in a few minutes the whole mass is once more stirred up, and the first process repeated. After the second solution has been drawn off, clean water is added, and when the mass is worked into a slurry, a plug in the bottom of the vat is opened and the thin slurry run off in wooden launders, whence it is raised and delivered away by a large centrifugal pump. The first extensive trial on Croydon Quartz Crushing Co.'s slimes gave: Average value before treatment: Gold, 9 dwts. 11 grs.; silver, 2 ozs. 17 dwts. 4 grs.; gross value, £2 5s 10d. Average assay of residues: Gold, 2 dwts.; silver, 1 oz. 12 dwts.; giving a value of 11s 8d. The bullion banked was 198 ozs. 4 dwt. 19 grs., of a value of 16s 3½d per ounce; there was figured to be another 104 oz. 10 dwt. in the unsmelted precipitates, solution and zincs, to come in next clean-up, which, if so, would make the total recovery £1 8s per ton. The total cost was figured at 13s per ton.

Machine Mine Rock Drills on the Pacific Coast.

NUMBER V.—CONCLUDED.

Written for the MINING AND SCIENTIFIC PRESS by by A. E. CHODZKO.

APPENDIX.

The former types of machines are all operated by compressed air (or steam) and belong to the category of the power drills.

It may be interesting to supplement these descriptions by presenting some types of drilling machines of different classes, some in use on the Pacific coast, and which have found special fields of usefulness in other parts of the country; I refer to the hand drill and to the diamond drill, and a few words concerning these classes of machines will perhaps not be out of place.

HAND DRILLS.—There is a two-fold idea carried out in the construction of a hand drill; first, to utilize human exertion to better advantage, and second, not to make the action of the machine subservient to the skill of the operator.

Rankine gives as the daily work developed by a man by hammering 480,000 foot pounds, and in turning a crank 1,296,000 foot pounds, being in the proportion of 1 to 2.7; and while the conditions of work with the revolving crank of a hand drill are probably less favorable than with a winch under a practically steady load (the case considered by Rankine), the fact remains that the turning of a crank, with resistances fairly balanced by a fly-wheel, is a better way of utilizing a man's strength than the consecutive lifting and dropping of a hammer.

And then, while an experienced miner can make remarkably good headway in hard rock, the proper handling of the bit and hammer is only the result of time and practice, whereas any laborer will soon learn how to turn the crank of a hand drill with a steady motion.

The machine here presented as a type of hand drill is the Jackson drill, made in Denver. Like in other similar machines, the three essential functions of a rock drilling tool are found.

The Leyner drill is made in Denver, Colorado, and can generally be described as having a valve motion of the Eclipse variety, a hand feed, and a rifle rotation bar with fixed pawls and movable ratchet. This machine differs from the other types found in the market in several important particulars. The bit is not attached to the piston, which is hammering on the head attached to the shank. The result is that the movable part of the piston can be made very light, and reciprocate at a high rate of speed. Another distinctive feature of this rock drill is the use of a hollow steel bit, through the interior of which water under pressure is injected into the hole, a special blowing-off attachment being provided whereby a jet of compressed air can be directed into the stream of water, to clean the holes from debris, and keeping the bit's edge cool. A similar central passage for injecting water is found in diamond drills, and offers the most direct way imaginable. In connection with former makes of rock drills of many years ago, the writer would quote the use of a hollow bit shank, wherein water was fed through a hollow piston rod, this shank being permanently connected to a small copper pipe inserted into an open longitudinal groove cut out of one side of the steel bit; the idea was to avoid the central hole in the bit, and this arrangement does not seem to have been adopted to any noticeable extent.

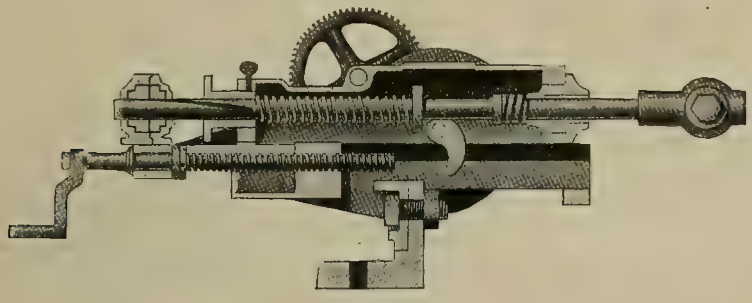
Another rock drill found on this coast is the Sullivan, manufactured in Chicago, and which may be characterized as follows: Valve motion, Eclipse type; feed, hand; rotary motion, stationary pawls, movable ratchet, head mounted on rifle bar.

SPECIAL FEATURES.—The motion of the piston valve is controlled by the main piston opening and closing suitable ports which lead to both ends of the valve chest respectively, where pistons of unequal size, forming part of the valve, are moving.

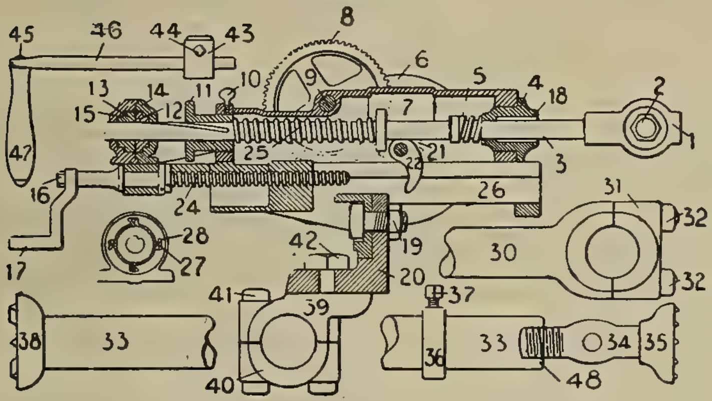
The pawls of the rotary motion are here formed of hardened steel rollers, engaging the rounded troughs of the teeth of the ratchet wheel, light springs keeping the rollers against the wheel.

This locking device is somewhat similar to the well-known arrangement of certain makes of hand twist drills.

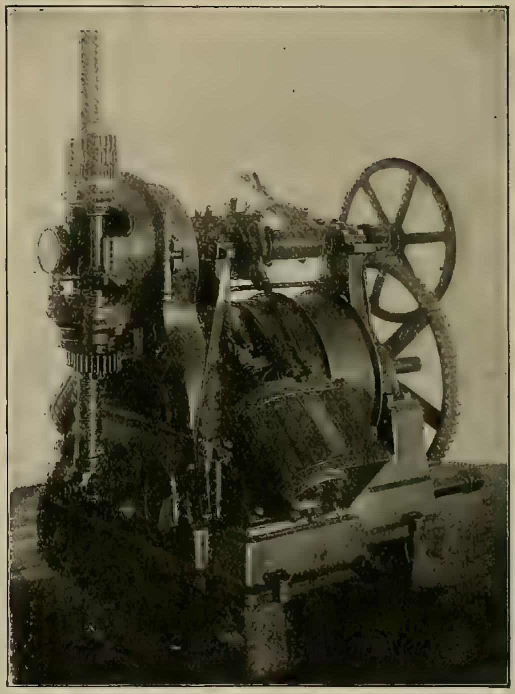
Another noticeable feature is found in the arrangement of the buffers, which here are made of two spiral springs, each mounted on one of the side rods, and alongside the front head of the machine. At the back end, the rods are secured by two jam nuts,



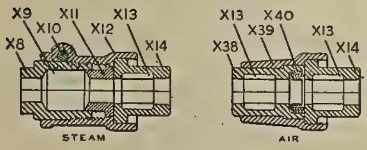
Jackson Drill.



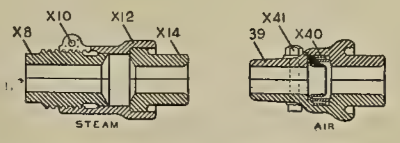
Jackson Drill, Sectional View.



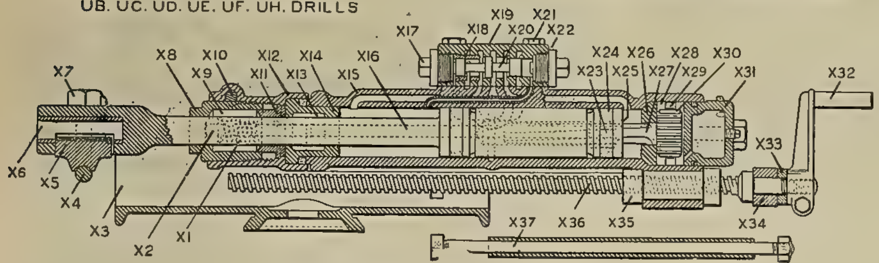
Bullock Diamond Drill; Swivel Head Locked in Position Ready to Bore.



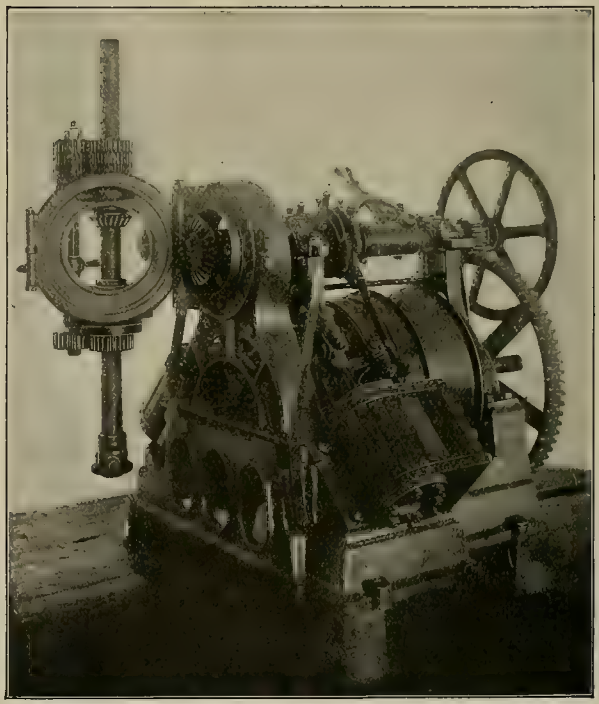
HEADS FOR
UB. UC. UD. UE. UF. UH. DRILLS



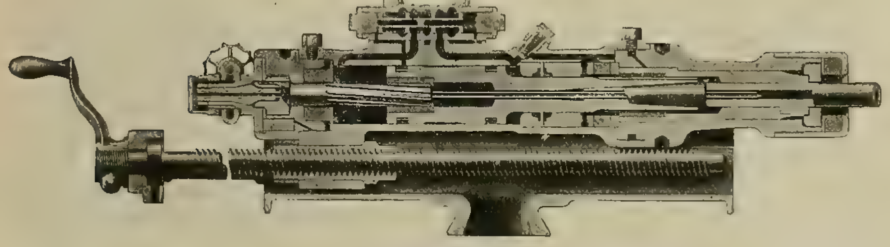
HEADS FOR UA. US. DRILLS



The Sullivan Rock Drill, Sectional View.



Bullock Diamond Drill; Swivel Head Unlocked and Swung Back.



The Leyner Drill.

separated by a spring washer. Cast steel is largely used in the construction of the Sullivan drill, and namely, for the shell, which is cast in one piece, no detachable guide strips being used, and the side wings of the cylinder being simply slipped from one end into the rectangular-shaped grooves of the shell. In this case, the reciprocating action of the air is replaced by the pressure of a cam, revolved by the operator, and which drives back the rod against a spring whose tension can be varied at will, and which in expanding projects the bit against the rock.

The rotary motion is produced by a rifle bar which, in this machine, is attached to the drill rod, its nut being stationary, and a part of the ratchet head revolving against stationary pawls. The feed is effected by hand, in a manner entirely similar to that used in power drills, permitting to vary the stroke at will.

ROTARY DRILLS.—In these machines the disintegration of the rock is no longer produced by the vis viva of a reciprocating mass, delivering successive blows on the head of a sharp tool; but a cutting ring formed, according to the hardness of the ground, of steel teeth or of pieces of black diamond, and secured at the lower end of a tube, is pressed steadily against the rock, and receives a rotary motion, its action being essentially abrasive.

A number of rotary drills have been devised, their use being more particularly well adapted to drilling very long holes, like in sounding, prospecting, and drilling oil wells.

The smaller sizes can drill in any direction, but a very deep hole will more generally be vertical, the tube being suspended, instead of resting against the bottom of the hole. A stream of water is continually forced down the tube, and flows out of the hole after washing the rock at its contact with the cutting ring, and carrying off the debris. Another advantage is that a core of the various material through which the hole is drilled can be secured and an exact section of the traversed ground obtained.

The several types of rotary drills can be classed under two heads, namely, heavy pressure and slow speed, or moderate pressure and high speed of rotation. The former is exemplified in the Brandt drill, a German machine which first became known at the Arlberg tunnel, in Austria, and which is at present used at the Simplon tunnel, between Switzerland and Italy.

The American machines belong to the second class, and no more typical illustration could be offered than the M. C. Bullock diamond drill, manufactured in Chicago, and which is here represented.

The scope of an already lengthy article will not permit of entering into a detailed description of the many ingenious features found in these machines.

The motive power used to produce the rotation of the tube may be steam, compressed air, water or electricity, and imparts to that tube a velocity ranging from 200 to 1500 revolutions per minute.

The cutting ring is pressed against the ground by a certain amount, registered on a thrust indicator graduated up to 5000 pounds, and maintained by an automatic feed, acting by means either of a screw or of a set of hydraulic cylinders. The depth varies with sizes of holes and various circumstances, and its largest type of machine is built by this firm under a guarantee of boring a hole 2⅞ inches in diameter when a depth of 5280 feet is reached.

The latter class of machinery is distinctly American, and it has led to the most remarkable results ever realized in the penetration of rocks at long distance.

Money Saving Power by Application of Blast Furnace Gas.

TO THE EDITOR:—I read under "Concentrates" of your issue of Oct. 20th an item about the use of blast furnace gas as fuel for gas engines. At one of the last meetings of the "Institut du fer et de l'acier" (Institute of Iron and Steel), Mr. Greiner, the emiinent general manager of the Cockerill works at Seraing, Belgium, read a paper in which he pointed out the saving of fuel made by using the gases of the iron blast furnaces as fuel for gas engines, especially for the generating of electricity. He proved that a stack of the common type, with a capacity of 100 tons daily, produces gases sufficient to generate 2000 H. P. The Cockerill Co. mines its own coal on the spot at a cost of $2.40 per ton, and thorough investigation and close calculations have shown that by using the furnace gas of their stacks a saving of fuel can be made of $36,000 per annum. The company has already ordered forty-eight gas engines which will be fed directly by blast furnace gas. The saving of the power that formerly went to waste is enormous, as the above figures show, and this new device of fuel is rapidly gaining favor. E. SMIT.

Colorado Springs, Colo., Oct. 27.

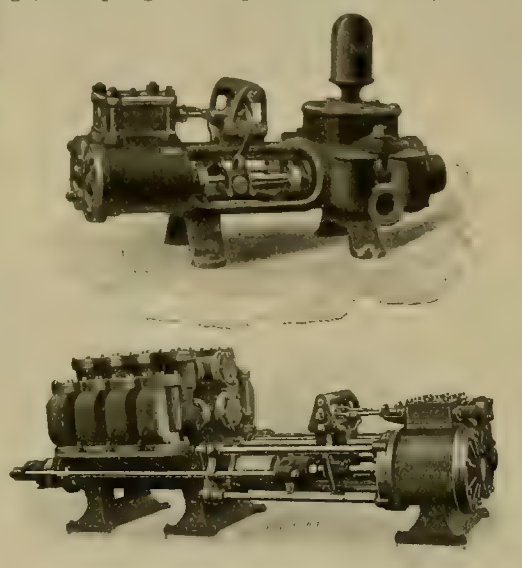
John A. Roebling's Sons' Co.

In the issue of October 6 appeared an extended notice of the exhibit at the Paris Exposition of the John A. Roebling's Sons' Co., Trenton, N. J., they receiving two grand prizes and two gold medals. Since then has been received an engraving of the exhibit, which appears on the front page of this issue.

Duplex Steam Pumps.

Herewith is illustrated a new line of duplex steam pumps, of which the Globe Iron Works of Stockton, Cal., has recently taken the general agency for California.

These pumps are known as the inside plunger design, the plungers are packed with a soft, fibrous packing, which remains stationary, considered advantageous for handling bad or gritty water; it can be kept tight under all conditions, and is readily accessible by removing the outside head on the pump barrel. The lever movement is adjustable to wear by hardened cone bearings. The suction valves are in pockets at the side of the pump barrels so they can be extracted without disturbing discharge valves or any other part.



Duplex Steam Pumps.

The plunger and piston rods are connected at the center by a compression coupling, which makes it possible to use brass rods on one end and steel rods on the other; either can be taken out or replaced independently. On the smaller pumps the steam piston is fitted with a steel ring, which is softer and more elastic than a cast-iron ring and unbreakable. The Globe Iron Works, Stockton, Cal., will send full details on application.

Exhibit at Paris of the Jeffrey Mfg. Co.

Herewith is produced a photograph showing the exhibit at the Paris Exposition of the Jeffrey Manufacturing Co. of Columbus, Ohio, showing their electric chain mining machines and electric and compressed air rotary coal drills, arranged so that power can be attached. About their space is arranged a fretwork of malleable and steel chains, which gives the visitor an idea of the styles of chains used in this country for elevators and conveyors in factories, mills and mines.

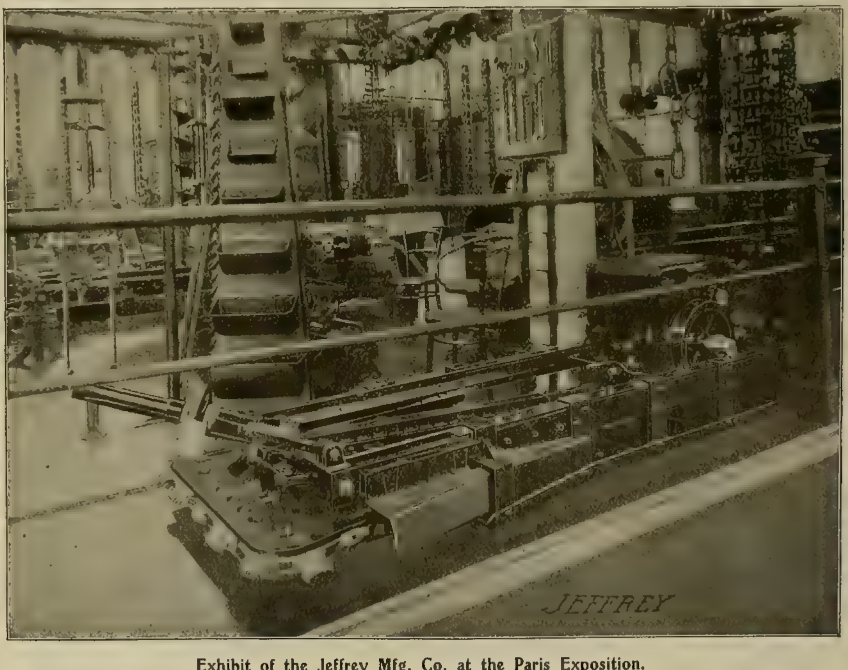


Exhibit of the Jeffrey Mfg. Co. at the Paris Exposition.

They issue a handsome catalogue covering their lines, published in English, German and French, of special interest to European engineers who visited their exhibit. Their exhibit was in charge of S. B. Belden, for years connected with the company, in charge of their Pittsburg office.

Usual Clumsy Attempt at Swindle.

The following is received from Newsome, Idaho. It is the usual "fake," a little clumsier than ordinarily, yet fixed up in a way calculated to deceive people who know no more about mining than mining knows about them. The thing is published as illustrative of the baitless hook so often dangled before gudgeons. Our Newsome, Idaho, correspondent writes:

"I enclose one of the most beautiful examples of the advantages of modern science that it has been my lot to see. Am thinking seriously of buying the whole plant and starting not less than 1,000,000 of the mills; I cannot conceive what niggardly policy limits the company to the establishment of a mere 1000—in its prospectus.

"What compound, double cylinder, direct acting, high pressure asses we have been to submit for so long to a mere fire assay! I presume it was to keep us from being too badly cut up over the discrepancy between this test and our present crude system of value saving."

OFFICE OF
.... GOLD EXTRACTION CO.,
ST. LOUIS, MO.

DEAR SIR:—We take your address from the.........., of which the subscribing attorney is a member, and knowing that your position enables you to furnish desired information, we take the liberty of requesting a favor which we hope you can grant without inconvenience. We enclose a folder prospectus, every statement of which we are certain is correct, and speaks for itself as to its value and usefulness, and which we request you to examine carefully. There are doubtless many persons of the middle classes and small investors, in your locality, to whom it is made available and who would be glad to invest in this valuable enterprise, and we are desirous of getting a reliable agent there to introduce the stock. The price placed on a limited amount of stock is $15 per share, the par value of which is $100, full paid and non-assessable. Agents are allowed 25% commission on orders. We would be much pleased if you would accept the agency yourself, as a better thing for both agent and investor can hardly be obtained; but if your duties preclude it, we request that you kindly furnish us the names and addresses of four or five reliable persons in your locality who would be suitable and available persons and who would probably accept such agency.

The kind of talk those fellows put out may be interesting. They say:

"Gold has become the sole standard of values, and its production the best paying industry of the age. Rich deposits of gold are scarce and seldom found; but thinly and widely scattered almost everywhere, its supply is conceded to be unlimited, provided it can be economically gathered.

"This problem of its easy and profitable gathering has been solved by the .... method, an entirely new principle of decomposing the gold-bearing earth or ore wet, in a cheap chemical solution, by this novel application of electricity, at very small cost, and producing most wonderful and profitable results.

"Its remarkable saving in placer dirt alone is sufficient to revolutionize present gold values. Out of many tests, probably hundreds, made upon placer in and adjacent to Colorado, it was proven that the present system of hydraulics does not save to exceed 2% of the gold which this method obtains. This means that if hydraulics will gather 25 cents per ton, this method saves in contrast $12.50. The same tests proved that the fire assay did not indicate a value of over 50% of the average obtained by this method from the same material. This raises the value of all 'pay' placer to a very good low-grade ore, and a most desirable proposition. We give a few instances: A sample from the Arkansas valley near Salida, Colorado, assayed $10.40, while it milled by this method

$21.60. Another sample from Goose creek, Colorado, showed 'not a trace' by fire assay, while it milled $9.90 by this method. A sample of black sand from a sluice in South Boulder creek, Colorado, assayed $29.60, but yielded by this method $46.20. A California sample assaying only a 'trace,' milled $8 to $12 in very many tests. A sample from San Juan river, Colorado, assayed $12 and milled $16.80. The same material run over plates saved less than 25 cents per ton, while the 'tailings' milled only 57 cents and assayed 37 cents, showing an extraordinary escape of fine gold flowing off with the water.

"But the success of this method is not confined to material carrying 'free' or metallic gold. A test of yellow clay taken at random from a cellar being excavated in Washington, D. C., showed $8 per ton gold. In the State of New York, between the Mohawk and St. Lawrence rivers, is a vast deposit of sand of lacustrine origin. It contains practically no 'free' or metallic gold, usually shows only from a 'trace' to $1 per ton by fire assay. Cyanide will only save about $1 gold per ton, while this method gets from $7.50 to $30, and has obtained as high as $50. This deposit is a great puzzle metallurgically, as accepted methods are valueless. It is a spur, geologically, from the great auriferous formation extending from Nova Scotia across British America, Alaska and Siberia, is inexhaustible and well located for cheap milling, water and fuel being plentiful, and labor reasonable.

"Again, from Maryland southward along the Appalachians is a vast auriferous country, sometimes developing 'free' gold, but, for the most part, resisting ordinary methods to gather 'pay,' but all eligible to this method, including the rich clays and vast deposits of talcose slates.

"It is hardly necessary to state that a process which is so successful in placer earths is equally so in all 'dry' auriferous ores, that is those containing little or no lead, copper or zinc. We append a few results of tests carefully made: Keystone ore, southern Nevada, fire assay $237, our result $840; Old Faithful, Montana, fire assay $5.20, our result $16; Iron Sulphide, Empire, Colorado, fire assay $21.60, our result $33; Astre ore, New Mexico, fire assay 60 cents, our result $13.20; New Prospect, Goose creek, Colorado, fire assay 'not a trace,' our result $6.67. These are a few of the extraordinary results obtained. Not all ores give such extraordinary results, but the proportion is very large.

"This wonderful method, as will be seen by the above comparison, saves gold where all others lose it, and produces large and wonderfully profitable yields where none before have attained pay. It is no longer necessary to find rich deposits, but only to save what was formerly wasted. In placer dirt, which yields only from 10 to 25 cents per ton by usual methods, it is common to save by this process at least $10 per ton, and sometimes far exceeding that amount. A mill with an output of fifty tons per day and an average yield of $10 per ton would produce $500 per day. Subtract from this $3 per ton or $150 per day for milling expense, leaves $350 net per day or $105,000 per year profit for 300 working days. The investment for such a mill complete would be under $50,000, thus showing it would more than pay for itself twice each year.

"But it is not necessary for this company to do its own milling to any great extent. Outside capital will be only too glad of the opportunity, and this company need only collect its royalty. This should be moderate and reasonable, say 5% only of the gross bullion output of the mill. This low royalty, upon the mill above mentioned, would be $7500 per annum. Upon 100 such mills in operation it would be $750,000 each year; and upon 1000 such mills in operation, which is not an exorbitant estimate for the United States alone, it would be $7,500,000 per annum, with no outlay save collecting the royalty alone. This is without mentioning its use outside the United States, while in the remaining gold-producing countries of the world it should easily be double that of the United States alone, or a grand total of $22,500,000 annual royalty. Thus it is seen the proposition is one of enormous profit from a single mill upwards and in a field now not even attempted.

"But this is not all. By a change of chemicals 'dry' silver ores, now seldom utilized, can be just as successfully treated, and by changing chemicals and electric current equally wonderful work can be accomplished in low-grade mercurial ores.

"We have also adapted to the gathering of the precious metals by amalgamation with mercury a machine nowise equaled by any other invention for the purpose before made.

"All these discoveries and patents, when issued, will be the exclusive property of the .... Gold Extraction Co., and will constitute a valuable monopoly, the profits of which, with proper management, are almost incomputable. It is usual in such cases to allow large capitalists to absorb and monopolize the benefits of such discoveries, and it never reaches the public until it has been already largely inflated. On the contrary, this company has decided to allow the public to share in the profits of its very initial promotion; and for which a limited amount of stock is offered. This company's stock is divided into shares of $100 each, full paid and non-assessable. It is offered temporarily at a price which will make the investor a large and quick profit. This price is not to be permanent, and the company reserves the right to advance it at any time without notice. You can ascertain the present price from the party furnishing this folder, or, failing in that, upon application to the company.

"As soon as this method is in general operation, which will soon occur, this stock will readily be worth par and doubtless paying a large per cent upon a much higher valuation and become a wonderfully remunerative investment. It is notorious how very valuable such revolutionary discoveries have been and few have equaled the promise and scope of this one." .... GOLD EXTRACTION CO.,
St. Louis, Mo.

The Oil Fields of Kern County, Cal.

NUMBER II.

Written for the MINING AND SCIENTIFIC PRESS by H G. PARSONS.

SUNSET DISTRICT.—The Sunset oil district has been known as such for many years, and has received considerable attention at the hands of successive State Mineralogists or their field assistants. This has been because of ample surface indications proving the existence of petroleum. Besides oil springs, there were extensive deposits of asphaltum, and in late years a considerable quantity of petroleum has been taken from groups of shallow wells sunk by Jewett & Blodgett in the mesa lands near the asphaltum beds. The district is 40 miles southwest of Bakersfield, in the foothills of the Tehachapi mountains, which form the southern boundary of the San Joaquin valley. Prof. W. L. Watts gave an extended description of this district in a monograph published by the State Mining Bureau in 1894. Besides describing the geology and topography of the district, he ventured certain opinions, which are being verified by recent developments. He stated that there are evidences of two geological formations at Sunset, and that each would be found to produce an oil peculiar to itself. He located one formation in the first tier of foothills rising out of the mesa lands; the other in the hills farther to the southward. As has been intimated, this opinion has received confirmation through recent developments. An oil of greenish cast and of lighter grade than that taken from the first wells sunk in the district has been found south of the first tier of hills. Already several companies are operating in this vicinity, hoping to find the green oil in quantities that will compare favorably with the output of wells producing black oil in the northern part of the field.

Lack of transportation militates against the Sunset district at present. It costs heavily to get freight into the district over a stretch of 43 miles of sandy road. It is thought the building of a railroad will not be long deferred. A branch of the S. P. from Gosford, on the McKittrick line, was projected before there were many productive wells. Now that production has begun in earnest, so that the railroad will secure freight both ways, there will be every inducement for a speedy completion of the line. A large quantity of material for the road is now stacked up at Gosford.

Another disadvantage at Sunset is lack of potable water. The wells all yield salty or sulphurous water, entirely unpalatable. Drinking water is hauled from a valley in the mountains 12 miles distant, making it expensive. It is probable that as the district increases in importance this water will be piped to Sunset.

The interests of Jewett & Blodgett in the Sunset district are paramount. It is largely due to the persistent work of these gentlemen that the petroleum industry holds such a prominent place as it does in Kern county's history to-day. They erected asphaltum works at Sunset eleven years ago, and followed this by sinking oil wells in adjacent mesa lands. They have always supplied a fine grade of asphaltum, and, when their present enlarging works are completed, they will manufacture an excellent article and a good deal of it. They have sunk over twenty oil wells in the Sunset district, nearly all of which are yielding. Their latest well, "No. 35," in the hills about 1½ miles southwest of the refining works, is probably the best producer in the camp. Besides owning much land in the district, part of which they have leased to other parties, they have leased additional lands, making them large factors in the development of this promising field. A description of the asphaltum works will be of interest:

Originally the company treated the crude asphaltum, which lay as a vast deposit on the surface of the earth. This product was melted in large vats, the impurities settled and the refined material was drawn off in a liquid state, leaving a sandy residuum which could be used as fuel. At present, asphaltum is manufactured from crude petroleum taken from the Jewett & Blodgett wells, or purchased from other wells in the district. It has been found that this plan is superior to the refining of crude asphaltum taken from the hillsides. The present works are modeled after those at Baku, Russia. Retorts have been placed which will dispose of 350 to 400 barrels per day of crude petroleum. Superheated steam under pressure is injected into the petroleum in these retorts. This agitates the vapors and they pass off at a less degree of heat than would be necessary if the fluid were heated over a firebox. Asphaltum heated above 400° F. will be destroyed by disintegration. The distillate which is condensed from the petroleum vapors is itself valuable, selling at present for 8 cents per gallon and containing 18% of a rich lubricating oil. This, however, must be extracted by a further process. The residuum which is drawn out of the retorts after the distillation is finished is 90% pure asphaltum. Such foreign matter as still inheres is of positive advantage, being infusorial earth that toughens and strengthens the product. This asphaltum, after being hauled by team over a long road to Bakersfield, is shipped to Eastern markets, where it has to compete with asphaltum brought from Trinidad, W. I. If the Sunset product were not of superior quality, the West India asphaltum would crowd it out, as cheap ocean transportation and a short haul by rail would be factors hard to combat. The General Electric Co. of Schenectady, N. Y., The Gilsonite Paving Co. of St. Louis, Mo., and Chicago, Ill., roofers are regular purchasers of Sunset petroleum. There is no trouble to find a market for all which may be manufactured. The crude petroleum of this district, specific gravity 12° B., will yield 50% asphaltum, manufactured as above described. The engraving on the front page gives a good idea of the appearance of the district.

Development work in the Sunset district has been stimulated by the operations of Easton & Eldridge, who manage the affairs of several companies.

Sunset King, on Sec. 10, 11–24, down 900 feet, with a little showing of oil, propose to go deep. Manhattan, on Sec. 11, 11–24, down 800 feet, are after the same sand as the Sunset King. Sunset District, on Sec. 3, 11–24, now rigging up. Bonita, on Sec. 3, 11–24, has just begun spudding. The Sunset Czar, on Sec. 19, 11–23, now down 460 feet and capable of producing, after perforation of casing, twenty barrels of oil per day. Sunset Petroleum & Refining Co., on Sec. 29, 11–23, down 100 feet, have had a showing of oil from near the surface. Sunset Consolidated, on Sec. 28, 11–23, down 300 feet, now putting in casing.

The Monarch Oil Co. of Arizona was the first company to strike oil in the hill section at Sunset. Their productive wells are on Sec. 2, 11–24. The first stratum of oil sand was struck at 385 feet, the second at 440 feet; the latter is 65 feet thick, but very rich in oil. Wells Nos. 1 and 2 are producing, but both are troubled with sand, which prevents steady operation of the pump. It is thought 100 barrels per day for each well will be a conservative estimate of the output after these wells are able to pump regularly. The Monarch supplies many other outfits with oil, sending it as far as to the Bay City, in the Midway district, 12 miles toward McKittrick.

There are several wells with bright prospects in the immediate vicinity of the Monarch. "No. 35," belonging to Jewett, Blodgett & Beal, has already been referred to. It is on Sec. 35, 12–24. It is producing as much as Monarch No. 1 and presents exactly the same characteristics. The Occidental Oil Co. of West Virginia are reaching a good depth in their well, on Sec. 2, 11–24. A strong odor of gas is observable. The Arcola is in the same vicinity. The rig is ready for operations, but matters are delayed by legal complications and scarcity of casing. At the Golden Gate, which is on the flat, southeast of the Monarch, a small stream of oil is pumped from the well, probably amounting to ten barrels per day. The Pittsburg, also on the flat and half a mile east of the Monarch, is closed down for lack of casing. The Superior, on Sec. 7, 11–23 (on the flat), has good indications at 600 feet. The Barrett well, on Sec. 11, 11–24, obtained oil at 1400 feet, but the oil production gave out and the well is now yielding water as salty as that from the ocean. This repeats the experience at Jewett & Blodgett's No. 17 well. The latter was a spouter of oil for several weeks, but it now produces water carrying some oil. Another of Jewett & Blodgett's wells on the flat supplies water for most of the boilers in the camp. The water is less salty than that coming from other wells, but is strongly sulphurous. The U. S. Oil Co. are sinking a well with good prospects on Sec. 26, 12–24, a short distance west of the J., B. & B. well on Sec. 35. Wheat & Wilson are putting up rigs on promising territory, Sec. 3, 11–24. The Lion Oil Co. have excellent indications on Sec. 12, 11–24. As their property is located a little distance from the hills, operations are watched with keen interest. They are now down between 600 and 700 feet. The Sunset Queen, the State Crude and the Queen Esther, all in the second or third range of hills, are thought to be in safe territory.

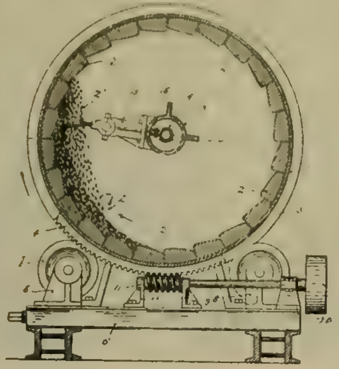
There are many wells being sunk northwest of the Monarch and "No. 35," but as yet this group is the farthest of productive wells in that end of the field. In the southeastern part of the field the Navajo and the Sunset Czar are both productive. The former is in rich oil sand at 600 feet. They sold 300 barrels of oil to other companies during September. These wells are in the first range of hills and are located diagonally across three sections of land from the Monarch. Thus the oil field at Sunset has a demonstrated length of 4½ miles. The early wells of Jewett & Blodgett, which are producing limited quantities of oil from shallow depths, lie on mesa lands in a straight line between the more productive extremities in the hills. The question now seems to be whether the rich oil belt at Sunset bends to the south, corresponding to the conformation of the hills, or whether it crosses the flat. This question will soon be determined by the operations of companies now sinking wells in both localities.

Mining and Metallurgical Patents.

Patents Issued October 30, 1900.

Specially Reported for the MINING AND SCIENTIFIC PRESS.

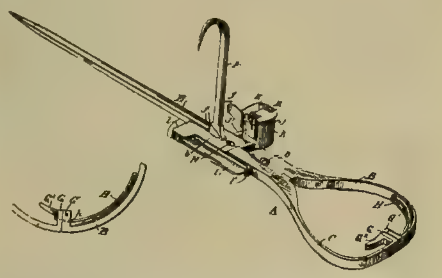
METHOD OF TREATING REFRACTORY ORES.—No. 660,173; J. C. Teller, Minneapolis, Minn.



Method of treating refractory ores, placing body of pulverized ore within tubular shell, rotating shell with such velocity as to cause successive portions of ore to be carried upward past horizontal plane, passing through axis of shell, whence they fall in free shower of separate particles, and projecting flame through falling particles.

◆

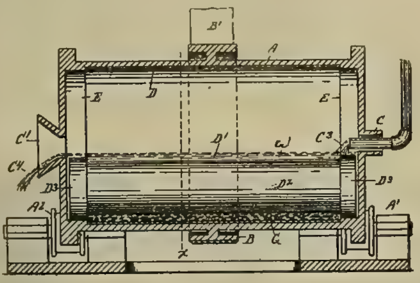
MINER'S CANDLESTICK AND COMBINATION IMPLEMENT.—No. 660,573; F. Herbst, Ouray, Colo.



Combination with miner's tool having pivoted jaws, of detachable candle support adapted to be confined in jaws, handles on jaws, means for locking jaws together comprising dog having squared bottom end pivoted to one member and adapted to engage opposite member, a spring adapted to engage bottom or end of dog to hold same in closed or open position.

◆

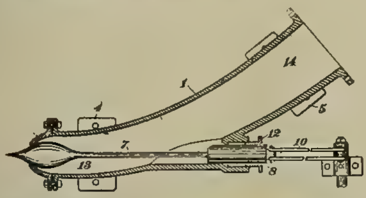
AMALGAMATOR.—No. 660,774; H. Hicks, Fort Wayne, Ind.



Amalgamating apparatus, combination with rotatable tank having surface coated with mercury, means for rotating tank rolling amalgamator having surface coated with mercury arranged within tank spaced therefrom intermediate of its ends caused to be set in rolling motion by rotation of tank, rolling amalgamator constructed with annular laterally projecting treads to raise rolling amalgamator from contact with inner surface tank.

◆

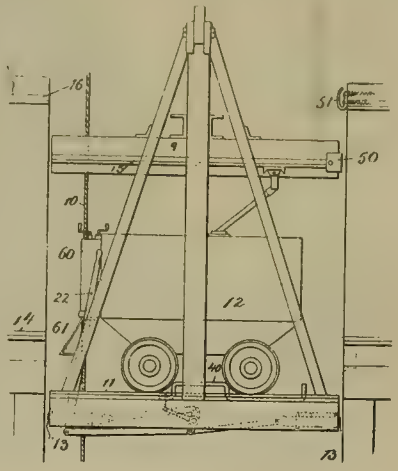
HYDRAULIC REGULATING NOZZLE.—No. 660,789; W. A. Doble, San Francisco, Cal.



Hydraulic regulating nozzle having discharge end converging on curved lines, movable spindle-shaped core piece mounted therein projecting through discharge end, adapted to open and close same, permit annular discharge of water therefrom on lines tangential to inner curved faces of nozzle end and anterior curved faces of central core, in combination with hydraulic balancing piston connected to core by flexible rod or stem, means to operate piston and core.

◆

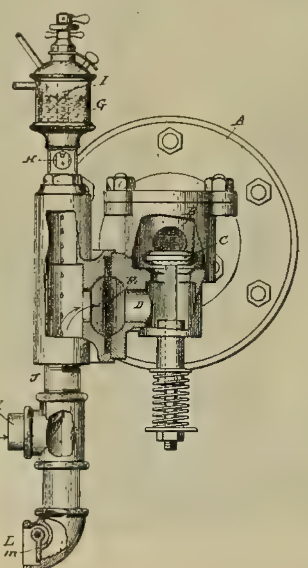
ELECTRIC CONVEYING AND ELEVATOR APPARATUS.—No. 660,724; G. K. Fischer, Salt Lake City, Utah, F. Klepetko, Great Falls, Mont.



In combination with rails and trolley conductors, of electric railway, elevator car having corresponding rails and trolley conductors, locking mechanism for elevator car and electric tram car having manual controller adapted to be run onto elevator car, manual controlling devices for locking mechanism and for operating elevator car being set in juxtaposition to normal position of controller of tram car when tram car is in place on elevator car.

◆

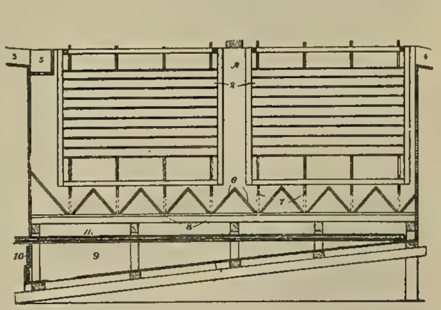
MIXER AND VAPORIZER FOR GAS ENGINES.—No. 660,778; J. W. Lambert, Anderson, Ind.



Combination, gas engine cylinder, inlet valve, mixing chamber connected thereto by lateral passage, feed device adapted to feed gasoline into upper end of mixing chamber so that gasoline will fall unobstructively through same, air inlet pipe connected to mixing chamber at its bottom, directly beneath feed device, so that inward current of air will be directed upward against falling gasoline and unvaporized gasoline will fall directly into air pipe; pipe to carry off unvaporized gasoline provided with outwardly opening valve adapted to be held closed by suction.

◆

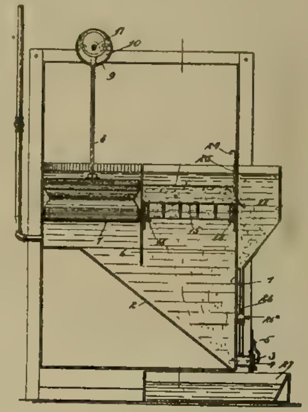
DEVICE FOR COLLECTING FINELY DIVIDED MINERALS AND SLIMES.—No. 660,844; W. E. Darrow, Sonora, Cal.



Apparatus for separating finely divided mineral from heavier gangue consisting of stationary tank or space having surfaces inclined toward longitudinal sides of tank so that heavy material will slide therefrom and lighter material will collect thereon, means for supplying water from below to fill tank and submerge surfaces, means for supplying material to pass through tank and over surfaces, discharge at opposite end, transversely corrugated or channeled bottom having openings therethrough and closed receptacle beneath filled with water whereby heavy sediment gradually passes through openings into lower compartment without agitation in upper compartment.

◆

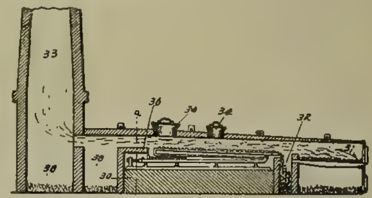
SLIME JIGGING MACHINE.—No. 660,869; C. B. Rogers, El Paso, Tex.



Slime jigging machine comprising two-compartment tank having bottom portion consisting of horizontal section, intact, substantially V-shaped base extending from horizontal section to opposite side wall of tank having continuous, uniform inclination, suitably shaped, upwardly flaring side walls; plunger in one tank compartment above horizontal section, screen in other tank compartment; bridge wall located immediately at one end of screen terminating short of top of tank; valved receptacle located exteriorly to tank adjoining bridge wall, walls projecting above outlet leading from lower extremity of bottom portion, means for controlling outlet; tank divided into two compartments by vertical transverse partition terminating at lower extremity short of base below plane of hortizontal bottom section.

◆

HEARTH FOR ROASTING ORES.—No. 660,982; G. Clary, Zacatecas, Mexico.



In an ore roaster, plate, plurality of rollers carried by plate, frame mounted upon rollers, table carried by frame pivoted at one end thereto, means carried by plate for moving frame rearwardly, separate means for moving table forwardly, means for raising and lowering free end of table.

◆

ART OF HARDENING AND TEMPERING COPPER, GOLD OR SILVER.—No. 660,983; D. E. Conner and O. Bagby, Covington, Ky.

Of hardening non-ferrous metals, first cooling same to a temperature at least 50° below zero F., then rapidly heating them to a temperature of at least 1000°, F., first placing them in liquid air, then rapidly heating to the stated temperature; cleaning and annealing metal treated by heating and immersing it in cold brine.

Some Colorado Metals.

Baily & Monnig, who give attention to the handling of some of the rare metals, state that almost 100 tons uranium oxide, associated with vanadium, have been shipped from the Dolores river, or Paradox valley region. The ore is somewhat siliceous, being found in a stratified sandstone section. Some of the shipments ran as high as 30% uranium. The three Gilpin county mines which are producers of this metal are at present closed down. The production of about 500 tons from the three mines ran about 15% to 20%.

Within the past year a few cars of metallic bismuth have been shipped from Leadville, the most of which ran about 8% pure, but also carrying gold and silver. The Leadville bismuth occurs as an oxidized ore, being found in streaks running through bodies of other oxidized ore and the streaks bearing it are stripped and sorted from the other material.

Many samples of cobalt, nickel and tin are frequently received by Baily & Monnig, but seldom in quantities to be handled.

The discoveries of large bodies of tungsten in Boulder county have attracted much attention among those who handle that class of material, which is made use of in hardening and toughening steel.

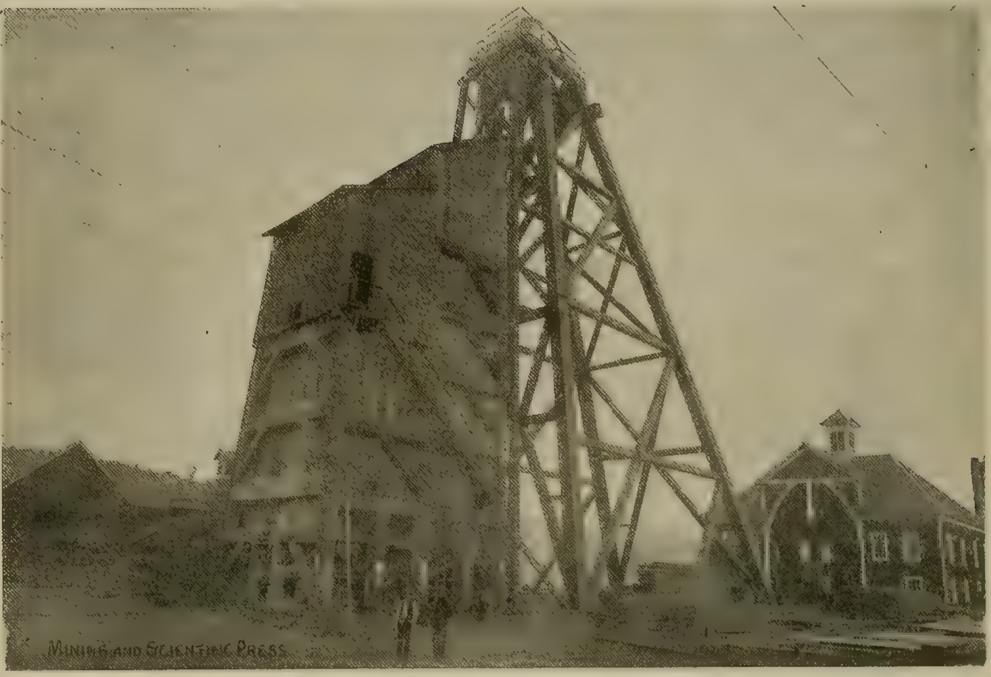
Denver, Nov. 2. WASCOTT.

The Cross Shaft, Angels, Cal.

Written for the MINING AND SCIENTIFIC PRESS by S. A. HOFFMAN.

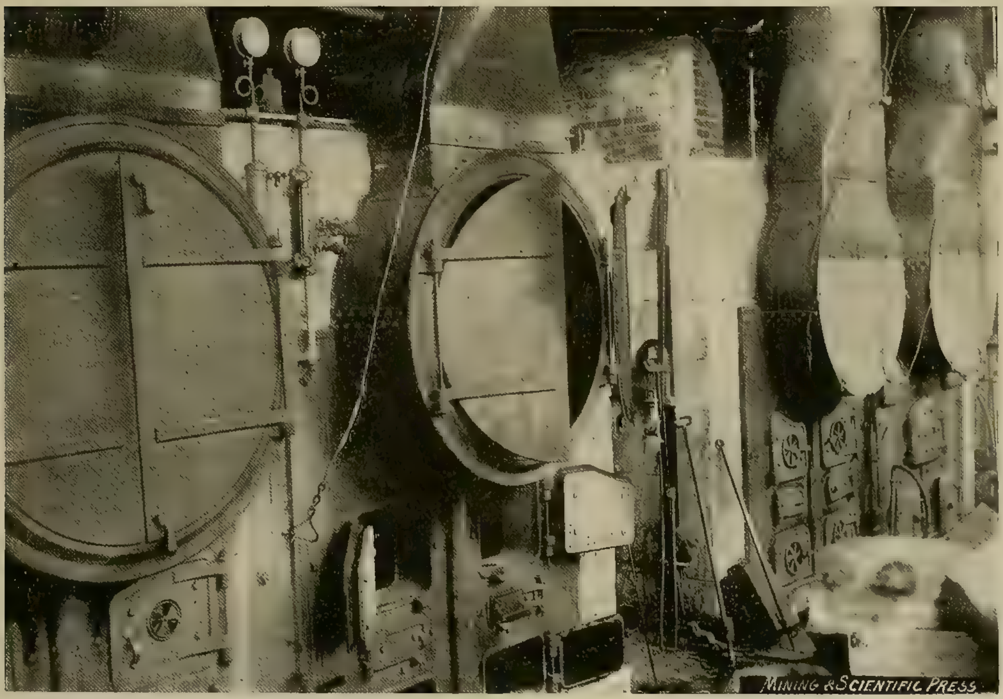
The machinery for this shaft was furnished by the Union Iron Works of San Francisco. The engines are of the pocket valve type. It is also fitted with water power, which will be used most of the time after the winter rains set in. The cylinders are 24x60 inches. The engine is direct acting.

The water wheels (two) are of Pelton make, each 10 feet in diameter, using 500 inches of water from running head of 380 feet, delivered through 26-inch steel riveted pipe. The reels are of the cone pattern, holding 1935 feet of 1⅛-inch plough steel cable—seventy-five coils round the cone. The reels are fitted with the Lane brake and are detachable; they can be used separately. The diameter of the cone at the largest end is 9 feet 11 inches, center to center of rope; the smallest end is 6 feet 6 inches.



Hoist and Engine House, Cross Shaft, Angels, Cal.

The crank disks are 9 feet in diameter, fitted with strap brake, operated by hydraulic cylinder. The diameter of the brake wheel on the reel is 13 feet 6 inches, with 12-inch face, fitted with double-acting post brakes, operated by steam. Total weight on three bearings which the reels rest on is eighty-five tons. Total length of reel shaft and crank shaft, 37 feet 2 inches, made in Bethlehem, Pa., forged steel, 15 inches in diameter, with a 6-inch hole full length through it. It is coupled in the center with forged steel couplings.



Boilers for Cross Shaft, Angels, Cal.

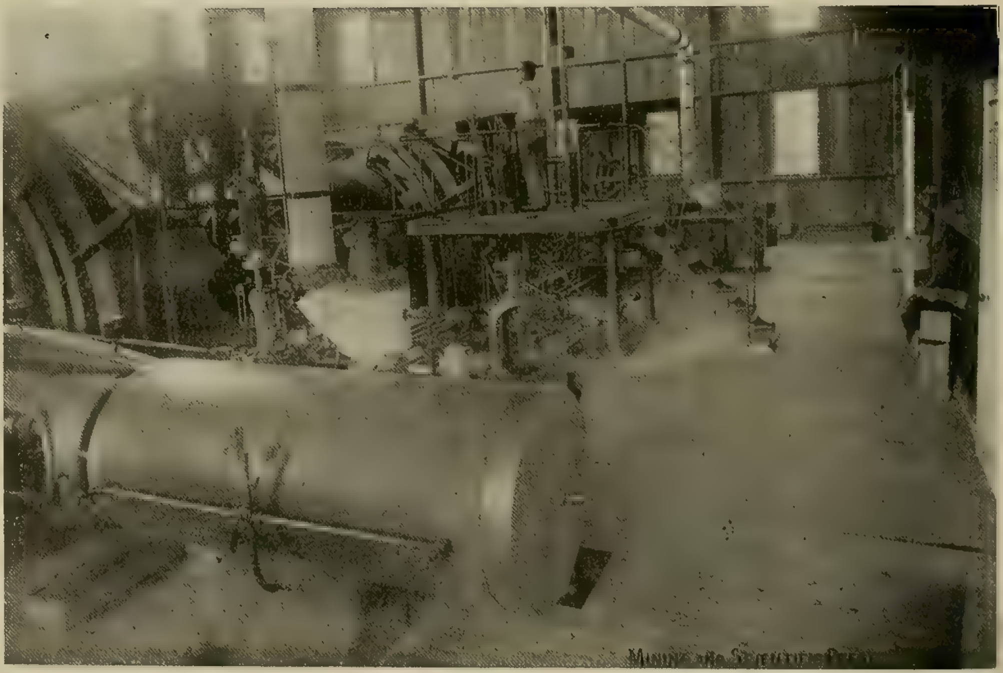
The engine is operated on a raised platform 5 feet high, 8x8 feet square. The machinery is on a concrete foundation, built of crushed quartz, 12 feet deep, and is anchored down with eighty-eight anchor bolts, each 2½ inches in diameter, 12 feet long. The foundations are 42x65 feet. This machinery will carry a skip, holding 1500 gallons of water, 1400 feet, making the round trip, fill the skip and dump it, in two and one-half minutes.

The gallows-frame has two sheave wheels, each 12 feet in diameter, solid cast iron, running on 6-inch shafting. The top of the wheels is 106 feet; top of frame 96 feet. This frame was designed by engineers of the Union Iron Works, and was raised and framed on the ground here by the Utica Co. It is built of 24x24-inch pine, having four posts. It was designed from the Eiffel tower pattern. The posts are spliced in the center.

The steam for the engines is furnished by four boilers of 75 H. P. each, of steel $\frac{5}{16}$ inch thick, with head ¾ inch. Each boiler has sixty-two 3¼-inch flues. Each boiler is 14 feet by 5. The total cost of this engine and hoist was $75,000. The time required from time of starting foundation to time of running was six months. The total weight of lift, loaded, is nine tons.

The Cross is a three-compartment shaft and is not worked above the 700 level. The shaft is 1400 feet deep.

For the above information I am largely indebted to Jno. Ellis, who had charge of the building of the foundations, and who has general supervision of the machinery now.



View of Engine Room, Cross Shaft, Angels, Cal.

ALUMINUM is incorrodible indoors. It is almost incorrodible in the outside atmosphere. When exposed to moist air a slight harmless oxide of alumina is formed, discoloring it a little, but protecting it from further corrosion. Steam and flue gases, ammoniacal vapors, any of the acids, strong or dilute (except hydrochloric acid slightly), do not affect it in any way; the alkalies alone affect it, hot caustic soda solution dissolving it very quickly. Its tensile strength is a little less than that of copper, diameter and length being equal; but, weight for weight, aluminum has nearly three times the tensile strength of copper. It is being used largely by American electrical engineers as a bare and insulated conductor for telephone and telegraph wires, and for power, etc. It is now used as a trolley wire and by electrical firms for commutators on account of its light weight and non-magnetic and non-sparking properties; for brushes and brush holders, switches and cut-outs, for the same reason.

Pennington & Sons' Steel Works.

On the front page is a view of Pennington & Sons' main steel works, San Francisco, in which are shown four steam hammers—one small, one medium and two extra large. The combined striking power of this collection, added to that operated in their branch works, compares favorably with any similar plant west of the Mississippi river. This firm makes a specialty of forging either iron or steel as desired. They turn out forgings ranging in weight from one pound to 30,000 pounds. Of their various manufactures their hammered steel shoes and dies, known as the "Pennington," are best known. Next in importance comes their shafting of all kinds, used mainly in the construction of ships, engines, automobiles, etc. Recently they have added a department for the manufacture of well boring tools.

MINING SUMMARY.

ARIZONA.

COCHISE COUNTY.

The Lake Superior & Western Co., operating near Bisbee, will put in a new hoist.

GILA COUNTY.

Phelps, Dodge & Co. are credited with intention to build a smelting plant at Globe to treat ores from their copper mines at Nacosari, Sonora, Mexico, and at Bisbee, Globe and Morenci.

MOJAVE COUNTY.

The telephone line from Chloride to the Connor and Minnesota mines, thence to the Merrimac, 5 miles, has been put in operation by the Philadelphia & Arizona M. Co. The company is putting on more men, and it is expected that by Jan. 1 they will have 200 men at work. Level connecting the two 400-foot shafts, a distance of 26 feet, is about completed, and timbering is now in progress.

W. Van Ansdal is down 100 feet on his claim near Chloride.

J. Priske is getting out ore from the Home Pastime, Mineral Park, for shipment to the Globe Smelting & Refining Co., Denver, Colo.

The Occidental, White Hills, has 100 men sinking, drifting, etc. The company also has many men working on other claims in same vicinity.

W. H. Lake of Kingman has ten men doing development work on claims near Kingman. He is connected with Philadelphia parties in the old Jumbo, and they may reopen mine during winter.

The Fay group, near Pyramid, is being developed by Los Angeles, Cal., men. Ten men are working and ore is being sacked for shipment.

Work at the Sheeptrail is progressing.

J. Hughes and F. W. Mitchell expect to put men on at the Fraction.

PIMA COUNTY.

At the Old Liberty, 40 miles south of Tucson, a strike has been made on the 71-foot level, showing 600 ounces silver, 30% lead and 4% copper per ton; W. R. Wemple manager.

G. Metz, on the Condon properties, Old Hat district, has twenty men working.

PINAL COUNTY.

C. E. Udall, manager McGorris Copper M. Co., has twenty-five men at work on the San Pedro, near Mammoth. Ore shows 20% copper and fifty ounces silver to the ton.

It is expected that upon the reopening of the Ray mines, near Florence, on the 15th inst., 175 men will be given work.

YAVAPAI COUNTY.

W. F. Staunton, manager Congress (gold), near Congress, is reported considering erection of 40-stamp mill and cyanide plant there.

L. C. Haynes and J. G. McBride of New York have bought the White Horse group, 7 miles from Prescott, for $25,000.

C. Harryhouser is pushing work on the Harryhouser group, near Jerome. Three shifts are working and sinking has been done to a depth of 325 feet. The group is bonded to Eastern men, who contemplate thorough exploitation.

YUMA COUNTY.

Ore from the Goodenough, Tison Wells district, 25 miles east of Ehrenberg, is reported to carry 15% copper and fifty ounces silver per ton. Development work on drifts and shafts aggregates 15,000 feet at present and development is in progress.

CALIFORNIA.

AMADOR COUNTY.

W. A. Pritchard, Supt. Keystone, near Amador, is sinking a single-compartment shaft at the mine.

The forty stamps at the Zeile, Jackson, are dropping. Work at the Central Eureka, Sutter Creek, is progressing. At the Bellwether a small mill has been put in. Sinking on the Kirkwood, Jackson, will begin as soon as new engine is placed. The Altaite M. Co. has bought the Nome, Amador, and will develop same.

Work at the Mutual mines, Sutter Creek, Supt. Porter, will resume. At the Oneida twenty-five stamps are dropping, being run by water power. It is expected that within a month, however, sixty stamps will be run by electric power.

CALAVERAS COUNTY.

The Lloyd, San Andreas, has resumed after a few weeks shut-down.

Upper plant of the Standard Co. has suspended temporarily.

Operations on the Vorlander, at Middle Bar, have resumed.

H. A. Guffey, of Fresno, who some time ago bonded the Tulloch-Magruder, Angels, has opened up lode on 300-foot level 11 feet in width, carrying sulphuret averaging $12 per ton; W. H. Bravin, Supt.

EL DORADO COUNTY.

Good ore is being taken from the Mt. Pleasant, near Grizzly Flats, on 800-foot level.

HUMBOLDT COUNTY.

H. C. Morse of Eureka has leased twenty acres gold-bearing sand beach at Little river and will put up a plant to save the gold.

KERN COUNTY.

The McWhorter Oil Co., capital $200,000, is incorporated at Bakersfield. Directors, M. McWhorter, J. H. Moss, G. B. Okerlund, J. C. Schiffer and A. Von Kuehlen.

It is thought that there is at present a demand and a market for 10,000,000 barrels of oil in California alone.

The Chino Land & Water Co. has abandoned its well in Fullerton extension at a depth of 1100 feet. They will sink another well.

The Continental Oil Co. has completed its second well, is down 180 feet on the third, and has a derrick up on the fourth.

The Carbon Canyon Oil Co., in Fullerton district, has struck oil and a flow of gas at a depth of 520 feet.

The Old Dominion, near McKittrick, will drive a 2500-foot hole.

The Navajo No. 1 produces fifty barrels oil per day.

The Green Whittier Oil Co., capital $1,000,000, is incorporated, to work near McKittrick.

MARIPOSA COUNTY.

(Special Correspondence).—The Francis M. Co., near here, has about completed the erection and installation of a 10-stamp mill. It will be ready for operation by the 20th of November. J. L. Madden, formerly of Amador county, is manager of the Francis property.

Cathay, Nov. 4.

NEVADA COUNTY.

The Phœnix, Nevada City, will resume.

The Crystal Lake G. M. Co., office at Benicia, will operate in the old Meadow Lake district.

The Union reports the uncovering at the Coe mine of a ledge with gold sprinkled all ovr the outere edges.

The Banner mine, Nevada City, Phillips Bros., owners, is again producing ore, tributers being at work there. The mine has been pumped out and everything found in good shape. Forty tons ore will be shipped to Selby's, San Francisco, and if returns are satisfactory, work will be pushed.

PLACER COUNTY.

The Mammoth Bar, near Auburn, has closed down for winter.

The Lincoln Oil Co., it is reported, will drill 3000 feet on its property, consisting of 1260 acres patented land near Lincoln.

W. C. Giles, Supt. Fairview quartz mine, 16 miles southeast of Cisco, has eight men employed on development work.

The 10-stamp mill at the La Trinidad mine, 16 miles southeast of Cisco, is running. The first cleanup since the resumption of work gave 92 ounces; G. S. Montgomery Supt.

The Rawhide Co., Auburn, are putting in 1200-foot tramway.

The Pioneer, Supt. Sullivan, has resumed.

Pay Streak mill, Humbug canyon, W. Lovelace, Supt., is running.

Colfax Sentinel: The new 8-stamp mill at the Girard quartz mine is completed, 7 miles west of Cisco, E. R. Edwards Supt.

PLUMAS COUNTY.

The Rich Bar M. Co., Quincy, has suspended operations for season.

Work on the Talbot, Lights canyon, is progressing.

RIVERSIDE COUNTY.

It is expected that Manager Segapno of Perris, who was given a decision in the Good Hope mining suit, will begin development work soon.

The Indian Queen, M. J. Andrews manager, is pushing work. A stamp mill, boiler, hoist and engine are in place, ready to run.

The Perris, owned by W. F. Bray, is reported bonded to Los Angeles men, who intend to begin operations soon.

Ore from the Washington, F. Bates manager, is said to mill better than $60 to the ton.

SACRAMENTO COUNTY.

The steam shovel put in at Teet's Flat, near Natoma, did not prove economical in handling gold gravel deposit, owing to depth. It is understood that a dredger will soon be built to replace it.

The Mississippi Bar dredger is undergoing repairs.

SAN BERNARDINO COUNTY.

Copper ore has been discovered at the Copper World mines, Valley Wells. Supt. Ritchie says he will give employment to fifty men.

SAN DIEGO COUNTY.

Julian reports the finding of the original ledge of the Stonewall mine at Cuyamaca by Jones, Stambak, Crane & Mueller.

The Oceanside Oil Co., Oceanside, has struck an oil vein at a depth of 620 feet.

The Victoria Oil Co., Pres. Woodward, is putting up new rig near La Costa.

The La Jolla Oil Co. will begin drilling.

SHASTA COUNTY.

It is locally reported that the Copper M. Co., Keswick, will put in additional furnaces and a new plant for treatment of low-grade ores.

SIERRA COUNTY.

(Special Correspondence).—The California-Idaho M. Co., Ltd., an Idaho company, has begun the driving of a tunnel to tap the Pliocene gravel channel, 1 mile north of here; W. W. Miller is Supt.

Pike, Nov. 1.

SISKIYOU COUNTY.

C. R. Weigel of Hungry Creek realized $100 from a 10-ton test of ore from the Sterling, Hornbrook.

The Money Maker Co.'s mill is running on $40 ore.

Hicks Bros., on China gulch, have a 4-inch stringer of $75 rock. They are in on it 100 feet.

A recent clean-up at the Jillson weighed eighty-five pounds after melting.

TRINITY COUNTY.

At the Lecompton mine the ledge is 2 feet thick and shows free gold and galena. The mine has been bonded to San Francisco men.

The new 10-stamp mill at the Brown Bear mine at Deadwood has started. Supt. Dobler is driving for the ledge in the lower tunnel. The new mill will be run on ore from the old workings.

TUOLUMNE COUNTY.

Lower Triumph tunnel, Carters, is in 55 feet on vein, latter carrying pay streak 2 feet wide. A hoist may be put up and sinking started.

At the Goldwin sinking is resumed.

A station is being cut and chute put in at 400-foot level of the Dreisam, near Jamestown; when completed, drifting will begin. Owing to inflow of water, drifts will be driven by hand drilling until shaft is unwatered.

The Jumper, near Stent, has resumed. Shaft has been retimbered from 600-foot level to near surface.

At the Phillips, near Ward's Ferry, tunnel is in 380 feet; a crosscut shows ledge to be 17 feet wide.

Thirteen men are employed at the Holmes.

The Spring Gulch, near Carters, will put in 60 H. P. engine and tramway.

The 20-ton cyanide plant at the Densmore, Jamestown, is completed. Main tunnel is in 500 feet.

Pease & Colby are pushing work on the Fleming, near Algerine. G. &. W. Smith & W. Sherer of Stockton have leased portion of the Fleming and will begin development. The Shawmut Co. will use oil as fuel in their new chlorination plant. J. Fisher, Pres. Golden Gate mine, Angels, says that twenty stamps will be added to mill, and that the chlorination plant will be enlarged, etc. The company has been reorganized and capital stock increased to 800,000 shares. A few men are working at the Manhattan of High Point M. Co. The new 10-stamp mill at the Willietta, Jacksonville, may be run with oil as fuel. Exploiting work at the Uncle Sam, near Arastraville, has stopped and machinery has been taken out.

COLORADO.

BOULDER COUNTY.

(Special Correspondence). — The Wall Street G. M. & M. Co., composed of Providence, R. I., people, is reported to have subscribed $125,000 to be expended in erecting a custom reduction plant at Wall Street, in which Robinson & Greenawalt's electro-chlorination process will be used.

Ward, Nov. 3.

The new shaft on the Chief Big Finger, Ward, is down 75 feet, and in the new drift 3 feet of milling ore shows.

A 6x8 4000-pound steam hoist, Vulcan pattern, and 30 H. P. boiler will be put in on the Apex group, on El Dorado mountain, M. Brooks manager. Two shifts will be put on and work will be pushed. Work on a 45x24-foot shaft house is in progress.

At the Silent Friend, Ward, sinking of the main shaft, driving of tunnels, etc., are being pushed.

CLEAR CREEK COUNTY.

(Special Correspondence). — The Colorado & California Share Holders' Co., under the management of W. H. Knowles, is milling fifty tons per day and shipping fifty to seventy-five tons per month of crude ore to the smelters, all from the Crown Point & Virginia mine, and 250 to 300 tons of concentrating ore from the Franklin mine. This company operates the Wilkie stamp mill and the Allen concentrator.

Shipments of ore are being made from veins opened by the Newhouse tunnel in ground under the Gem Extension workings, the latter being controlled by Idaho Springs parties. The extension of the great tunnel continues.

The Sun & Moon mine is sinking a shaft to make a connection with the Newhouse tunnel.

The Seaton mine employs fifty men. On this property considerable new work is in progress and exterior improvements have been made. The production has been increased and there is said to have been an improvement in the ore values.

Idaho Springs, Nov. 1.

(Special Correspondence). — A 400-foot upraise from the Knickerbocker tunnel to the bottom of the Emerson shaft has just been completed, and is regarded an interesting and intricate piece of work. The shaft, which was 400 feet deep, was badly caved and held considerable water, preventing co-operation through the shaft with work in the upraise. The upraise was made by hand drills, was well timbered as the work progressed, stations were made at each 100 feet, and the upraise struck squarely the base of the shaft and the connection was safely made. The work was done under the direction of Bert Ventress of Idaho Springs.

Idaho Springs, Nov. 5.

Ore carrying gray copper is reported to have been struck on the Tom Crowin, Astor group, near Georgetown.

CONEJOS COUNTY.

The sale of a group of claims for $60,000 is reported from Greyback mountain, to a company of Illinois men. J. Gandy says the company will ship ore and construct buildings, roads and a tramway to Greyback gulch.

EL PASO COUNTY.

Sinking is in progress on the Last Dollar, near Colorado Springs. A new $30,000 plant is completed and work will be pushed. It is reported that the company may declare a dividend.

FREMONT COUNTY.

The engine, pump and generator at the Union, Florence, are running. Work on the Rocky Mountain smelter is progressing.

The new plant of the Union Extraction Co., Florence, is completed and running; W. B. Milliken, general manager. The plant cost $300,000.

GILPIN COUNTY.

At the Pittsburg–Meeker, Central City A. Campbell Supt., a good strike of yellow and gray copper ore has been made in 400-foot level.

One hundred and fifty men are working at the Cook, and shipments of ore average between 250 and 300 tons per day; C. R. Colvin manager, W. Jelinek Supt.

At Central City the Cook, on Bobtail hill, has 150 men working. Daily production is from 250 to 300 tons. The ore is hauled bp electric motor to the new mill at Blackhawk.

The Fisk has fifty men working.

The Hamlet, on German mountain, near Central City, is leased. The lessees will begin development.

Sinking on the Daisy will be resumed.

Ore carrying a good percentage of gray copper and peacock iron has been opened up in the bottom levels of the Pittsburg–Meeker, Russell district.

The Running Lode, Blackhawk, Manager Dunstone, will begin sinking about Dec. 1st. Thirty men are employed.

M. Rosetti is driving a tunnel on the Busy Bee, Apex.

The following are incorporated: Cleveland Deep Tunnel Co., capital $50,000; Metal Miners' Corporation, capital $500,000; Boston & Denver Con. M. & M. Co., capital $5,000,000.

H. J. Stephens is pushing development on the Queen of the West, in Chase gulch, on the third, fifth and seventh levels.

The Cayuga Lake M. Co. is in 875 feet in its Advance tunnel; F. Owen Supt.

The Robert Emmett, on Maryland mountain, will resume.

Two shifts are working at the Virginia, Chase gulch. The shaft will be sunk to the 500-foot level. Drifting is progressing on the 400-foot level.

Ore from the Wautauga, Russell Gulch, is being hauled to Idaho Springs for concentration. Daily shipments average forty tons. Thirty-eight men are working on day and night shifts and more men may be put on soon; Supt. Clayton.

At the Pocahontas drifting is being done on the 300-foot east and west levels and on the 100-foot level.

Hall & Co. are down 40 feet on the I. X. L., in Russell district.

The new Boston & Denver Con. M. & M. Co. is the successor of the old Boston

& Denver M. & M. Co., and will succeed the latter in the management of the Gregory–Bobtail and Cook mines consolidation, and of the new Boston & Denver 80-stamp mill at Blackhawk; also of the Fish and Puzzle mines on Gregory mountain.

GRAND COUNTY.

The tunnel of the Colorado Fuel & Iron Co., Fierro, is in 400 feet. Three shifts are sinking at the Emma, Fierro. Progress is slow, however, on account of unusually hard ground. Works have been inclosed for winter operations and two pumps are kept running. Sinking is resumed on the Modoc group, Fierro, Supt. White. Twelve men are employed. McCargo & Henderson are putting in a whim at the Heartburn, Fierro, and will push work. The steam hoist at the Iron Head, Fierro, Gilchrist & Dawson operators, is completed. A spur to connect the mine with the Santa Fe branch near Anson S. bridge will be built.

GUNNISON COUNTY.

A strike of lead ore was recently made at the Climax, at the head of Cement creek, near Gunnison. Ore is steel galena, running 60% lead, 20 ounces silver and $2 gold per ton.

LAKE COUNTY.

(Special Correspondence).—The Iron-Silver mine, under the superintendence of T. E. Schwarz, is shipping from 5000 to 6000 tons of crude ore to the smelters and milling about eighty tons per day of the zinc-lead-iron ores by concentration. The zinc ore exports from this property amount to 200 to 500 tons per month. At the Stevens shaft, on this property, sinking and prospecting with diamond drills are in progress.

Leadville, Nov. 3.

No. 2 Weldon will resume operations this month. The surface plant at the A. V. is about completed and sinking will probably be started soon. Manager R. Harper is working six men on the Hall shaft of Crown Point property and is shipping twenty tons iron and two and one-half tons ore. At the Toledo shaft the lime rock has proven so hard that 225 drills per day are required to make headway. Average drive per day is 2½ feet. Shaft is down 230 feet. It is reported that the Vielle Montaigne Smelting Co. of Antwerp, Belgium, will erect a reduction plant on the Arkansas river somewhere between Leadville and Pueblo. Conservative estimates give 250,000 tons available argentiferous blende ores on dumps in and around Leadville.

Henderson & Munro are crosscutting on the Quaker City group, Leadville. Two new furnaces of Boston Gold-Copper Co. are under way and buildings will soon be completed. Manager Bailey, of Bailey G. & S. M. Co., is pushing development on Mt. Massive.

At the California Gulch, Leadville, drifts are now advanced north, south and west from 550-foot station. Cost of shaft up to date about $85,000. While the pumping plant is capable of handling 1000 gallons, mine is making less than 400. It is reported that another strike has been made in the Rubie. Drifting is in progress. Sinking in the Carbonate Hill property is in progress and will not be stopped until 600 feet is reached; a station is to be cut out at 540 feet and drift started westward. Shaft is down 450 feet.

The first motion hoist on the Wolftone is finished. The mine will be working next month.

A drift on the 426-foot level is being run on the O'Donovan Rossa and Arnold placer claims on Carbonate hill, Leadville.

Forty tons of good ore from the 660-foot level of the Fortune, on Little Ellen hill, are shipped daily.

Work on the 1100-foot level at the Small Hopes is progressing.

The Home Extension Co. is cutting a station and placing a pumping plant in position at the 300-foot level.

The Coronado M. Co.'s shaft is down 600 feet. At 50 feet farther is a known body of iron ore.

The new station pump for the Rialto Co., operating the Pyrenees, in Graham Park slope, is being put in position at a depth of over 1100 feet.

The report of the Marion Con. M. Co., Leadville, covering a period from 1894 to 1900, shows that 172,235.39 tons of ore were extracted, carrying an average assay value of 23.09 ounces silver per ton. At 62.02 cents per ounce, the average quotation for silver during the period named, gives a total value for the output of $2,466,482.78.

PARK COUNTY.

At the Sacramento, Fairplay, crosscutting is being continued and the vein is soon expected to be cut.

On the Big Seven the diamond drill has been driven over 300 feet below the bottom of the shaft, making a total depth of over 400 feet. The management will go down a few hundred feet farther.

PITKIN COUNTY.

Pumps from the old Argentum-Juniata, Aspen, have been put in on the 1060-foot station at the Mollie Gibson, in the same locality.

SAGUACHE COUNTY.

(Special Correspondence). — The San Luis Land & M. Co., purchaser of Baca grant No. 4, is erecting a mill which will be among the largest in the State, and is calculated that properties located on the grant and partially developed will furnish sufficient amount of ore to keep the mill operating. The company leases many of the mining claims of the grant to active miners.

Crestone, Nov. 2.

SAN JUAN COUNTY.

The five new boilers for the Gold King mill, Silverton, are about placed and it is expected that the new 80-stamp mill on Cement creek will be treating ores from the Gold King and the American within the next week or so. Pipe from the compressor to the drills, a distance of 1 mile, is being laid.

A night shift has been put on at the new Silver Lake mill, on Animas river, 2½ miles above Silverton.

Work on lower drift in the Daniel Webster is being pushed.

SAN MIGUEL COUNTY.

The Liberty Bell G. M. Co. is putting in forty additional stamps on its property near Telluride, making a total of eighty to operate, with a capacity of 250 tons of ore per day.

The cyanide plant of the San Juan Gold & Silver Recovery Co., capacity 200 tons per day, on Gold Run placer, is treating tailings from the Smuggler–Union and other mines, which have accumulated for the last fifteen years. In some places the tailings are 10 feet deep, and values run from $1 to $14 per ton. It is estimated that there are 300,000 tons on the property.

SUMMIT COUNTY.

It is thought that placers around Breckenridge, Blue valley, will be worked until the latter part of this month.

TELLER COUNTY.

(Special Correspondence).—The mines of the Vindicator Con. G. M. Co. produced, within the months of July, August and September, 1900, a total of 7545 tons of ore, the gross returns for which amounted to $239,150; freight and milling charges were $77,885, leaving net milling returns amounting to $161,264. The total mine expenses amounted to $64,463, leaving a net profit of $61,982, after paying $34,882 to lessees. Within the same period $11,859 was paid for equipment and $4049 was expended on buildings. The ore came from eight different shafts; and 106 tons of the product, worth $6873, consisted of dump washings. The two principal shafts, Nos. 1 and 2, are 800 and 400 feet depth, respectively, and it is announced that each one will be sunk 200 feet deeper. From the shaft No. 1 three different veins are opened, from which shipments are made; there are also three veins being worked through shaft No. 2. A new hoisting engine, 20x48 inches, carries a double-decked cage and is capable of working to a depth of 2000 feet. At the ore house is a device for washing a portion of the dump, the talc and fine material adhering to the waste rock being washed off and settled, the sediment containing high values. The Vindicator Co. is a heavy stockholder in the Union Gold Extraction Co., whose reduction plant is almost ready for operating; when it starts up Vindicator ore will be taken to it.

Independence, Nov. 1,

(Special Correspondence).—The Vindicator's production for October ran about 3000 tons.

Chas. J. Moore has taken a lease on a block of ground adjoining the Cameron townsite, which belongs to the Pinnacle Co., and is to pay 25% royalty.

The Bull hill properties of the Victor Gold M. Co., which formerly were large producers, were sold by the County Sheriff on the 2nd inst. to satisfy a judgment in favor of D. H. Moffat, which amounted to $154,659, Mr. Moffat being the only bidder. The property is well equipped with machinery and was one of the first that was developed on Bull hill. During the year it has operated at a loss.

Victor, Nov. 3.

Shaft of Tenderfoot Hill Con. G. M. Co., Cripple Creek, is down 215 feet.

The Piggott & Conklin lease of the Big Mike, on Squaw mountain, Cripple Creek, is sold to Illigan Leasing Co., L. Johnson, manager, for $30,000.

Specimens of charcoal are being found in the Elsmere No. 1 shaft imbedded in the breccia at depth of 235 feet.

The Rittenhouse Co., Cripple Creek, has a new ore house on Gold Hill.

The White & Reynolds lease on Eclipse No. 1 of New Haven Co. is to be transferred to Chicago M. & L. Co. Development work will be carried out by means of funds derived from sale of treasury stock.

Work on the Nickel Plate No. 4 will resume. A 50-foot drift will be run on 350-foot level.

The Marie M. Co. will put in another compressor and will sink shaft to 845-foot level.

Sinking on the Nellie V., Cripple Creek, will be continued from 325-foot level.

The St. John Bostwick, on Raven hill, is sold to J. W. Proudfit & Co., of Colorado Springs, for $35,000. Development will be pushed.

Sinking on the Clyde is resumed.

The Atlantis Mines Corporation has resumed mining operations on the Santa Rita. During suspension a station was cut on the 550-foot level. The company has put in a telephone system throughout the workings.

Recent chemical experiments made in destroying gas from the Moose, Victor, have been partly successful; gas is believed to be of carbonic acid character, while ingredients used in destroying it are composed principally of bioxide of sodium. The chemical was ignited and lowered in bucket to sixth level, and in the course of few hours made the mine tenable. On following day it was lowered to 1000-foot level, to which point experimenters could almost approach in bucket. Further advances have been made, but, despite several efforts, success has not been attained to extent which will permit entrance into drifts.

The Golden Cycle Co., Cripple Creek, now has 110 miners at work. Work is resumed in all parts of the mine, and output is averaging 125 tons milling ore per day.

The new plant for the Granite, on Battle mountain, is on the ground and construction is under way. Chief operations in mine at present are on the 9th level, where drifting is being done on vein.

The trouble at the Independence caused by search method put into effect some time ago was settled on 31st ult. at a conference of management of the company and a committee of the Miners' Union. Work was resumed at 3 P. M. 1st inst.

The Denver Times says that the Portland mine at Cripple Creek has been sold to an English syndicate, including the Exploration Co., the Venture Co. and Werner, Belt & Co. The price is given as $15,000,000. A new company will be organized to take over the property and its stock will be floated in London.

The foundations at No. 2 shaft of the Portland, Victor, are ready for the new hoist. Hoisting is expected to begin by Dec. 15th.

Operations on the Elkton have been suspended, and men are at work tearing down the old shaft and engine houses, to make way for the new.

IDAHO.

BOISE COUNTY.

The Golconda, near Idaho City, is bonded to J. C. Stout of Minnesota, to be operated this winter.

CUSTER COUNTY.

The Clayton M. & Smelting Co., at Clayton, Mgr. L. Greene, will close down its furnace to-day, having on hand and in transit 1,700,000 pounds high-grade lead-silver bullion. The plant has a capacity of fifty tons ore per day.

J. McGregor, manager Salmon River M. Co., Bay Horse, will continue development during the winter.

LATAH COUNTY.

The Chickasaw M. & S. Co. of Princeton, capital $50,000, is incorporated; trustees, H. W. Greenburg and G. H. Wright of Spokane, Wash., and W. J. Springer, A. B. Harris and C. W. Levis of New Hampton, Iowa.

LEMHI COUNTY.

D. L. S. Barker, owner of the Silver Belt, at the head of Rock creek, has started a crosscut to tap the vein at a depth of 200 feet.

OWYHEE COUNTY.

A. Berg of Silver City has made a strike on Florida mountain.

Work on the Poorman & Pauper mines, near Silver City, is reported resumed after an idleness of nearly twenty years. Improved methods and general prosperity permit of resumption.

SHOSHONE COUNTY.

On the Blue Grouse group, Wallace, development is being pushed.

Near Pierce the Mascot 9-stamp mill is the only one running at present.

Near Wardner the spur is being built from the Sierra Nevada tunnel to connect with the O. R. & N. Railroad, 4½ miles long. Supt. Ennerson has 125 men at work; he pays $2.25 per day.

The Ruth M. Co., Wallace, will work four men during winter. They expect to run a tunnel.

MICHIGAN.

HOUGHTON COUNTY.

In Houghton it is expected that the Tamarack shaft No. 5, at a depth of 4300 feet, will tap the lode about Jan. 1st.

MONTANA.

CASCADE COUNTY.

"The longest electric railroad in the world" is proposed from Billings to Great Falls—200 miles—to be operated entirely by electric power, supplied from generating stations on the Missouri and Yellowstone rivers.

FLATHEAD COUNTY.

The mill of the American Kootenai M. & M. Co., Libby, is running. It is expected that work will be carried on all winter; general manager, W. Beager.

GRANITE COUNTY.

The Lehigh, Sunflower and Blue Bell, on Franklin hill, near Phillipsburg, have been bonded by Eastern men for $15,000, and work is in progress.

LEWIS AND CLARKE COUNTY.

The Montana M. Co., in the report of its revenue account, shows a net profit for the half year of £9816 19s 9d. The 60-stamp mill was in operation during the half year and reduced 25,100 tons of ore; the twenty stamps of the 50-stamp mill were in operation three months, reduced 1370 tons, making the total for the half year of 26,470 tons of ore, which sent to the mills yielded in bullion, bars and concentrates (on realized and estimated realizable values) $158,027.78, average $5.97 per ton. The expenditure on mining, milling and prospecting operations amounted to $164,359.07, equivalent to $6.21 per ton, resulting in a loss of $6331.29, or an average of $0.24 per ton. From the 5th of April to the 30th of June, 1900, 33,168 tons of tailings were brought under treatment and produced cyanide precipitates, realizing as per smelter's returns, $110,820.63, average $3.34 per ton; expenditure, embracing the treatment and transport of the tailings and redemption of cost of the tailings plant, amounted to $50,659.48, equivalent to $1.52 per ton, net profit $60,161.15, average of $1.82 per ton. Compared with the previous half year the average realized value of the product ($3.34) shows an increase of 63 cents per ton, and the net profit ($1.82) an increase of 60 cents per ton. In his report to the directors, General Manager Burrell says: "The development work has been a continual series of disappointments. At the end of last year we found a small ore body 50 feet below the 1000-foot level in the No. 3 shaft part of the mine. This discovery gave us encouragement to push on below, but the ore did not extend more than 25 feet up or down. We then sank the No. 1 winze to the 1100-foot level, and extended the south drift 115 feet, going beyond the ore found 50 feet above, but failed to find any pay ore on this level. Our object in drifting within short distances in this part of the mine was to enable us to open for immediate extraction any ore we might discover, so as to keep the mill in operation. When the 1200-foot level was reached in this part of the mine, at 17 feet from the winze, the south drift undercut ore at two different places for a distance of 20 feet each on the level. It is here that we are making the most active efforts. South of the last point above mentioned we encountered a fault, throwing the vein 70 feet toward the hanging wall. Following the faulting plane to the east we re-encountered the vein, and while it is 65 feet wide between the walls, and not barren, no pay ore was found in this work. Owing to our want of success here and at other points in the mine, the 60-stamp mill was shut down on July 15th until such time as our development work shall discover sufficient pay ore to enable us to again resume milling operations."

At the head of Big Blackfoot river there are bodies of gold-copper ore. J. K. Waite, Sec'y Montana Copper M. Co., which owns the Marlinspike, W. J. Bryan, Copper World and other claims, says: "Although at present remote from the railroad, the veins of that district can be worked out at 30% of the cost involved in Butte. They can all be developed to great depth by tunnels; the country is heavily timbered, being within 3 miles of the Lewis & Clarke forest reserve, and there is abundant water power in the streams to operate. The principal leads are in Mineral mountain; the summit, 9000 feet above sea level, is granite. Under this is a belt 2000 feet deep, of copper-bearing rock, porphyry and gneiss, subdivided by strata of slate. Lund Bros., Dickson & Nelson have driven a tunnel 300 feet on the hanging wall and crosscut 120 feet to the foot wall. The mines are reached from Drummond by a wagon road to Kleinschmidt flat, on Cooper lake, to the Marlinspike."

Output from Elkhorn Queen, near

Helena, for last four months has averaged 1000 tons per month. Upon completion of additions to works at East Helena, force at this mine will be increased. Sinking is in progress. A shipment of fifteen tons of ore from the Howard, Helena, netted $1600.

MADISON COUNTY.

Men are at work in the Keystone and Strawberry mines near Pony. The raise between the lower and upper levels of the Strawberry has been completed and stoping is in progress. The mill has resumed.

The new 50-ton concentrator of the Red Chief M. Co., operating the Waterlode and Red Cliff mines, Red Bluff, is completed.

NEVADA.

WHITE PINE COUNTY.

(Special Correspondence).—The Jupiter group, heretofore belonging to L. S. Scott and W. J. Peters of White Pine, has been sold to a company, prominent in which are Byron E. Shear and E. P. Giroux of Denver, Colo., J. A. Snedaker of Denver having made the examinations for the purchasers. The property is said to embrace two ledges of ore carrying principal values in copper and accompanied by considerable gold. Active development is now in progress.

White Pine, Oct. 30.

The new mill at the Robust, near Ely, with crushing capacity of 120 tons crude ore daily, will run, it is said, by Dec. 15th.

HUMBOLDT COUNTY.

The Ogden Copper Co. of Ogden, Utah, capital $375,000, is incorporated to work the South Star, Capital, North Star No. 1 and other properties.

STOREY COUNTY.

Crosscut No. 2 on the 900-foot level at the Caledonia, Virginia, is in over 35 feet. Ore from the 900-foot level in the Overman runs $17.46 per ton, $8.27 being gold.

NEW MEXICO.

BERNALILLO COUNTY.

Work on the new mill of the Cochiti Reduction & Improvement Co. at Woodbury is being pushed.

DON ANA COUNTY.

At the Torpedo, Organ, work of pumping out south shaft is in progress. The new pump is satisfactory, it is said, having pumped out 14 feet of water in twenty minutes.

GRANT COUNTY.

The Summit group of lead mines, Cook mining district, has been sold to Fuller Bros. of Chicago for $75,000. The ore is a sand carbonate, with galena. The deepest shaft is 140 feet. F. A. Fuller will supervise the work of putting in machinery and beginning operations. Electric drills and machinery will be put in. A tunnel which will strike the ore body several hundred feet lower than present workings will be run.

The El Paso Co., operating the Othello and Desdemona properties, has thirty men at work.

The Deming M. & M. Co. has bought forty acres near Deming for a mill site. It is expected mill will be ready in January.

The Stenson mines, in the Florida mountains, are shipping ore to the Silver City smelter.

SOCORRO COUNTY.

Ore now being taken from the 9th level of the W. H. Martin Co. mine is yielding $500 to the ton, it is said.

In the Cochiti district work on Algodones smelter will commence soon. It is expected that within a month 300 men will be working.

STOREY COUNTY.

On the Utah, Virginia, surface tunnel No. 2 has been extended a total of 731 feet.

WHITE PINE COUNTY.

Final transfer of the Chainman mine at Ely to Eastern men is effected: selling price, $150,000—$50,000 cash, balance in two deferred installments. The new company is the Chainman M. & E. Co.; L. F. Shepherd, Supt.; F. D. Smith, mill Supt. It is estimated that the ore can be mined and delivered to the mill at $1 per ton. The cost of treating the ore by the plate amalgamation process and of cyaniding the tailings has been estimated by F. D. Smith to be $1.25 per ton. The company will have the present milling capacity increased to 125 tons per day and erect a 100-ton cyanide plant.

OREGON.

BAKER COUNTY.

Additional men have been put on at the Gold Ridge, White Swan camp, near Baker City.

The Little Giant, Sumpter, has resumed. The crosscut tunnel, now in 900 feet, will be extended to main ledge. Machinery for 20-stamp mill is on the ground, but same will not be put up until results of development are known.

It is expected to have a stamp mill on the Tammany by May 1, 1901.

GRANT COUNTY.

A hoist is being put in on the Red Boy, Granite, and sinking will be continued to 2000-foot level.

The Cougar, J. W. Larkin manager, has a number of men at work. The cyanide plant has capacity of 200 tons.

Men will be put on at the Little Giant and work pushed.

The Concord group, J. H. Robbins owner, is being developed.

A. J. Trimble of Sumpter has taken a bond on the Grizzly group and is working same.

GRANITE COUNTY.

J. G. McGuigan will resume work on the Alamo, near Grant.

J. T. Grayson will run a 3000-foot tunnel to tap the Gold Bug and other properties.

The Monumental (silver) may soon resume.

The shaft house on the Portland is completed; sinking is progressing.

JACKSON COUNTY.

The Roberts & Jillson, Henley, has produced $300,000 in last two and a half years. In past four months it has produced $200,000; fifty men employed. The La Flesh & Miner has struck rich pay shoot.

The Gold Hill Quartz M. Co. has resumed. At the Kublia lead has been struck running $100 to ton.

SOUTH DAKOTA.

CUSTER COUNTY.

(Special Correspondence).—David Jones recently shipped a car of ore from the Globe mine to Denver, Colo., as a test to aid in determining whether it were better to sell the product of the mine direct or ship to the smelters and pay smelting charges. The ore ranges in value from $15 to $20 per ton.

Custer, Nov. 3.

LAWRENCE COUNTY.

Colorado men have closed deal for the Dakota Maid, Deadwood, J. King owner; they will put in a cyanide plant. The British-American M. Co. of Detroit, Mich., will put in cyanide plant on the Bronson. The Elizabeth M. Co., now experimenting with cyanide process on ores from the Bismarck, may put in cyanide plant and a stamp mill.

PENNINGTON COUNTY.

The Keystone belt of ore begins 4 miles northwest of Keystone and extends southeast 20 miles, disappearing under the limestone near French creek. The principal mining companies at work in the Keystone district are the Holy Terror, Bismarck, Golden Return and Lucky Boy, east of the Holy Terror mine.

UTAH.

BEAVER COUNTY.

Ore on property of the Ben Harrison Copper M. Co., near Beaver, Beaver Lake district, assays 25% copper and $8.20 in gold to the ton.

JUAB COUNTY.

(Special Correspondence).—W. H. Brevoort of Cólorado has sold his interest in the Carissa mine, near Mammoth, to Eben Smith of Denver and H. E. Cary of Salt Lake City, who control the property.

Mammoth, Nov. 2.

The final payment of $18,000 on the purchase price of the Illinois group at Eureka by the Illinois M. Co. is made.

The Ridge & Valley and Gemini mining companies, owners of adjoining properties at Tintic, have arrived at a satisfactory agreement. At a recent meeting the Gemini Co. consented to the drawing of a deadline between the two, and to further payment of $7500 for ores extracted from the latter's ground.

Hannafin Bros. are pushing work on the Mountain View, near Eureka.

At a depth of 973 feet in the Swansea at Silver City 5 feet of carbonates are exposed. The rule has been that they have yielded $3000 per carload in silver and lead.

PIUTE COUNTY.

The Sevier Con. G. M. & Prosp. Co. of Ogden, capital stock $50,000, is incorporated to work the Pointer, Sevier Extension, Erie and the Erie Extension, in Gold Mountain district, near Kimberly.

Richfield and Kimberly are to be connected by telephone.

SALT LAKE COUNTY.

The Ben Butler, Supt. McQueen, is taking out ore from a 12-inch streak.

Supt. Nutting of Bingham C. & G. Co.'s smelter, Bingham, reports all materials for the new plant are on the ground ready for construction.

The Dewey mill, Bingham, is running on ores from the Nast and other properties near there.

Bullion output for October at the Highland Boy smelter is reported at nearly 600,000 pounds.

At the Aurora, Marysville, ore has been struck running $10.80 gold, with a small amount of silver, to the ton.

SUMMIT COUNTY.

Sinking on Ontario shaft No. 3 will be continued to the 200-foot level.

J. Boyle of Park City will put in a 50-ton matting plant for the Valeo, near there.

TOOELE CO.

Material for the new roasting plant at the Sacramento, Mercur, is on the ground. Manager McConaughty will push construction to have the furnaces lighted up within the next sixty days.

On the 400-foot level of the Showers Con., Diamond, Tintic district, high-grade copper ore has been opened up. The new air compressor and drills will be started up and sinking resumed.

It is stated that the old Copper Plant, J. P. Channing manager, will resume.

The new ore bins at the Star Con., Tintic, are completed and extraction of ore will be resumed.

During October the Con. Mercur, Mercur, produced 30,699 tons ore—an average of nearly 1000 tons per day.

WASHINGTON.

FERRY COUNTY.

The Mountain Lion, Republic, has suspended operations.

Development is progressing at the Quilp.

At Republic the shaft at the Alpine, now down 50 feet, will be continued to the 300-foot level.

Supt. Nickerson of the Butte & Boston, Republic, has struck 2½ feet of good quartz in a 30-foot drive in the hanging wall.

By the partial closing down of the Mountain Lion, Republic, fifty men are out of employment. Twenty-five men are at work drifting on east ledge.

The shaft of the Tom Thumb is to be sunk to depth of 450 feet.

OKANOGAN COUNTY.

The American Flag G. M. Co. will put in a stamp mill on Goat creek, near Winthrop, by next spring. The size of the mill has not been given, but it is said that it will be either a 20 or 40-stamp mill.

It is stated that the War Eagle, Loomis, will be worked through Palmer mountain tunnel. This will tap War Eagle vein at 800 feet depth, and will save expense of hoisting and a 2-mile wagon haul to mill.

SNOHOMISH COUNTY.

Development work will be started on the Mountain King group, near Index, by Tacoma men who recently took it under bond for $15,000.

In the face of the 4½-foot tunnel at the Kittanning, Index, 30 inches of high-grade chalcopyrite have been opened up.

WHATCOM COUNTY.

Mr. Slanislawski, owner of the Post–Lambert properties on Lone Jack mountain, Mount Baker district, is making improvements and expects to continue during the winter.

FOREIGN.

AUSTRALIA.

At the Gold Fields of Victoria, Bendigo, in crosscutting on the 1030-foot level, several spurs were opened up, average width 7 feet, running 8 dwts. to the ton.

BRITISH COLUMBIA.

The tunnel on the Review, near Bolster, in 650 feet, is expected to strike the vein within 50 feet. If the vein shows well, a mill may be put in.

Work on the Buckhorn will continue during the winter. Two shifts are driving the 400-foot crosscut tunnel.

The Phœnix, near Canterbury, will run a 200-foot crosscut.

Sixteen men are working on the Paradise, on Spring creek.

Thirty-eight tons of ore from the Rambler–Cariboo, Slocan, recently returned $14,568.20 to the ton, or 54.9 ounces gold and 63.3% lead per ton. The main drift, to be completed by next May, will be 2000 feet long. It is said that a concentrator will be put in.

There are two grades of free-milling ore found near Ymir. The first, from the Ymir, carries considerable galena with quartz and is about 75% free milling. By a combined amalgamating and concentrating plant, however, only 2% or 3% is lost. The Porto Rico ore is free milling in about the same proportion, but galena is absent, being replaced by iron sulphides.

The main shaft on the Greyhound, near Greenwood, is down 135 feet, and will be continued to the 200-foot level. The tunnel on the Great Hopes is in 345 feet. On the No. 2 and the No. 3 veins on the Morrison, drifting is in progress.

Operations at the Le Roi, Rossland, are to be pushed by Manager B. Macdonald. A new five-compartment shaft will soon be completed to the 900-foot level and a plant put in; cost about $250,000.

The King Solomon Co., on Woodberry creek, Slocan, has twenty-five men working. It is expected that the Ivanhoe mill will soon start up. Power hoists will be put in on the Iron Mask and the Lucky Strike, Kamloops, and monthly shipments made. Operations on the Empire group have stopped for the season; 210 feet of crosscutting and 40 feet of drifting along second lead had been done up to the time of stoppage. It is reported that a 6-foot ledge of solid galena has been struck in the Aurora, across the lake from Moyie, East Kootenay.

The St. Eugene Con. 400-ton concentrator, Whitewater, is running to its full capacity and turning out 100 tons of concentrates every twenty-four hours. It has recently received further order for 2500 tons of concentrates from Guggenheim Bros., Antofogasto, Chile.

There are 350 men employed in Trail smelter and payroll runs $27,000 per month. When capacity of smelter is doubled, the plant for which is now being put in, the payroll will be increased.

It is reported that tin has been found on the Dayton group, 5 miles from Kaslo.

At the Ymir, near Ymir, eighty stamps are dropping, crushing 200 tons ore per day, netting $5.50 per ton; capacity may be increased to 160 stamps.

The Granby smelter, Phœnix, Supt. Hodges, recently treated 616 tons ore from the Knob Hill and Old Ironsides in one day, being 116 tons over normal capacity. Ores from these mines are self-fluxing, which accounts for big run.

J. B. Charleson, Supt. of construction Quesnel–Dawson telegraph line, reports line complete and in working order to a point 570 miles north of Quesnel.

The Leo Gold Mines Co., Ltd., J. Moran Pres., have resumed operations near Hall.

The new compressor at the Nickel Plate, Rossland, will be running in the near future. Building is well under way.

Work on the new smelter of the British Columbia C. Co., Greenwood, P. Johnson Supt., is progressing; it will be completed next month.

Operations on the Empire group, Lardeau, have ceased for the season.

R. Dore is working his nickel claim on Wild Horse, East Kootenay.

The Society Girl will ship during the winter.

The Paradise group, Windermere district, Manager Bruce, will continue operations during the winter.

Coryell Bros. of Grand Forks have been given contract to furnish 80,000 bricks for Mother Lode smelter at Greenwood.

The B. C. is shipping 1000 tons of ore per week.

A small pumping plant will be put on the Carmi, near Greenwood, and work will be pushed during the winter.

Drifting on the 300-foot level of the Brandon and Golden Crown is progressing; G. H. Collins, managing director.

After a two years' shut-down, the Salmo Con. G. M. & D. Co., 10 miles from Salmo siding, in Nelson mining division, will resume.

A strike has been made on the Snow King group, on La France creek, 8 miles south of Pilot bay. Ore carries gray copper and ruby silver; T. Wall, owner.

An electric light plant will be put in at the Sullivan, East Kootenay.

The Yankee Boy and Yankee Girl group on Hardy mountain, near Grand Forks, are shipping ore to the smelter at that point.

J. Hamilton has resumed development work on the Betts & Hesperus group. Ledge is 20 feet wide and has been opened up by cuts and 30-foot shaft.

The Snowshoe, in Wellington camp, will soon begin shipping ore to the Granby smelter.

Lower tunnel at the Douglas–Hunter, Rossland, is in 540 feet.

Shipments of ore from the Brandon and Golden Crown, Greenwood, G. H. Collins managing director, will be suspended until completion of British Columbia Copper Co.'s smelter and of the Standard Pyritic smelter, near there. Development is progressing on the 300-foot level.

BRITISH GUIANA.

For mining purposes British Guiana is divided into five districts. The local mining laws provide that no placer claim shall exceed 1500 feet in length or 500 feet in width, and that no person shall hold more than five placer claims in one district. The Government royalty is 90 cents on each ounce of gold and 4 cents on each ounce of silver.

LOWER CALIFORNIA.

At San Diego C. Benton says he has

bought from J. Brophy and associates the San Fernando group of copper mines, 70 miles south of San Quintin, for P. Burns of Canada, W. R. Ramsdell of Helena, Mont., and others.

MEXICO.

(Special Correspondence). — The Paso City Copper Co. of El Paso, Texas, has been incorporated under the laws of Arizona to develop the General Guerrero and other properties in the State of Chihuahua and elsewhere. Capital stock, $100,000; A. Emig, president; H. E. Runkle, secretary.

El Paso, Texas, Nov. 3

The New Mexican Rosario M. Co. of Nieves, Zacatecas, will put in new hoisting pump on its property near there.

The Las Guijas (silver), owned by M. Villegas, is sold to Los Angeles men, who will erect plant on property.

Torrington, Conn., men have secured bond for six months upon the Nieves Con., and are pushing development work.

The mines at San Miguel de Mezquital, 45 miles from Nieves, have been closed down since September, 1898, when they were washed out by inrush of water at the rate of 1000 gallons per minute.

The Angelica (copper and silver), 15 miles from San Gabriel, State of Durango, has been bought by a Carnegie, Pa., company, which lately bought the Voluntad de Dois (gold) in that vicinity. A. C. McCaughan is Supt. both properties.

The Chihuahua Enterprise asserts that the Rosario mine, at Guadalupe y Calvo is sold to W. A. Clark for $50,000.

SOUTH AFRICA.

The delay of Roberts in closing up the Boer war has been so prolonged that April 1st or July 1st is the best now looked for. Gen. Roberts allowed twenty men to enter Johannesburg for the purpose of looking after the mines. Pumping had been commenced at some of the mines, but according to the latest advices this had been stopped owing to the difficulty of obtaining supplies from the coast. The fact is that Roberts' forces require all the facilities the railroads can furnish, and the mines must wait until the armies have returned to the coast.

A Chicago firm which has had on its hands mining machinery for the Transvaal, ordered before the war began, has instructions to start it, and $2,000,000 in South African gold is reported on its way to this country to pay for more machinery for the Rand.

THE KLONDIKE.

As a result of the first auction of Crown claims in the Klondike, out of 300 claims offered for sale, 200 were sold at prices ranging from $1 to $1350, the latter price being paid for a claim on Gay gulch. The sale realized $19,500. The balance of 5000 claims will be offered for sale this month, and, if not sold, opened for relocation. Dawson welcomes the order of the Government abolishing Crown claims. In the future claims abandoned by their owners will be subject to relocation and will not revert to the Crown.

Catalogues Received.

D. Hug, manufacturer of the Hug water wheel, Denver, Colo., has issued a new catalogue, describing this wheel and its work and giving data of interest to those utilizing water power.

"Giant Air Compressors and Giant Rock Drills" is the subject of the latest catalogue issued by the Compressed Air Machinery Co., 11–13 First St., San Francisco, profusely illustrated and descriptive of the different sizes and styles of their manufacture, with double cylinder, single and double drum hoists, pneumatic tools and other specialties made and furnished by the company.

Westhinghouse railway motors are finely illustrated and described in the latest brochure issued by the Westinghouse Electric & Manufacturing Co. of Pittsburg, Pa., the types treated having been given the test of working operation. The concluding part of the handsome treatise depicts typical railway power-house installations supplied with both direct current and polyphase systems. Copies of the pamphlet will be mailed to officers of electric railways, consulting and contracting engineers, and others interested, upon application.

Books Received.

"A Handbook of Rocks, for Use Without the Microscope," is the title of an octavo of 185 pages by James Furman Kemp. The book is worthy of the author, and should be of value to beginners. All its contents, except the glossary, have been published before, and here appear in convenient form. Published by D. Van Nostrand & Co., New York City; price, $1.50.

Personal.

HORACE F. BROWN is at Lillooet, B. C.

G. CROSS of Salt Lake, Utah, has gone to Mexico.

G. B. NORMAN of Salt Lake, Utah, has gone to Arizona.

W. C. WYNKOOP of Bland, N. M., has gone to Chicago.

F. RICHMOND of Salt Lake City, Utah, has gone to Denver, Colo.

R. MILLET of Salt Lake, Utah, goes to Australia and New Zealand.

T. THORNTON of Chloride, Ariz., has gone to Cripple Creek, Colo.

W. H. BRAVIN is manager Tulloch-Magruder mine, Angels, Cal.

J. SHERLOK, Bland, N. M., has returned there from California.

LUDWIG MOND is examining mining property at Sudbury, Ontario.

J. J. CRAWFORD has returned to San Francisco from Placerville, Cal.

D. C. JACKLING has returned to Republic, Wash., from Spokane, Wash.

JNO. TREWEEK, former Supt. Mercur, Utah, mine, has gone to South Africa.

W. WOLF of the Ruby, Nevada City, Cal., has returned from San Francisco.

J. S. HANNA of the Sacramento M. Co., Eureka, Cal., has gone to Bloomington, Ill.

ELISHA HAMPTON succeeds F. M. Manson as Supt. Banner mine, Nevada county, Cal.

H. P. GORDON has returned from Nome. He says "California is good enough for me."

C. S. WHITWER, vice-president Spencer Con. M. Co., Seattle, Wash., has gone East.

RICHARD A. PARKER of Boston is examining mining property at Bingham, Utah.

C. J. DEVEREAUX of Boston, Mass., of the old Mercur Co., is in Salt Lake City, Utah.

J. H. PIERCE, formerly of the Alaska, Tintic, Utah, has returned there from Nome.

SUPT. PORTER, Mutual mines, Sutter Creek, Cal., has returned there from Oregon.

C. R. CLAPP, Treas. and Wm. Jenks, Supt., Jura-Trias Cop. Co., Toledo, Ohio, are in Utah.

G. E. TOMLINSON is now chemist and assayer Copper Queen Con. Copper Co., Bisbee, Ariz.

E. A. DAVIS, Supt. Ribbon Rock, Placerville, Cal., has returned there from Redding, Cal.

L. D. CLOUD of the La Democrata mine, Mexico, has returned there from Nogales, Ariz.

RICH. STANFORD is examining some Tuolumne county, Cal., mines for a New York company.

J. W. NEILL, Manager Taylor-Brunton Sampling Works, Salt Lake City, Utah, is in California.

R. O. JENNINGS, manager Mount Sicker M. Co., Kimberley, British Columbia, has resigned.

C. W. RAYMOND has charge of operations of the Crystal Lake G. M. Co., Meadow Lake, Cal.

SUPT. J. A. KIRBY of the Daly–West, Park City, Utah, has returned there from Salt Lake City, Utah.

E. W. HEYL of Heyl & Patterson, Pittsburg, Pa., has returned from an extended European tour.

GENERAL MANAGER L. R. POUNDSTONE of the Densmore, near Jamestown, Cal., is in San Francisco.

F. H. HARVEY has returned to Galt, Cal., from an examination of the Banner mine, Nevada county, Cal.

CHAS. STEBBINS, a Cripple Creek mine operator, is in San Francisco to bond some California mining property.

E. T. WASHBURN, Supt. Lone Star mine, Bland, New Mexico, has resigned and has gone to Grass Valley, Cal.

J. A. RICE succeeds E. T. Washburn in the superintendency of the Navaho G. M. Co.'s Lone Star mine, Bland, N. M.

J. H. HENLEY, Supt. Ibex mine, Leadville, Colo., has gone to Chihuahua and Sonora, Mexico, on mining business.

B. MACDONALD, manager British American Corporation, Rossland, B. C., has returned there from London, England.

D. MCVICHIE, general manager Cochiti and Navaho mines, Bland, N. M., has returned there from Salt Lake City, Utah.

F. L. BARTLETT, general manager American Zinc–Lead S. Co., Canyon City, Colo., is convalescent after a serious illness.

A. SHARP of Rossland, B. C., has been appointed Supt. First Thought mine, Pierre Lake district, Washington, vice W. H. Manning.

WM. YOLEN WILLIAMS, manager of the Miners & Graves Syndicate of Rossland, B. C., recently made a tour of the mines of Colorado.

T. A. RICKARD AND J. H. HAMMOND were examining mines at Mercur, Utah, last week, the former going to New York City, the latter returning to California.

List of U. S. Patents for Pacific Coast Inventors.

REPORTED BY DEWEY, STRONG & CO.,
PIONEER PATENT SOLICITORS
FOR PACIFIC COAST.

FOR WEEK ENDING OCTOBER 30, 1900.

660,807.—GATE — H. Alten, Sebastopol, Cal.
660,612.—WEED DESTOYER—M. J. Anderson, Defur, Or.
660,715.—BREASTWORK—R. S. Anderson, Tacoma, Wash.
660,839.—WEATHER STRIP—J. E. Bundy, S. F.
660,947.—BURIAL APPARATUS—J. Carhart, Campbell, Cal.
660,890.—PLANTER—J. C. Colby, Visalia, Cal.
660,844.—GOLD SAVING APPARATUS—W. E. Darrow, Sonora, Cal.
660,789.—HYDRAULIC NOZZLE—W. A. Doble, S. F.
660,632.—BAND CUTTER—T. Elliott, Dallas, Or.
660,895.—TRUSS — J. Fandrey, Los Angeles, Cal.
660,794.—WEIGHING SCALE — Hanek & Hoepner, S. F.
660,957.—FOOT WARMER — Helena Hermans, Tacoma, Wash.
660,645.—TRACK BRAKE—Lowe & Meighan, S. F.
660,967.—NAIL—J. G. McGaughey, Spokane, Wash.
660,709.—FRUIT CLIPPER—N. B. McGhee, Orange, Cal.
660,734.—PIPE WRENCH — Nordham & Bramlette, Downey, Cal.
660,922.—DRAG SAW—J. H. Perkins, Seattle, Wash.
660,736.—LOCK — B. Phelps, Seattle, Wash.
661,022.—BICYCLE BRAKE—H. E. Pringle, Redlands, Cal.
33,475.—DESIGN—G. T. Willis, Fresno, Cal.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

ORE SEPARATOR.—No. 660,342. Oct. 23, 1900. J. P. Smith, Denver, Colo., assignor of one-half to A. H. B. Harenc and J. A. Lehrritter, of Salida, Colo. This invention is designed to separate heavy valuable portions of ore from their gangue and from other associated material as well as from each other. It consists essentially of transversely inclined shaking tables having longitudinally disposed guides, the ends of which lie in diagonal lines from one side to the other of the table; slime conveyors and movable hinged fingers at the end of the table opposite the receiving point; intermediate between the tables is a return conveyor which receives the pulp from the first table and has a movement independent of that of the tables. In conjunction with these tables is a mechanism for producing a shaking movement.

REMOVABLE VENTILATING PITCHER COVER.—No. 660,370. Oct. 23, 1900. A. Drennan, A. Smith and A. Graham, of Bodie, Cal. This invention relates to a device for preventing the access of flies and insects to pitchers and like containing articles, and a means for providing ventilation for the contents and removably attaching the device to the pitcher, so that they can be separated and perfectly cleaned. The device consists of a wire ring surrounding the pitcher between the swell of the body and outer curve of the top, this wire having angular bends at the rear, and it is thence carried up over the rear of the cover, the latter fitting the top of the pitcher. The bends are separated from each other to allow then to expand when the rim is to be removed, and coiled springs encircle that portion of the wire which extends horizontally over the rear of the cover adjacent to the handle. Each of these springs has one member attached to the cover and another member secured to the ring at a point between the rear portion and the angular bends so as to normally close the cover. An upwardly projecting loop serves as a thumb piece so that by pressure upon this the cover can be lifted to pour out its contents, the coiled spring yielding for that purpose and acting to again close the cover as soon as the thumb piece is released.

ALMOND HULLER AND SEPARATOR.—No. 659,801. Oct. 16, 1900. Walter G. Read, Colusa, Cal. This invention relates to an apparatus for removing the hulls from almonds and separating the hulled nuts from the unhulled nuts, hulls, leaves, sticks, etc., delivering the cleaned hulled nuts into a receptacle, the unhulled nuts into another receptacle, and the separated hulls, leaves, sticks etc., into still another receptacle. It consists of a cylinder or drum, a longitudinally journaled rotary shaft extending therethrough, means for delivering the unhulled almonds into the drum, beater arms fixed upon the shaft within the drum, with radial braces or arms in the receiving ends of the drum having their outer ends twisted or turned to present their edges towards the nuts so that the latter will pass readily through the drum. From this drum they are delivered upon a suspended shoe which has means for oscillating it, and a peculiarly constructed wire screen surface which allows the hulls to pass through while retaining the almonds thereon. Other screens and chutes are employed upon which the separated materials are received, and means for delivering them to their proper receptacles.

FRUIT PACKING FORM.—No. 660,362. Oct. 23, 1900. S. L. Casella, Alma, Cal. This invention is designed to provide an apparatus for rapidly filling baskets or packages with fruit, such as grapes, berries, etc., which are ordinarily packed into small veneer baskets. The apparatus consists of a rectangular frame having elastic metallic plates fixed and projecting outwardly in one direction, and these frames are approximately the shape of a basket which is to be filled. Between the plates is fitted a slidable block which may be moved to the top or bottom, with means for holding it in position. The frame is fulcrumed in a yoke, which yoke is fixed to the table or bench where the work is to be done, and the frame is turnable to reverse it, with suitable locking devices for either position. The frame being turned so that the plates project upwardly, the block or plate within the space enclosed by the plates drops to the lower side, and is there supported while the space between the plates is filled with the fruit. The basket is then inverted over these plates, and the device being reversed the basket is withdrawn and the movable plate acts as a follower to press the fruit into the basket as it is removed.

PIPE RIVETING MACHINE.—No. 660,542. Oct. 23, 1900. S. Foreman, Sacramento, Cal., assignor to Schaw, Ingram, Batcher & Co. of same place. This invention is designed for riveting large gas, water and other pipes which are laid in trenches, or other permanent resting places, and joined together to form a continuous pipe after the sections which are usually made in the shop are brought to the place where they are to be finally laid. The ends of the meeting sections are slipped one into the other, and holes being made through them, they are riveted by the use of a pneumatic tool, preferably operating upon the point of the rivet inside of the pipe. On the outside is a holder-on or anvil which presses against the heads of the rivets, while the inner end is being upset by the tool. In this invention a band surrounds the pipe extending on one side sufficiently to form a yoke to receive the holder-on and anvil, and these are secured to these projecting ends of the yoke so as to stand in line with the rivet while the latter is being headed. The device is easily turnable so as to advance the anvil to the next rivet and so on successively until all are riveted and the joint completed. The pipe thus serves to support the resisting anvil without any exterior support. The anvil itself is peculiarly made to extend out flush with the edge of the outer section of pipe and serves to close the two pipe sections together and make a tight joint without subsequent calking.

APPARATUS FOR MAKING SEAMLESS TOOTH CROWNS.—No. 660,319. Oct. 23, 1900. J. F. Twist, San Francisco, Cal. This invention is designed to form tooth crowns and to fit and adapt them to the position in which they are to be used. It consists of an apparatus for primarily shaping the crowns consisting of a series of dies, a supporting stand, a guide fitting the stand concentrically with the dies and punches by which the part to be shaped is passed through the successive dies until the desired form and size has been produced. The punches are guided by radially moving wings slidable in a casing and acted upon by springs so that they will fit any size of punch.

GATE.—No. 660,807. Oct. 30, 1900. Henry Alten, Sebastopol, Cal. This invention relates to improvements in gates such as are used upon farms. It consists of a hinged gate adapted to swing so as to stand transversely across the road which is to be closed, or by swinging to one side to stand parallel with the roadway and leave a free passage, and in combination with such gate, a mechanism by which the gate may be unlatched by a person approaching from either side, and mechanism by which the gate is caused to swing to either open or close. In conjunction with this is a latching device by which the gate is retained in either its open or closed position. These movements are all produced by a vertically disposed fulcrumed lever which acts to raise the latch, tilt the gate and cause it to swing. Connections are made between this lever and other levers located at the side of the road, and at a sufficient distance from the gate so that the approaching passenger can operate the levers and open it.

Commercial Paragraphs.

THE E. P. Allis Co. is supplying a 1200 H. P. Corliss engine for the plant of the Colorado Fuel & Iron Co., at Pueblo, Colo.

THE Frantz & McRay Co. are fitting up a new machine shop on Delgany St., Denver, Colo. All work will be done with electric power.

AN 18-drill air compressor of the Rand make has been shipped to Creede, Colo., for the Commodore mine. It is a cross-compound, with steam and air cylinders 24x14 inches each.

THE Colorado Iron Works have made a shipment of such machinery as will be necessary to rebuild the plant of the Cochiti Reduction & Improvement Co. at Woodbury, N. M.

J. GEO. LEYNER of Denver, Colo., is building a 16-drill, compound compressor for the Amador Copper & Gold M. Co. of Wallace, Idaho, whose mines are at Iron Mountain. This compressor will be belt-driven by a water wheel. Mr. Leyner also reports the sale of a 16-drill compressor and additional Leyner drills to the King of Arizona mine, at Mohawk, Ariz.

THE diamond drills of the M. C. Bullock Mfg. Co. of Chicago, Ill., have been awarded a gold medal at the Paris Exposition, the only diamond drill that received such award at that exposition. The company would be pleased to send any prospector or miner their complete diamond drill catalogue No. 33, upon application to their office, 1170–1172 W. Lake St., Chicago.

Latest Market Reports.

SAN FRANCISCO, Nov. 8, 1900.

SILVER—Per oz., Troy: London, 29¾d (standard ounce, 925 fine); New York, bar silver, 63⅝c (1000 fine); San Francisco, 63⅝c; Mexican dollars, 50½c.

The London Statist says: "As the silver in the reserve is now at an irreducible minimum, the whole of the further demand for rupees will have to be met by purchases of new silver. If India absorbed 60,000,000 ounces of silver in the past year of famine, what will it require in a year of prosperity? The world's production of silver is not much over 160,000,000 ounces, and India's requirements in the past year have been equal to nearly 40% of the total output. From the closing of the Indian mints until the current year India's purchases of silver were not more than about 15,000,000 ounces per annum. Now we have the prospect that the demand may be 60,000,000 ounces a year. It will be evident, therefore, that the Indian Government will be a constant and large buyer of the silver and that the price in the future will probably rule at a much higher level than it has done since the closing of the Indian mint."

COPPER.—New York: Lake, 1 to 3 casks, $17.00 cash; carload lots, 16.75; Electrolytic, 1 to 3 casks, 16.87½; carload lots, 16.50; Casting, 1 to 3 casks, 16.75; carload lots, 16.50. San Francisco: 18. Mill copper plates, 20c; bars, 22@23c.

LEAD.—New York, $4.37½; Salt Lake City, $4.00; St. Louis, $4.27½; San Francisco $5.00, carload lots; 5½c 1000 to 4000 lbs.; pipe 6¾, sheet 7½, bar 6c; pig, $4.70 @5.10. London, £17 11s 3d=3.76c per ℔.

SPELTER. — New York, $4.20; St. Louis, $4.05; San Francisco, ton lots, 5½c; 100-lb lots, 5¾c.

ANTIMONY.—New York, Cookson's, 10½c; Hallett's, 9½c; San Francisco, 1000-lb lots, 12c; 300 to 500 lbs., 13@14c; 100-lb lots, 15@18c.

IRON.—Pittsburg, Bessemer pig, $14.00; gray forge, $13.50; San Francisco, bar, per lb., 2½c in small quantities.

STEEL.—Bessemer billets, Pittsburg, $20.00; open hearth billets, $23; San Francisco, bar, 7c to 12c per lb.

TIN.—New York, pig, $27.50; San Francisco, ton lots, 30c; 1000 ℔s., 30½c; 500 ℔s., 30c; less, 31c; bar tin, ꝑ ℔, 35c.

QUICKSILVER. — New York, $51.00; large lots: London, £9 2s 6d; San Francisco, local, $48.00 ꝑ flask of 76½ ℔s.; Export, $45.

NICKEL.—New York, 50@60c ꝑ ℔.

MAGNESIUM.—New York, $3.00 ꝑ ℔.; San Francisco, $4.00.

ZINC.—San Francisco, 5¼c; slab, 5¾c; bar, 7c.

BABBITT METAL.— San Francisco, No. 1, 10c.

SOLDER. — Half-and-half, 100-℔. lots, 18.70c; San Francisco, Plumbers', 100-℔. lots, 15.85c.

ASSAY LITHARGE.—San Francisco, 10c ꝑ ℔, small lots.

BISMUTH.—New York, ꝑ ℔., $1.60 50-℔ lots; San Francisco, $2.50 to $2.75 ℔ lots.

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 30c to 35c.

PHOSPHORUS. — F. o. b. New York 50@60c ꝑ ℔.

TUNGSTEN.—New York, ꝑ ℔., 95c; San Francisco, $1.15.

FERRO-TUNGSTEN. — New York, 37%, 35c; San Francisco, 65c (60%).

FERRO-MANGANESE. — Pittsburg, 80%, domestic, $85, large lots.

PLATINUM.—San Francisco, crude, $17 ꝑ oz.; New York, $18.20 per Troy oz

POWDER.—F. o. b. San Francisco: No 1. 70% nitro-glycerine, per ℔., in carload lots, 15¼c; less than one ton, 17¼c. No. 1*, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1** 50%, carload lots, 11¾c; less than one ton, 13¾c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9½c; less than one ton, 11½c. No. 2** 30% carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9, in lots not less than 1000.

FUSE.—Triple tape, $3.60 per 1000 feet; double tape, $3.00; single tape, $2.65; Hemp, $2.10; Cement No. 2, $3.00; Cement No. 1, $2.65, in lots of 3000 feet and up.

CANDLES.—Granite 6s, 16 oz., 40s., 11¾c ꝑ set; 14 oz., 40s., 10½c.

CHEMICALS.—Cyanide of potassium, 98%–99%, jobbing, 32½@33½c ꝑ ℔.; carloads, 30@31c; in 10-℔. tins, 40c; sulphuric acid, 66% B, 2c ꝑ ℔.; soda ash, $1.60 ꝑ 100 ℔s. 58%; hyposulphite of soda, 2¾@3c ꝑ ℔.; blue vitriol, 5½@6c ꝑ ℔.; borax, concentrated, 7@8c ꝑ ℔.; chlorate of potash, 12@13c; roll sulphur, 6c; alum, $1.90@2.00; flour sulphur, French, 2¼@2½c; California refined, 1¾ @ 2c; nitric acid, in carboys, 8c ꝑ ℔.; caustic soda, in drums, 3@4c ꝑ ℔.; Cal. s. soda, bbls., $1.00; sks, 95c ꝑ 100 ℔s.; chloride of lime, spot, $2.50@2.60; nitrate of potash, in kegs, 8c; caustic potash, 10c in 40-℔. tins.

OILS.—Linseed, pure, boiled, bbl., 86c; cs., 91c; raw, bbl., 84c; cs., 89c. Deodorized Stove Gasoline, bulk, 14½c; do., cs., 20½c; 86° Gasoline, bulk, 21c; do., cs., 27c; 63° Naphtha or Benzine, deodorized, in bulk, per gal., 13½c; do., in cs., 19½c; Lard Oil, Extra Winter Strained, bbl., 70c; cs., 75c; No. 1 bbl., 50c; cs., 55c; Neatsfoot Oil, coopers' bbls., 60c; extra bbls., 65c; cs., 60c; No. 1 bbl., 52½c; cs., 57½c.

COAL. — San Francisco, coast, yard prices: Wellington, $9; Seattle, $7.00; Coos Bay, $5.50; Southfield, $9.00. Cargo lots, Eastern and foreign: Wallsend, $8.00; Brymbo, $7.50; Pennsylvania, hd., $14.00; Scotch, $8; Cumberland, $12; Cannel, $9.50; Welsh Anthracite, $12.00; Rock Springs, $8.50; Colorado Anthracite, $14.50. Coke, $16 per ton in bulk; $18 in sacks.

San Francisco Stock Board Sales.

SAN FRANCISCO, Nov. 8, 1900.

200 Belcher.....12c	100 Savage.....18c
200 C. C. & V.$1 05	200 Seg. Belcher.05c
100 G. & C......82c	500 Sierra Nev...25c
400 H. & N.....22c	100 Silver Hill...37c
300 Occidental...10c	500 Union Con...17c
200 Ophir......82c	

Recently Declared Mining Dividends.

	Payable.
Bunker Hill & Sullivan M. & C. Co., $21,000	Nov. 5
Swansea M, Co., Utah, 5 cents per share, $5000	Nov. 10
Rocco-Homestake-Nevada Co., Utah, 1½ cents per share, $4500	Nov. 10
Utah M. Co., Utah, 2 cents a share, $2000	Nov. 15
Daly-West, Utah, 25 cents per share, $37,500	Nov. 15

ALPHABETICAL INDEX TO ADVERTISERS.

(--) Indicates every other week or monthly advertisements.

A — PAGE.
Adams, W. J....13
Ainsworth & Sons, Wm....13
Aitchison Perforated Metal Co., Robert....15
Akers, Wm. A....13
Allis Co., Edward P....5
American Copper Mining & Extraction Co....14
American Diamond Rock Drill Co....9
American Injector Co....1
Ames. A. T....4
Atlas Pipe Wrench Co....11

B
Baird & Co., Henry Carey....17
Baker, E. D....1
Baker, F. D....1
Baker & Hamilton....—
Balliet, Letson....13
Barnhart, Geo. W....11
Bartlett & Co., C. O....18
Bell, J....13
Bell, Newton M....16
Benjamin, E. H....13
Birch & Co., W. H....15
Boesch Lamp Co....—
Bowes & Co....9
Box 376, Mining and Scientific Press....1
Bradley Pulverizer Co....6
Braun & Co., F. W....5
Bucyrus Company....8
Bullock Mfg. Co., M. C....9
Burlingame & Co., E. E....13
Burt Mfg. Co....—
Burton. Howard E....—
Butters & Co., Ltd., Chas....13

C
California Anti-Caloric Co....17
California Borax Co....17
California Debris Commission....7
California Perforating Screen Co....15
California Vigorit Powder Co....—
California Wire Works....19
Canton Steel Co....9
Cary Spring Works....10
Colorado Iron Works Co....8, 10
Colorado Midland Railway....15
Colorado & Southern Ry....15
Compressed Air Machinery Co....12
Con. Cal. & Virginia Mining Co....17
Copper King, Ltd....10
Cory, C. L....13
Crown Gold Milling Co....4

D
Davidge & Davidge....13
Davies & Co., D. Campbell....7
Dearborn Drug & Chemical Works....14
Denniston's San Francisco Plating Works....11
Denver Engineering Works....15
Denver Fire Clay Co....14
Denver & Rio Grande R. R....7
Deseret News Office....1
Detroit Lubricator Co....16
Dewey, Strong & Co....7, 14
Doble Co., Abner....9
Donaldson & Co, A. M....1
Dow Pumping Engine Co, Geo. E....—

E
Eby, Jno. D....11
Elkins, John T....13
Ericsson Telephone Co....1
Eureka Co....1
Evans & Co, C. H....18
Excelsior Redwood Co....—

F
Fairbanks, Morse & Co....6
Falkenau, Louis....13
For Sale....1
Fowler, G. C....—
Fraser, E. J....1
Fraser & Chalmers....15
Frue Vanning Machine Co....—
Fulda's Planing Mills....—

G
Garratt & Co., W. T....1
Gates Iron Works....2
General Electric Co....17
General Photo-Engraving Co....5
Gibson, Chas. B....13
Globe Engineering Co....17
Globe Iron Works....1
Gold & Silver Extraction Co. of America, Ltd....14
Goodell, Albert I....13
Goodyear Rubber Co....18
Gutta Percha Rubber & Mfg. Co....—

H
Haff, Edward L....13
Hallidie Ropeway....19
Hamilton Mfg. Co., Wm....18
Hanks, Abbot A....13
Harrigan, Jno....13
Harvey, F. H....13
Hayden & Co, J. M....7
Heald's Business College....7
Hendrie & Bolthoff Mfg. & Supply Co....3
Hendy Machine Works, Joshua....3
Hercules Gas Engine Works....18
Hersey, Clarence....13
Heyl & Patterson....5
Hirsching, H....14
Hoskins, W....14
Hooper & Co, C. A....—
Hug, D....12
Hunt, A M....13
Huntington, F. A....18
Huntley, D. B....13

I
Independent Assay Office....13

J
Jackson Drill & Mfg. Co....9
Jackson, Geo. G....12
Jackson Machine Works, Byron....18
Jeanesville Iron Works Co....14
Jeffrey Mfg. Co., The....16
Jessop & Sons, Ltd., Wm....9
Jewett, Daniel G....13

K
Kent Mill Co....7
Keuffel & Esser Co....14
Keystone Driller Co....8
Knight & Co....12
Koppel, Arthur....18
Krogh Mfg. Co....16
Kyle & Co, T. D....—

L
Lallie, J. S. J....13
Langley & Co., S. Thornton....1
Larkin Mining Co....17
Leffel & Co., James....12
Leschen & Sons Rope Co., A....6
Lexow, Theodor....9
Leyner, J. Geo....9
Link-Belt Machinery Co....11
Lloyd. Benj T....1
Luckhardt Co, C. A....13
Ludlow-Saylor Wire Co....12
Lunkenheimer Co....16

M
Macdonald, Bernard....13
Madison, Bruce & Sellers....1
Main Belting Co....11
Mammoth Garfield Gold Mining Co....17
Mandell, Frank C....13
Marina Marsicano Gold Mining Co....17
Mariner & Hoskins....14
Marion Steam Shovel Co....18
Mariposa Commercial & Mining Co....17
Marshutz & Cantrell....—
McFarlane & Co....8
Meredith, Wynn....13
Mine & Smelter Supply Co....3
Miners' Assay Office....18
Montgomery Machinery Co., J. H....11
Moore & Co., Chas. C....8
Morris, H. D. & H. W....3

N
National Iron Works....—
Nevada Metallurgical Works....13
New Process Raw Hide Co....—
Nicholson, Hudson H....13
Novelty Mining & Milling Machinery Co....6

O
Ogden Assay Co....13
Oregon Railroad & Navigation Co....15
Oriental Gas Engine Co....—
Osceola Con Mining Co....17

P
Pacific Coast Smelting & Refining Works....8
Pacific Tank Co....3
Paraffine Paint Co....8
Parke & Lacy Co....9, 19
Paul, Almarin B....7, 13
Pelton Water Wheel Co....12
Penberthy Injector Co....16
Pennington & Sons, Geo. W....—
Perez, Richard A....18
Peterson, L....16
Phillips & Co., Alvin....14
Pneumatic Cyanide Process Co....14
Postlethwaite, R. H....13
Powell Co., Wm....16
Price & Son, Thomas....13

Q
Quick, Jno. W....15

R
Rand Drill Co....9
Rank, Sam'l A....13
Reade, Frank....13
Reckhart, D. W....13
Richards, J. W....13
Risdon Iron Works....2
Robins Conveying Belt Co....11
Roebling's Sons Co., John A....—
Roessler & Hasslacher Chemical Co....14
Runkle, H. E....1

S — PAGE.
San Francisco Novelty & Plating Works....15
San Francisco Pioneer Screen Works....15
Schaw, Ingram, Batcher & Co....11
Schilling & Sons, Adam....18
School of Practical Mining....13
Selby Smelting & Lead Co....8
Shaw, Willis....9
Shepard & Searing....15
S. H. Supply Co....1
Sierra Nevada Silver Mining Co....17
Simonds, Ernest H....13
Simonds & Wainwright....13
Situations Wanted....1
Smidth & Co., F. L....17
Smith & Co., Francis....1, 10
Smith & Thompson....14
Smooth-On Mfg. Co....—
Snedaker, James Angus....13
S. O....1
Star Drilling Machine Co....—
State Ore Sampling Co....14
Stevens, Ralph E....13
Stillwell-Bierce & Smith-Vaile Co....8
St. Louis Sampling & Testing Works....14
Sturtevant Mill Co....—
Sullivan Machinery Co....9

T
Tallon, C. J....1
Tatum & Bowen....11
Taylor Iron & Steel Co....16
Taylor & Co., John....14
Thomson & Boyle Co....7
Trenton Iron Co....16
Truax Mfg Co....17
Tyler, S. W....13

U
Union Gas Engine Co....4
Union Iron Works....19
Union Photo-Engraving Co....12

V
Van Der Naillen, A....13
Van Dieren, Hermann J....13
Van Slooten, Wm....13
Van Wagenen, Theo. F....13
Volger, Wm. B....11
Vulcan Iron Works....11

W
Wade & Wade....1
Walter, R. J....13
Weber Gas & Gasoline Engine Co....18
Weigele Pipe Works....—
Western Chemical Co....16
Westinghouse Electric & Mfg. Co....10
Wetherill Separating Co....14
Wigmore & Sons, John....7
Wimmer, Geo....15
Witte Iron Works Co....18
Wohler, Bartning Suc's....1
Wolff & Zwicker Iron Works....5
Wood, Henry E....14
Woodbury, Geo. E....—
Woodin & Little....—
Wynkoop, W. C....13

Y
Yawger, I. C....9

Z
Zeller, Geo. A....7

SITUATIONS WANTED.

ELECTRICIAN AND MACHINIST would like to get a place in the country or city or in mine; has the best of letters. Box 56. this office.

MINING ENGINEER (technical training), twenty years' experience as surveyor, assayer, superintendent and manager of mines and mills; business qualifications; linguist; at present general manager mining and milling proposition in Mexico; desires to make a change on account of health; best references. Address S. O., Mining and Scientific Press.

Mining engineer with ten years' experience in copper and lead mining, milling and smelting, desires to secure position as superintendent or manager of developing or producing property in this country or abroad. Good assayer, surveyor and bookkeeper. Address "Montana," care of Mining and Scientific Press.

Copper Blast Furnace Foreman. Experienced man wants position. A1 references Address "Copper," care of Mining and Scientific Press.

WANTED.

A Second-Hand Diamond Drill. Must be in first-class condition and complete in all respects. Address H. R., Mining and Scientific Press.

Superintendent of drift mine desires responsible party to join him in purchase of same. Complete outfit, water power, and on paying basis. $15.000 on easy terms. Patented. Principals only. Address "Superintendent," Box 46, this office.

WANTED—The address of Thomas Watts. bricklayer and miner, formerly of Butte, Montana, and Denver, Colorado. If dead or alive, any information will be thankfully received by Will B. Cameron, 409 Main St., Seattle, Wash.

Charcoal Burner wanted. Must speak Spanish and be capable of burning 1200 cords of mesquite per month into charcoal for smelting. Healthy part of Sonora, Mexico. Salary $100 gold per month. Only sober man need apply. References and record of experience required. Address C. Coal. this office.

INFORMATION WANTED regarding whereabouts of John R. Williams, about 70 years old. Last heard of as Supt. of a mine in Copper's Hill, Vermont, in 1866. Has an adopted son about 32 years old. Supposed to be placer mining in the West, possibly California. $25.00 reward at Deseret News Office, Salt Lake City, Utah.

REFRACTORY ORES WANTED.

1000 TONS or more which will assay $75.00 Gold per ton and over, delivered free of charge at San Francisco, Cal. Correspondence solicited.

C. J. TALLON,
308 MARKET STREET, SAN FRANCISCO, CAL.

WANTED.

Experienced Promoters
—AND—
Mining Share Operators
TO SELL THE SHARES
—OF—
MERITORIOUS, DEVELOPED, SHIPPING Gold and Copper Mines.
S. THORNTON LANGLEY & CO.,
Rossland, British Columbia.

Quicksilver

—FOR SALE BY—
The Eureka Company,
OF SAN FRANCISCO.
ROOM 1, - - 320 SANSOME STREET, SAN FRANCISCO.

FOR SALE.

Two Second-Hand PUNCHING MACHINES,
SUITABLE FOR PIPE MAKING.
FRANCIS SMITH & CO., 46 Fremont St., San Francisco, Cal.

FOR SALE.

A JACOBS CONCENTRATOR, been used about four months.

Also a fine O. & S. ENGINE, 25 H. P.

25 H. P. BOILER, used about six months, in good order and condition

Also a 40 H. P. ENGINE, now running and can be seen in motion.

Address E. D. BAKER, YREKA, CAL.

Second-Hand Mining Machinery and Supplies OF ALL KINDS.

Send for Catalogue.
THE S. H. SUPPLY CO.
22nd and Larimer Sts., DENVER, COLO.

FOR SALE.

Lease and Bond, Eighteen Months, Easy Terms, Copper Property, New Mexico.

High grade ore with good gold values. Accessible. Plenty wood and water. Strong vein. Three shafts. Will pay from start. Adjoins large producing mine. **H. B. RUNKLE, El Paso, Texas.**

FOR SALE.

One 10″x12″ Double Cylinder, Double Drum Mine Hoist.
One 14″x30″ Duplex Air Compressor, Corliss Steam ends.
Two 54″x16′ Return Tubular Boilers.
One No. 6 Llewellyn Feed Water Heater.
One 36″x9′ Air Receiver.
One Duplex Boiler Feed Pump.

All in good working order and nearly new. Also Rock Drills, Sinking and Station Pumps, Air Pipe, Ore Cars, Skips, Wire Rope, Blacksmith and Carpenter Tools. A bargain for anyone wanting an up-to-date mine equipment. Address Box 376, this office.

THE ERICSSON SWEDISH TELEPHONES HAVE BEEN IN USE OVER 20 YEARS. THEY ALWAYS TALK. GIVE THEM A CHANCE TO TALK TO YOU. CATALOGUES FREE.
ERICSSON TELEPHONE CO
20 WARREN ST. NEW YORK. N.Y.

WE BUY very rich Ores, Dental Scraps, Tellurium Ores, Mill Wastes, Jewelers' Sweeps, Gold Retorts, Old Iron Retorts, Base Amalgam, Quicksilver, Amalgamated Plates, Gold and Silver, Old Slags.

A. M. DONALDSON & CO.,
ASSAYERS AND WASTE PRODUCT SMELTERS,
1661 Larimer St., Denver, Colo.
Donaldson's Assayers' Slag Hammer { 1 lb......$1.10 / 1 lb. 3 oz. $1.25

BENJAMIN T. LLOYD, STOCKS, BONDS AND MINES.

Have immediate customers for well-developed Gold and Copper Properties.
P. O. Box 608, SALT LAKE CITY, UTAH.

AUTOMATIC SAMPLING
Mill Plans, Cyanide, Concentration, Smelter.
F. D. BAKER, Mech. Engr., DENVER.

DEWEY, STRONG & CO.
SCIENTIFIC PRESS PATENTS PATENT AGENCY
330 MARKET ST. S.F.

WEST COAST OF MEXICO.

WÖHLER, BARTNING Suc's, Mazatlan (Sinaloa), Mex.
Bankers, Importers, Exporters and Commission Merchants.

Representatives and Agents of the principal Mining Companies in the State of Sinaloa and the dependencies of the Pacific coast in the States of Durango, Chihuahua, Sonora, Lower California and Jalisco.

ORE BUYERS AND EXPORTERS. - MINING SUPPLIES.

SMOOTH-ON COMPOUND

TRADE MARK
AN IRON CEMENT

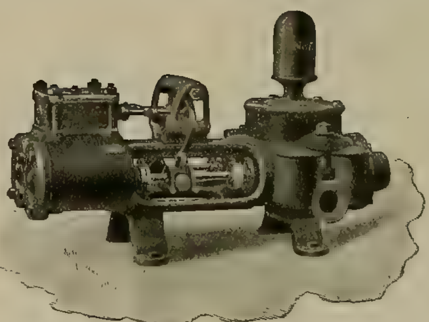
For repairing leaks or fractures in steam or hydraulic work. When hard it will withstand a red heat. steam, water or oil, and expands and contracts the same as iron, insuring a tight joint at all temperatures. Difficult flanged connections can easily be made with **SMOOTH-ON COMPOUND**, as it adapts itself to the flanged faces, whether parallel or not. Connections are easily taken apart. Unequaled for boiler patching.

Sole proprietors and manufacturers: Smooth-On Mfg. Co., Jersey City, N. J., U. S. A.

MESSRS. MADISON, BRUCE & SELLERS,
34-36 STEUART ST., SAN FRANCISCO, CAL.......................AGENTS FOR PACIFIC COAST.

The Canton Duplex Steam Pumps

For Mines, Elevators, Ice Plants, Water Works.



FIRE AND GENERAL SERVICE PUMPS OR BOILER FEEDING IN POWER PLANTS.

GLOBE IRON WORKS,
General Agents, STOCKTON, CAL.
—SEND FOR CATALOGUE.—

POINTS OF EXCELLENCE OF OUR NEW JACK-HEAD PLUNGER PUMP.

Pumps sand and grit without injury to cylinder.

Seldom requires packing and is easily repacked.

Forces water on the down stroke so does not require balanced bob.

Water column and pump rod can be made to perfectly balance.

Each pump is provided with an automatic air valve which relieves pump of air taken in when suction gets out of water.

Combines strength with lightness.

We make a specialty of pumps and would be pleased to forward to you our catalogue.
Send us your inquiries.

W. T. GARRATT & CO.,
Cor. Fremont and Natoma Sts.,
SAN FRANCISCO, CAL.

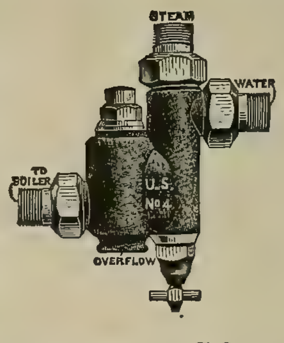
U S

The Drip=Cock

is an exclusive feature with our Injector. It prevents freezing, starts with lower steam, enables you to draw hot water when Injector is working, and gives many other points of advantage to the

U. S. AUTOMATIC INJECTORS

over all others. Our little "Engineers' Red Book" covers 500 points of interest to every engineer and tells all about our Injectors. Write for one.



AMERICAN INJECTOR CO.,
Detroit, Mich., U. S. A.

PUT YOUR ADVERTISEMENT

In the paper read by the men who buy the goods you have to sell. ☘ ☘ ☘ ☘ ☘ ☘ ☘

This Paper not
to be taken from
the Library.****

CALIFORNIA
STATE
LIBRARY

MINING AND SCIENTIFIC PRESS.
AND PACIFIC ELECTRICAL REVIEW.

Whole No. 2104.—VOLUME LXXXI. Number 20. SAN FRANCISCO, SATURDAY, NOVEMBER 17, 1900. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

Dredging for Gold.

ELEVATOR BUCKET DREDGE, "COL. GORDON," WORKING IN MONTANA.

The first elevator bucket dredger operated in the Northwest was built at Bannack, Mont., on Grasshopper creek, in 1895, by H. J. Reiling and others, was named the F. L. Graves, was rebuilt in 1896 and became successful in 1897. That same year the dredger A. F. Greater was built and was a success from the start. Then followed the dredgers Maggie A. Gibson, Bon Acord and Geo. F. Cope, all located on Grasshopper creek, below Bannack. These dredgers met with varying success. The Maggie A. Gibson ran into poor ground, was finally dismantled and moved to Ruby valley, Mont. There was practically no prospecting done in Grasshopper creek at Bannack, the creek being too wide to admit of tests, pitting or drilling. A. F. Greater felt sure there was gold there, for he had been there since the early 60's and had seen much gold taken out with the rocker and sluice box in the shallow workings. He secured favorable ground and made considerable money. The dredger Geo. F. Cope is now reported to be a success after a year's work in changing and reconstructing the machinery to adapt it to handle the ground in a proper manner.

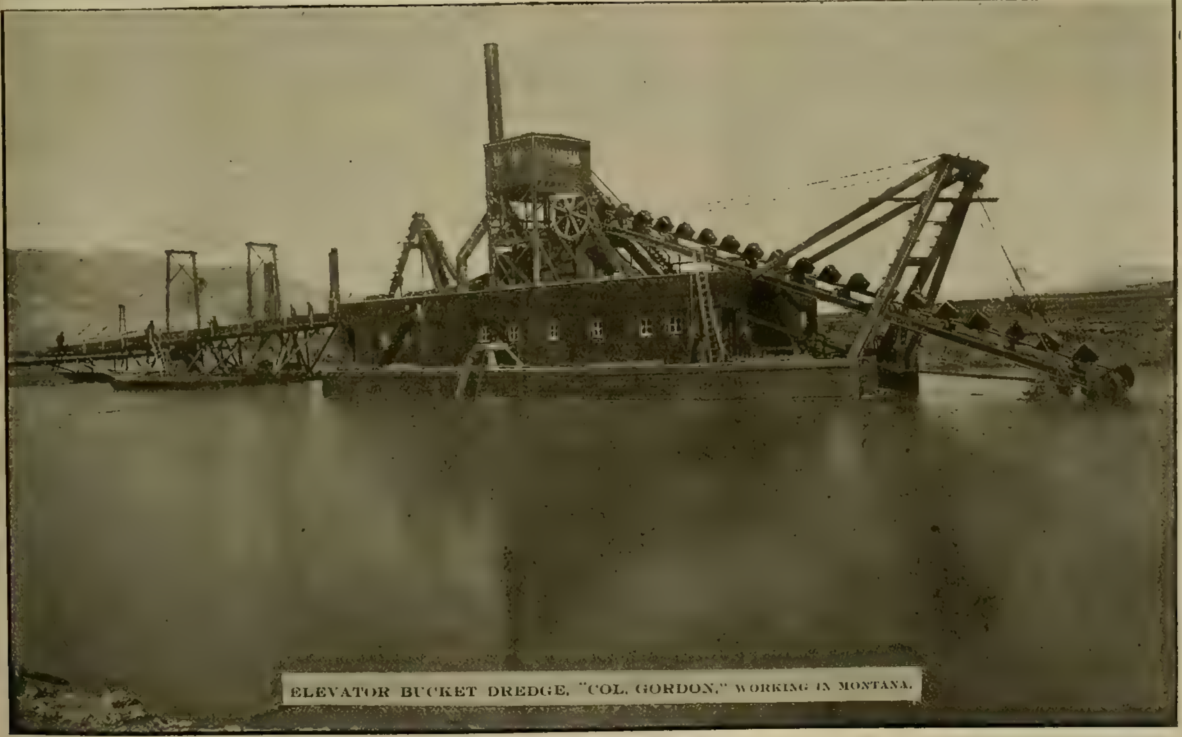
These particulars concerning the Bannack dredgers are mentioned to show the necessity of careful inquiry and study of conditions surrounding a placer property, as well as systematic and intelligent prospecting. During the past two years a number of elevator bucket dredgers have been put out in other States, and are under successful operation. The North American Gold Dredging Co. at Breckenridge, Colo., have two elevator bucket dredgers at work in 40-foot ground. The Boise Dredging Co. of Philadelphia have three elevator bucket dredgers near Centerville, Idaho, in the Boise basin, in 28-foot ground. These are all operated by electric power. The Horse Prairie Gold Dredging Co. have a new elevator dredger—the Isabel Brenner—in operation at Horse Prairie, 18 miles west of Red Rock, Mont. The Pacific Gold Dredging Co. of Chicago have a large elevator dredger near Salmon creek, Idaho, working on the McNutt placer grounds.

The Conrey Placer M. Co. of Boston, Mass., J. Baier Supt., have a large single lift elevator dredger, working in Ruby valley, at the mouth of Alder gulch, 7 miles from Virginia City, Mont., in 30-foot ground. Two views of this dredger, the Col. Gordon, in operation are given on this page, as built by the Vulcan Iron Works, Toledo, Ohio.

The Boston & Idaho Gold Dredging Co. of Boston, Mass., have operated a Risdon dredger at Idaho City for the past two years, having met with good success after the first few months of trial in 20-foot ground.

There are about twenty dredgers working in California, up the Sacramento valley, from Folsom, on the Feather river, northward. At or near Oroville there are nine dredgers, of which five are elevator dredgers.

The new Vulcan elevator bucket dredger is designed to be fitted with buckets holding 10 cubic feet each, to have capacity to dig 5000 cubic yards of material every twenty-four hours. This dredger will have about 300 H. P., will be equipped with modern engine power, surface condenser, steel gearing and sprocket wheels, steel tumblers and bucket chains, ball-bearing grizzly, steel sluice boxes and electric light plant, the hull to have water-tight compartments, length about 120 feet, beam 44 feet, draught 4 feet. The great aim is to secure careful survey of the ground to be worked and then build a dredger suitable therefor, to avoid the expense of changing and reconstructing the dredger after it has started to work, which is always painful and discouraging work. A dredger that will work successfully from the start is the one prized by those who invest in such ventures. Profits in elevator dredging depend on the richness of the ground and economy in operation.



ELEVATOR BUCKET DREDGE, "COL. GORDON," WORKING IN MONTANA.

MINING AND SCIENTIFIC PRESS.

ESTABLISHED 1860.

Published Every Saturday at 330 Market St., San Francisco, Cal.

ANNUAL SUBSCRIPTION:

United States, Mexico and Canada....................$3 00
All Other Countries in the Postal Union.................. 4 00

Entered at the S. F. Postoffice as second-class mail matter.

J. F. HALLORAN.................................Publisher.

Special Representatives:

EASTERN.
E. H. HAVEN....................150 Nassau St., New York City.
MIDDLE WEST.
CHAS. D. SPALDING.................153 La Salle St., Chicago, Ill.
INTER-MOUNTAIN.
W. A. SCOTT..................43 Jacobson Building, Denver, Colo.
SOUTHERN CALIFORNIA.
W. D. CURTIS..................223 W. Second St., Los Angeles, Cal.

San Francisco, November 17, 1900.

TABLE OF CONTENTS.

ILLUSTRATIONS.—Elevator Bucket Dredge, Col. Gordon, Working in Montana, 528. Lunkenheimer Automatic Injector; Armor Plates for the Protection of Shaft Timbers Where Blasting in Shaft Sinking, 532. Mining and Metallurgical Patents, 534. The Smidth Ballmill—Type A. Showing Grinding Plate and Sieve Arrangement; Type A, Showing Through Shaft; Smidth Automatic Ballmill Feeder; Smidth Ballmill, Type B, Showing Roller Bearing as Used on Type C, 535.

EDITORIAL.—Dredging for Gold, 528. The Mount Morgan Mines, Australia: Winter and Prospecting; State Mining Legislation; Nothing Wonderful—in California, 529.

MINING SUMMARY.—536-537-538-539.

LATEST MARKET REPORTS.—540.

MISCELLANEOUS.—Concentrates, 530. The Oil Fields of Kern County, Cal.; Leaching Copper Ores; Primitive Mining Methods in the Philippines, 531. Classifying Crude Oils; The Lunkenheimer Automatic Injector; Protecting Shaft Timbers When Blasting, 532. Some Questions Answered; Some Recent Additions to the Collection of the State Mining Bureau; Pyritic Smelting in the Black Hills, 533. Mining and Metallurgical Patents; Cost of Coal; Tempering Drills, 534. The Smidth Ballmill; The Power Behind Nature, 535. List of U. S. Patents for Pacific Coast Inventors; Notices of Recent Patents; Personal; Recently Declared Mining Dividends; Commercial Paragraphs; Obituary, 539-540.

"IT is snowing hard and the prospectors are coming in," says a letter from a Northwestern mountain town. In California the prospector in many localities can keep on through the fall and winter, but in many of the mountainous regions of the metal mining States his movements are governed by the snow. When it begins to disappear from the foothills in the spring he is off with his outfit and horse or burro, and through the summer is busy. When he starts he has mostly food supplies, cooking outfit, and a few simple mining tools; when he returns he has mostly samples of ore, and the local assayer is kept busy. He works through the winter, grubstakes himself or gets some one to put up for him and starts off again; he always sees riches ahead, and though those riches do not always materialize, who shall say that he does not get as much enjoyment from their prospect as the weary-eyed, overworked city man who ofttimes has the money without being able to stop long enough to enjoy a little of it. The prospector is the best friend of the miner, and of the man who makes mining machinery. He creates the domain that they enter into and enjoy. Upon his failure or success depends the prosperity of many people. He is the pioneer in all mining operations and is the faithful and efficient ally of everything connected therewith.

◆

UNIQUE among gold mines is the Mount Morgan property, Queensland, Australia. The receipt of the annual report of the directors recalls attention to this singular mine. Ten years ago the "mount" was about 1600 feet high, cone-shaped, made up mostly of finely comminuted matter. Working from the top downward, the hill is being dug away, in its entirety, being now cut down to about 1400 feet height. Every ounce dug out is treated, gold being disseminated throughout in particles even finer than in the banket of the Rand, South Africa. During the year for which the report was made out—June 30, 1899, to June 30, 1900—there were treated 239,276 tons. This was classified as 59.20% "low-grade oxidized ore;" 16.02% "medium grade oxidized ore;" 11.22% "high-grade mundic ore;" 13.56% "low-grade mundic ore." All the 239,276 tons averaged 15½ dwts. gold per ton—63.34 shillings, $15.41. Out of the year's receipts the company paid £350,000 dividends. The treatment process, technically considered, has been fully given in these columns. The supply of material to be so treated is the measure of the cubical contents of the mount itself. As the top of the hill is cut away and the men go deeper into the mass of the mount the material does not "grow rich with depth," as is so often said about a mine's workings, but appears to deteriorate. The average value of the ore treated in the past year was 1s 9d per ton less than the average value of the previous year's tonnage.

State Mining Legislation.

The several State Legislatures that will shortly convene have among their newly elected members many practical mining men fully acquainted with the needs and requirements of their constituents, and it is probable that some beneficial legislation will result therefrom this winter. In general it may be said, as of other governmental functions, that men are governed best who are governed the least, and ordinarily the best encouragement to the miner is to not attempt to hamper him with legislation. There are a great many absurd rules and restrictions that vex and annoy, and in this case, as in others, it is more a question of needs than of suppositions. To those, however, who realize how fast this west half of America is filling up, how greatly the ranks of working miners are increasing, and with what giant steps the mining industry is advancing, it will probably be apparent how necessary are some additional legal requirements concerning the owning and operating of mining properties. There are a great many suggestions sent in as to what is and is not required concerning such legislation, and among other recommendations from men who by reason of their positions and experience should know what they are talking about, it is believed that in the interest of the miner there are a few general measures that might with propriety be advocated.

Among the measures proposed are the creation of a commissioner of mines for each State and Territory, with due authority delegated to enforce sundry legal regulations for the removal of explosives from general supply stores in mining camps where there is no municipal law governing the storage of the same, or in mining camps not incorporated; that no engineer in charge of any hoisting works or who, in addition to other duties, hoists and lowers men shall be employed to exceed eight consecutive hours in each twenty-four; that no one under 18 years of age be so employed, and that any one acting in such capacity be required to have a license properly issued by a duly appointed board.

Regarding this last suggestion things are beginning to run somewhat loosely. It is conceded by all that the engineer, or call him what one will, the man who has charge of the lowering and hoisting of workmen in a mine shaft, occupies a very responsible position, one that requires considerable intelligence and constant vigilance, and to avert accident no one ignorant of at least the rudiments of the requirements of such a position should be so employed. Of all men the engineer should not owe a position to any "pull," and yet it now sometimes happens, as many miners know, that the man who has been tried in other positions around a mine, and who has demonstrated his inability or incapacity, is finally put to lowering and hoisting men and in charge of the engine. This, however, is likely to occur, only in a small mine in an isolated locality.

In California and Montana there is a compulsory system of mine bell signals which every engineer must observe in those States, and is supposed to know, though in some instances the supposition is not warranted. This comes under the head of the duty of the State to protect its citizens, even though some of those citizens may object to such protection.

Some other suggested requirements are that abandoned shafts, pits or other excavations likely to endanger the life of man or beast be properly covered over or fenced in; that in all shafts equipped with two cages no engineer shall hoist or lower more than one cage at a time; that the speed at which men are hoisted and lowered shall be regulated; that mines hoisting material from two or more levels shall employ a man as cager, whose duty it shall be to unload and attach, and give all signals to the engineer; that all mining superintendents make monthly or quarterly reports to the properly constituted State institution of the condition of the mine; that all working mines keep up a set of working maps, both plan and section, which shall be open to inspection by officers of the State Mining Commission, such maps to be compiled by a competent mining engineer at least twice a year; that local inspectors be appointed in the various mining camps whose duty shall be to examine into and report upon expenses when so instructed by the commissioner of the mine; that there shall be prohibited the use of iron, steel or other metal bar in tamping; that laddered ways be partitioned off and be separate and distinct from the main working shaft; that guard rails or gates be provided at station levels; that provision be made for leaving a pillar of ground around the main working shaft sufficient to insure safety; and that an official bureau of mining information be created, to which corporations and individuals owning mines should be required to make regular reports.

To these and such as these will be made considerable objection. It is not to be understood that this paper endorses all or any of the above suggestions. They are just what is found in the minds and on the tongues of a good many men everywhere throughout the mining region, and are here given place for what they are worth. That additional mining legislation is necessary is manifest because of the increasing importance of the industry, the greater number of men actively engaged in mining and because of the absence in so many cases of legal safeguards. In general, the objection to such legislation may be stated in the expression of opinion from some sources that it is not the business of the public nor is it the business of the State to attempt any parental supervision of such things, nor is it in accordance with public policy or requirements to compel any one to make report of his private business, or admit of its regulation.

The obvious answer to such objection would be that the State is paramount, that it is the duty of the State to make all required safeguard for the lives and property of its citizens and that the public have rights that must be respected; that when a portion of the public domain is given to any individual or corporation, the development of that part of the public domain entitles all those interested in mining to at least a general outline of results; that while it is not fair to the individual to expect that he shall give a detailed account of his private business, yet for the general good certain fundamental data and phases of development should be reported; that competition can in no way injure the business of the gold miner and that ordinarily where men are doing a legitimate business there is no objection to the affording of information as to development and operation generally.

It is also probable that there will be considerable brought up in the Legislature this winter of proposed mining legislation in the way of State and Territorial laws concerning the locating of claims, work thereon, etc. Inasmuch as federal mining law is supreme in all those cases, it is always well to have as few State limitations as possible, and it is a matter of necessity that any mining legislation be so fairly and plainly presented that its passage will not be, as in so many recent cases, the signal for universal demand for its repeal.

Nothing Wonderful==in California.

At the Humboldt County Bank there is a gold nugget—a chunk of virgin gold of irregular shape and knobby surface — whose longest axis measures 3 inches, with an extreme width of 1¾ inches and an extreme thickness of 1¼ inches. Its weight is a little over eleven and one-half ounces. It was picked up on the Peterson Bar mining claim, in Eddy gulch, a tributary of the North Fork of the Salmon, in Siskiyou county, and was sent to the bank for sale or deposit to the credit of the owner of the mine, C. A. Peterson of Rollins, in that county.—Eureka Standard.

The above is from a California "country paper." It is an ordinary notice that attracts little attention. But if such a "chunk of virgin gold" were "picked up" at Nome, or Tierra del Fuego, or some other far-off region of eternal ice and night, what a furore! How it would be photographed, and what columns would be written about so wonderful a nugget of gold! But in California it is just a common, ordinary eleven-ounce nugget, worth probably $200 or so, "picked up" in a placer claim, given a few lines in the local paper and taken as a matter of course, the same as the trees or the climate.

Concentrates.

SELENIUM is considered insoluble in liquid ammonia.

A REFINERY will be built at the Northport, Wash., smelter in 1901.

THE "Oregon Mining Stock Exchange" at Portland, Or., is comatose.

A CUBIC FOOT of dry oak wood weighs 59 pounds; of steel, 490 pounds.

A BELT pulls harder, or with less strain, with the grain side next the pulley.

BRITISH COLUMBIA smelters value copper in the ore at about $2.25 a unit.

TRY sal ammoniac in the boiler for boiler scale, if occasioned by carbonate of lime.

THE back pressure per square inch on the plunger of a pump that is raising water 175 feet is 75.6 pounds.

PROBABLY two-thirds of the copper now produced in the United States is refined by the electrolytic method.

TO THE 1st inst. the total gold output of Cripple Creek, Colo., has been $104,917,586. The October output was $1,956,900.

A SAW has recently been invented in San Francisco that will rip and plane lumber at the same time with one handling.

ARTICLES of a practical nature, illustrated or otherwise, of interest to miners or metallurgists, are always gladly received.

SUNDAY begins at midnight following the preceding day at the meridian of 180° east or west of the meridian of Greenwich, England.

FERRO-CHROME is a 50% alloy of iron and chromium, used in making shoes and dies for stamp mills and in the manufacture of tool steel.

THE ninth annual convention of the California Miners' Association will be held at Golden Gate Hall, 625 Sutter St., San Francisco, beginning 10 A. M., Nov. 19th.

A CUBIC FOOT of solid carbide weighs 137 pounds, and if of commercial purity would yield 685 cubic feet acetylene, having a thermal value of about 232,200 calories.

SEA WATER contains about 5 ounces salt to the gallon. At a temperature of 39.1° F. a gallon of sea water weighs 8.565 pounds. Sea water at sea level will boil at 213.2° F.

THE rocks forming the earth's crust have a density of about three times that of water, increasing with depth, the temperature rising about 1° C. for every 90 feet of depth.

IN the U. S. standard of board measurement, by 1000 feet is meant superficial feet, or the amount of lumber required to cover 1000 square feet of surface with boards 1 inch thick.

GOOD SALESMANSHIP is agreeable, adequate representation of goods in the presence of both goods and customer. Good advertising is the same thing in the absence of goods and customer.

SPECIALLY MADE gas engines are now built from 3 H. P. to 150 H. P., capable of producing from 50 to 1500 16-C. P. incandescent electric lights when belted to a dynamo of the proper capacity.

PROBABLY the next general improvement in the gas engine will be the more common use of high compression, which occasions increase in fuel economy, and, likewise, increase in the power of the engine.

THE calculated flame temperature of average coal gas burned in air is about 4860° C., or 5133° absolute. In the gas engine the rise in pressure does not indicate a temperature exceeding 1900° to 2000° C., absolute.

A single-acting pump is capable of doing good service, but it is to be borne in mind that for a given duty the water piston of such a pump must have double the area of a double-acting pump, assuming the strokes to be equal.

FOR marine boilers fusible plugs are made of Banca tin. Where it is desired that the fusing point shall be 200° F., the fusible compound may be tin 25 parts, lead 25, bismuth 50; where 208° to 212° F., tin 19, lead 31, bismuth 50.

IN the case of a boiler "72 inches diameter, double-riveted lap seam, $\frac{11}{16}$-inch rivets spaced 3 inches between centers, thickness of plate $\frac{9}{16}$ inch, of 60,000 pounds tensile strength," the safety valve should be set to relieve the boiler at 130 pounds.

WITH proper and necessary arrangement there is no reason why an isolated electric lighting plant should not work satisfactorily and economically. Any reputable electric supply company will gladly furnish full details and estimates of cost and results.

THERE is nothing in the U. S. mining law requiring the locator of a mining claim to make application for U. S. patent therefor. He can hold it for twenty years, if so disposed, by complying with all requirements pertaining to unpatented mining claims.

THE silver on an electro-plated plate wears off in a time directly proportionate to the grade of the ore run over it—the lower the grade the quicker the wear. Barren ore run over a well-coated copper plate will abstract some of the amalgam from its surface.

THERE are beds of rock salt near Danby, San Bernardino county, Cal. At Salton, in the same county, salt is produced by natural evaporation, and on the north shore of San Francisco bay about 10,000,000 pounds of salt are annually produced by evaporation of sea water.

IN a zinc-lead ore carrying iron sulphides there should be no serious difficulty in separating the latter by concentration, there being considerable difference in the specific gravities, and it is on this matter of difference in specific gravity that all ore concentration is based.

MOST men in putting on a new hoisting rope, flat or round, pass it through a bath of hot lubricant—a bushel of freshly slaked lime to a barrel of coal tar is a recommended mixture. If pine tar is procurable, tallow can be used instead of lime, as there is no acid in pine tar.

"CLEARANCE" in an engine means all the steam space between the valve and cylinder and between the cylinder head and piston when the latter is at the end of the stroke. Piston clearance is the distance the piston clears the cylinder head when the crank is on the dead center.

ABOUT 1,500,000 tons sulphuric acid were used in the United States last year. Of this amount 50% was used in the manufacture of kerosene, 35% in the manufacture of fertilizing material from phosphate rocks, 15% in the arts, galvanizing iron and steel, and dynamite manufacture.

CRIPPLE CREEK, COLO., is the greatest gold mining center in the United States; Butte, Mont., has probably the largest number of residents actually engaged in mining of any one American city; Houghton county, Mich., has about the greatest developed system of mining of any county on the continent.

WHETHER a steam engine will work better in the rain or the sunshine is a difficult question to determine. It is manifest, however, that the drier the weather the more liability there is to boiler scale, for in times of drought the water is drawn from lower levels, impregnated with mineral, in wetter seasons from surface or soft water.

IN nearly all forms of metal mining the British colonies in the South Pacific are prominent. As types may be mentioned: Mt. Morgan, gold mine; the Broken Hill Proprietary, silver; the Bischoff, tin, in Australia; the Mt. Lyell, copper, Tasmania. The Hartley & Riley, dredging, New Zealand, instances the profit in placer propositions.

FLAT WIRE hoisting ropes are in favor on the Comstock, Nev., at Butte, Mont., in Tintic district, Utah, and two or three other localities. Round ropes are in more general use. Flat ropes range in width and thickness from $2\frac{1}{2}$x$\frac{3}{8}$-inch to 9x$\frac{7}{8}$-inch. A round steel or iron wire rope, to hoist a 5000-pound load, should be not less than 1-inch diameter.

THE advantage of a compound over a simple engine is chiefly the reduction in cylinder condensation, thus making it possible to expand the steam to a lower pressure without loss, and, therefore, with a gain in power, thus enabling the compound engine to develop more power with the same weight of fuel, or the same power with less fuel than the single-cylinder engine.

REGARDING the silver yield of the Butte, Montana, copper mines, the silver deposits were developed mostly north of the west end of the copper area, where in former years large quantities of silver were produced. In the copper produced from the ores of the copper area about 3% of the value is in gold, and the average proportion of gold to silver by weight is $\frac{1}{200}$ to $\frac{1}{300}$.

THE "bucking and snorting and refusal to start" of the gas engine may be due to moisture in the cylinder, which often prevents regular ignition till dried by the heat of several explosions. By shutting off the water jacket a few minutes before stopping the engine, and not turning it on again till after the engine begins to explode regularly when again started, the difficulty may be obviated.

"DISPLACEMENT" refers to the quantity of liquid displaced by the immersed hull of a vessel, and "tonnage" to the freight-carrying capacity of the ship, determined by certain rules of measurement. The displacement of a vessel is the entire weight of the hull with all its contents, as a floating body displaces a weight of fluid just equal to its own weight. A ship sinks in the water to such a level that the pressure of the fluid displaced exactly counterbalances the weight of the ship.

NEXT to the Rio Tinto of Spain, which has produced copper ore for nearly 2000 years, the oldest producer of copper in the world is probably the Falugrufva mine, near the town of Falum, in central Sweden. The mine is first mentioned in public records in the year 1220, A. D., but is much older than that. The oldest privilege belonging to the mine is from King Magnus Ericcson, and is dated February 24, 1347. The ore contains 3% copper, but has proved profitable.

IN "Concentrates" in the issues of Oct. 6th and Nov. 3rd, 1900, were directions how to make sodium amalgam. A Breckenridge, Colo., miner writes: "The sodium amalgam must be freshly made to be effective. If kept long it oxidizes. Metallic sodium may be kept in wide-mouthed bottles covered with coal oil. Enough for a single cleanup can be made in a small frying pan. A small quantity of mercury from a fresh flask is poured into the pan and dried with a sponge and then heated beyond the boiling point, but not enough to volatilize the mercury. A piece of sodium is cut into $\frac{1}{2}$-inch cubes and the mercury taken out in the open air. A cube of sodium is placed with tongs in the center of the warm mercury. A flash follows; a small portion of mercury is volatilized and another cube of sodium is placed with less flash. This is repeated three or four times, when the sodium sinks down gently. At the proper moment a solid mass of amalgam will appear in the center. The contents of the pan are then stirred, and a few more added cubes change the whole to a mass of crystallized sodium amalgam."

LINEMEN say that in setting telegraph and telephone poles remove the earth around the poles 2 or 3 inches from the poles and about 3 inches deep, and pour a gallon of tar oil around it, so that the pole is tarred just above and just below the surface of the ground, and then put back the earth. In southern California the earth is dug from around the poles to the depth of a foot, and about two gallons crude oil having been poured in and allowed to settle and soak, the earth is put back again and tamped. In some localities the Bell Telephone and Western Union companies, using large round poles, dig narrow channels from 2 to 3 feet deep around the poles and fill the channels with rock salt for surface preservation.

ONE advantage of a power pump and a driven well in connection with a good heater is that all of the pumping must be done before the engine is shut down, which means that exhaust steam is passing through the heater, and no cold water can reach the boiler. An injector is convenient in such a plant, because it may be run to fill up the boiler after the engine is shut down. In many places this is a necessity, because boilers cannot be filled up as they should be at night without causing water to be thrown over into the engine cylinder and causing trouble there. The water from an injector is always warm, but if a larger one than is actually necessary is secured a valve may be placed in the suction pipe, and as the water supply is throttled the delivery becomes warmer, which is better for the boilers.

IN the case of Jordan et al. vs. Duke et al., rendered by the Supreme Court of Arizona, April 16, 1898 (53 Pac. Rep., 197), it was held that "when parties located a mining claim, but did not work thereon to hold it until December 31st, when they went on the claim and worked that day and the next five or six days of the succeeding year, and then abandoned the claim without having performed all the work required by the statute, other parties who made a location of said mine on the first day of the year, before the prior locators had stopped work, acquired no rights thereby, as they should have waited until the prior locators abandoned their work, and, the land at the time of their location not being subject to location, their acts cannot relate back to when it became subject thereto by reason of such abandonment."

IN the location of a mining claim the discovery cut and stakes are monuments, but a record of a mining claim "calling for its own discovery cut and its own stakes is defective when it contains no reference to a natural object or permanent monument to fix the locality of the claim." (McEvoy et al. vs. Hyman, 25 Fed. Rep., 596.) Where the notice calls for its own stakes and for adjoining claims may be good if such claims are found on the ground with definite corners and boundaries. (Russell vs. Chumasero, 4 Montana Rep., 309.) In the case of Drummond vs. Long, 9 Colorado Rep., 538, the lode was described as being on the southwest side of Mount Hardin and in Portland gulch, and about 1500 feet north of the Hawk Eye lode, and the court held that this reference located the lode generally, but was not that definite location, by reference, which the statute contemplates.

"CONCENTRATES" was in error in the issue of November 3rd in a statement regarding the mining law of Mexico. Article 5 of Title I of the present Mexican mining law says: "The title of all mining property * * * shall be perpetual and irrevocable, provided that the federal tax * * * is duly paid." Article 22 of Title IV says: "* * * In all other respects the owners of said properties shall enjoy complete liberty of industrial action and shall be allowed to work their mines in the manner which may be more suitable to them, or to hasten, delay or suspend the labors, employ the number of laborers which they may deem best or concentrate their efforts in one place with preference to other. * *" The annual tax is $10 in Mexican silver per claim of a square of 100 meters on each side, payable in advance every four months in three equal amounts. There is no tax on the output or earnings of a mine; but in case of taking the ore or bullion out of Mexico, an export duty is levied.

ALL coal deteriorates or decays to a more or less degree by disintegration or crumbling, and also by the gradual combustion of the volatilizable element. Atmospheric oxygen is absorbed and converts the hydrocarbons into water and carbonic acid. It has been proved in one case, according to Clarke's "Rules, Tables and Data," that bituminous coal, after having been exposed for nine months, lost half its value as fuel; coal exposed for three months to a temperature of 284° F. lost all its hydro-carbons. The coke manufactured from coal thus deteriorated is inferior to coke made from coal freshly mined. The decay of coal proceeds more rapidly in hotter climates; dryness is unfavorable to the change, while moisture accelerates it. When sulphur or sulphurate of iron is present in considerable quantity in coal which is changing under the action of the air a second powerful heating cause is introduced, and both, acting together, may produce spontaneous combustion. The presence of sulphur or iron pyrites, if in considerable quantity, is sufficient to excite combustion.

The Oil Fields of Kern County, Cal.

NUMBER III.

Written for the MINING AND SCIENTIFIC PRESS by H G. PARSONS

McKITTRICK DISTRICT.—The McKittrick oil district is located in the Coast Range mountains, southwest of Bakersfield, with which it is connected by a railroad 48 miles long. The railroad was built before there was much development of the petroleum interests of the locality. Although petroleum was known to exist there, by reason of oil springs in the hillsides, it was the asphaltum deposits which induced the building of a railroad. Vast deposits of this material—which is nothing but petroleum with its volatile gases liberated—tempted enterprising men to take commercial advantage of the natural conditions here existing. A refinery was established, and asphaltum was shipped in great quantities. It was mined from veins, like coal, or taken from flat beds where the petroleum had exuded from the ground and was left as a dirty residuum. A small settlement sprang up, called Asphalto, where the works were situated. The refinery was run until last November, when a majority of the stock was absorbed by a competing company, and the works were closed down. It is doubtful if they will ever be reopened, at least so long as the supply of petroleum holds out, for a better article of asphaltum is now made from crude petroleum than can be mined from the ground, and the distillates obtained by the latter process more than offset the increased expense of manufacturing the superior article.

The town of McKittrick is distant 1 mile from Asphalto. There is an asphaltum bed back of McKittrick, and in it deep trenches have been cut. There is a constant seepage of petroleum into these trenches, and this is pumped out every few days. At another place in the canyon, a short distance north of McKittrick, there is a stream of crude petroleum oozing out of the soil and flowing sluggishly down the hillside. At places along this flow one can pick up chunks of pure asphaltum.

It is not surprising that in a locality abounding in such evidences of the existence of petroleum wells sunk into the heart of the earth should tap the fountain head and produce oil in great quantity. The wonder would seem to be that this work was not pushed more thoroughly years ago, as at Sunset, where the surface indications are hardly as great. W. J. Berry and associates were the first successful developers of oil in the McKittrick district. Two or three wells had been sunk in 1892–93 by the Buena Vista Oil Co., but the production never exceeded twenty to thirty barrels per day, and this was supposed to be seepage oil. Messrs. Berry and associates leased land from Italian owners in San Francisco and from the Kern Valley Bank, and in February, 1899, began the sinking of wells. Their lease with the Italians was to extend for six years, with option to purchase in three years at $200 per acre. With the Kern Valley Bank the lease was to run for ten years, with option to purchase at $225 per acre within five years. The royalty while the lands are under lease is to be one-eighth. Mr. Berry, W. M. Spencer, T. L. Keller, W. I. Roberts, Clarence Berry and Milton McWhirter formed several companies, the best known of which is the El Dorado. These companies have sub-let a large part of their holdings to the S. P. Co., to Dabney Bros. & Miley, to the Kern River Oil Co., to the California Standard Oil Co., and to the Giant Oil Co. They are receiving a larger royalty from each of these companies than they pay to the original lessors, and at the present rate of production they will not only be able to buy the land with the proceeds of their royalty, but may become oil magnates without turning a hand toward further development. They own or control some of the richest oil lands in the State of California.

The place selected by the El Dorado Co. for their first wells was near one of the asphaltum deposits. Other local indications of petroleum were plentiful. The company merely went deeper than some of the earlier workers in the district, and they were rewarded by striking oil sand from which the petroleum forced itself over the top of the casing. The oil belt in this immediate vicinity is hardly more than 1200 feet wide, as has been demonstrated by dry wells sunk outside of those limits. The trend of the belt is northeast, and, so far as can be judged, it grows wider in its northward course. It has already been defined for a distance of 3 miles in a northerly direction, and extends from the hills at least into the mesa lands adjoining. Whether it can be traced far into the flat remains yet to be determined. In a southerly direction from the El Dorado wells the conditions are also uncertain, as there have been several failures to locate the underground stratum along a line in conformity with the northerly trend. The limits and direction of the trend must be decided by trial, as no geologist or expert can settle such matters as unerringly as does the drill of the well borer. It is a "hit or miss" proposition with the best of them.

The Southern Pacific (or Treadwell) Co. have five producing wells at McKittrick, one of which flows steadily, the others intermittently. There are pumps on each of these wells, as in most cases a well will yield more by pumping than if left to flow naturally. This has been an exception in the case of a so-called "gusher." The average depth of the S. P. wells, which are located in the best part of the McKittrick field, is 650 feet. The stratum of oil sand is 250 to 500 feet thick. The total yield from the company's six wells is 300 barrels per day.

The Dabney Oil Co., who lease from the El Dorado Oil Co., have four producing wells, one of which is probably the best producer in all of Kern county. It was a great gusher when first struck, and has flowed constantly since, though with intermittent force. Two other of these wells are intermittent flowers. If anything happens to the pumps the oil soon boils over the top of the casing. The total product of the Dabney wells is 600 barrels per day. The company were perforating three wells at the time of my visit, and had four rigs at work drilling. Their operations are characterized by much energy, and they have given new life to the district. Dabney Bros. and E. J. Miley compose the company.

The California Standard Oil Co. is a close neighbor to the Dabney, and they also own land in the northern part of the field—200 acres in all, mostly along the supposed oil belt. They have two producing wells and one drilling. Their output amounts to 110 barrels per day; tankage capacity, 10,000 barrels. This company make an excellent showing for the one year in which they have been operating at McKittrick.

The Kern River Oil Co., who are also fortunate enough to be in the productive belt, have three producing wells, another on top of oil sand at 800 feet, and a derrick built for still another well. The product is variable, as the wells flow or yield intermittently. At times they produce 400 barrels each per day. One of the Kern River Co.'s wells is the best producer yet struck in the northern part of the field.

The Giant Oil Co., in the northern part of the field, have two producing wells.

The McKittrick Oil Co., also in the northern portion of the belt, struck oil sand at 700 feet, and are now 200 feet in the stratum; are preparing to sink another well.

The McKittrick Consolidated, in the same locality, struck oil sand at 850 feet.

The San Francisco & McKittrick Oil Co., northwest of the McKittrick Co., have one producing well; bored a second, but injured their casing, so abandoned that, and are now sinking a third.

The Pacific Crude Oil Co., located in the hills in the northern part of the field, are in oil sand and will soon have a producer.

The Del Monte is in the same locality; are now in oil sand, but on account of trouble with casing are not producing.

The Belmont is located next to the McKittrick & San Francisco; now drilling.

Toward the Temblor district, some miles to the north, are several ventures. The Adirondack is drilling. The Gould & Central is down 800 feet, in soft oil mud, from which a seepage of twenty barrels per day can be obtained.

In the Temblor district itself four wells have been completed or are in oil sand, while four more wells are in process of drilling.

The McKittrick district is the seat of considerable activity, and promises to be a great producing section. Five carloads of oil were shipped the day I visited the camp, and that is said to be the amount usually sent out.

Leaching Copper Ores.

At the Petoskey mine, northern Arizona, the ore occurs in a blanket vein and yields 12% copper, two ounces silver and $1.80 gold per ton. The formation is siliceous, of volcanic origin, the copper occurring in green and blue carbonates, silicates and sulphides. Ordinary methods of leaching do not properly reach the silicate of copper, hence the special process employed at the new plant on the property. The method which has been resorted to consists in fine pulverization, especially shaped, self-dumping digesting vats of prepared wood to resist the chemicals, a solving solution to solve both copper and silver, but immediately precipitating the latter. Some iron will also go into the solution if any be present in the ore.

The prepared chemical solution is made to wash out the copper from the first digesting vat of pulverized ore; its chemical energy is exhausted by passing it through successive vats of ore until desired result is attained, when it is diverted to the precipitation vats or cells containing metallic iron, specially arranged and electrically connected with cathodes of copper, by which the copper in solution is electrolytically deposited, ready for market.

The chemical solution, having first united with the copper in the ore, leaves it in the precipitating cells by uniting with the iron, flowing first through these cells as an iron solution to large, shallow cisterns or wells, where, on cooling, crystals of iron salts are formed. These are retorted and the combined chemical recovered, to be used again in the solving of the copper from the ore. The iron, also specially treated, is used again.

The silver, having been left behind with the ore in an insoluble condition by the chemical solution used to extract the copper, is now treated with a hot, saturated solution of common salt (the ore having previously been washed by water to recover the chemical solution), whereby the silver is taken up and carried from the ore to the silver precipitatory vat, where, on cooling, most of it is deposited as chloride. The brine, being used only for this purpose, is pumped to a higher vat, ready, on reheating, to be used again.

The gold yet resides with the ore, which is now dumped from the vat, and, by suitable conveyor, discharged into a specially devised amalgamating apparatus and the gold retained, while the pulp is passed away to the dump.

Primitive Mining Methods in the Philippines.

Native mining is primitive at a gold mine in the Benguet district; the mountain is seamed with quartz veins from a few inches to 5 feet across, all said to be gold bearing; yet the Igorrote miner has never got beyond the oxidized ore of the surface. He takes an iron pike—a simple stick, shod with a steel point 6 inches long—and with this strikes and pries out blocks of disintegrating rock. Perhaps during his working period, which seldom lasts more than two hours a day, he detaches twenty to forty pounds of quartz, which he carries down the gorge to his home for the next operation of crushing. A miner succeeds, by weeks of this labor, in letting himself into a burrow 10 feet at the most, and then only takes the trouble when the vein is rich, as it necessitates his burning a torch, prepared by the women from thin sticks of resinous pine, which every few minutes smokes him out. A writer says one is disappointed at this method of gold mining and the seams of quartz suggest possibilities for a small stamp mill; but the next stages of crushing and abstracting the gold entirely overcome a progressive mind. From behind a thin shade of boughs, near the houses below, rose a thud, thud, stopping now for an instant, and then taken up again monotonously. Peering behind the screen one discovers an old hag, wrinkled and dried by threescore years of a toilsome life, swinging to and fro from the hips, in her squatting position on the ground, and with her outstretched and rigid arm rocking a slightly cylindrical stone of fifty pounds upon another, larger in size and slightly concave.

Between the faces of these two stones is crushed the quartz. The big pieces are first smashed into lumps as large as a walnut by volcanic boulders, and then these are taken, one at a time, and crushed to coarse dust under the primitive arrastra described. The fairly uniform coarse dust is then fed between the rocking stones, and finally comes out after hours of patient labor as an impalpable powder.

The men are lazy, but the poor old women will sit for hours moving this crusher back and forth, spreading the grinding quartz into new positions with a dexterous swish of the hand, and then, after a day's labor, will have but a scant ten pounds of powder ready for the last operation of "panning."

The panning is done principally in calabashes, or the half shells of big gourds. The powder is placed in the calabash, which is then filled with water. A circular motion is imparted to the water, which starts all the lighter dirt in motion with it.

At each turn of the pan a portion of the water is swished over the edge, carrying out the bulk of the dirt by the time the first water is exhausted. By the addition of water several times and repetitions of throwing it out by rotary motion, nothing but the gold and black magnetic iron ore is left in the bottom of the pan. A still more careful washing takes place in some localities by the use of a second smaller dish, and the iron ore is finally removed, after drying, by the use of a magnet, but in some of the regions to the far north, where the Igorrotes are even more primitive than those of the Benguet district, the black sand containing gold is packed in small tubes of bamboo and sold in this condition at the seacoast to Ilocano and Chinese traders for a song.

What surprises the average American is the total absence of practical machinery for mining, and then, again, that if there are actually valuable mineral properties in the Philippines they have not been exploited and developed long since by the Spaniards and foreign residents of the islands. There seems to be but one possible explanation for this commercial inactivity, and that lies in the defective Spanish laws relating to mining and the development of mineral wealth, which made it possible for the title to mineral lands to revert at any time to the Crown.

No one could possess a known valuable claim without being ruined by Spanish officials, who demanded hush money. No one could import mining machinery without attracting the Government's attention to the fact that an enterprise was about to be established in which the Government might have the lion's share; hence there has been a paralysis of mining industries.

The writer referred to says he has not seen a flume in any portion of the mining region he traversed, though there are miles of deep black sands in the narrow river bottoms which might pay if sluiced out and amalgamated. They have not even got as far as miners' cradles.

Classifying Crude Oils.

At the Petroleum Congress, held in Paris during the Exposition, a paper by Prof. S. F. Peckham, on the "Classification of Crude Petroleum," shows the importance to the commercial world of the scientific treatment of the subject. Prof. Peckham states that in the earlier oil days no attention was paid to the composition of different productions of crude, and shows how the commercial value, in consequence, was injured.

Scientists were at work on the subject of petroleum at a very early date, but Prof. Peckham says, up to 1855, "rock oil" had been regarded by both geologists and chemists as a species, and Prof. Sillman in that year was the first person to observe the destructive distillation of petroleum. In 1868, after making tests with Pennsylvania and California petroleum, Prof. Peckham made known the results of his test to C. M. Warren, an expert petroleum chemist, and was laughed at when he stated that the two products differed in their bases.

"When I assured him," says Prof. Peckham, "that by passing gases through Pennsylvania and California petroleum, that would deprive them of hydrogen, I could evaporate the first and convert the second into asphaltum, he was incredulous, and thought my ideas regarding the origin of petroleum theoretical, without any substantial basis of fact to rest upon.

"Although I had no absolute proof thereof, I was firmly convinced that the California oils consisted of hydrocarbons containing less hydrogen than was found in those of Pennsylvania.

"When, in 1880, I was engaged in collecting the statistics for my report on petroleum to the Tenth Census of the United States, I encountered two significant facts: First, the investigators of Russian petroleum had discovered that the hydrocarbons that made up the bulk of Russian petroleum were not paraffins, but additive benzols; second, a correspondent reported that the refiners of California petroleum were not making an illuminating oil that could be sold in competition with Eastern oil, but were sending their products to Mexico, where they found a less critical market than in California.

"This evidence pointed to sharp distinctions in petroleums from different localities. The wells first struck in Oil creek and the Alleghany river produced a petroleum easily refined into naphtha, illuminating and lubricating oils; and, while the evolution of the technology of these oils required many years, the movement was along certain well-marked lines, wherein no obstacles were encountered to continued success. The process of cracking, discovered by Joshua Merrill while working on the distillates from coal, was applied with great success to the Pennsylvania oils; but attempts to apply this method of distillation to the California oils did not produce corresponding results, although distillation under pressure did increase the yield of light oils.

"This discovery revived in my own mind the conviction, formed many years before, that the petroleums of the Pacific coast were specifically different from those of the Mississippi valley, containing different hydrocarbons and requiring different treatment for their success and manipulation. This conviction led to renewed attempts on my part to persuade the owners of large interests in California petroleum to have made a careful and thorough examination of their crude material, with a view to determining the chemical constitution of the oil, the nature and value of the products, and the best methods of securing these products by treatment. These gentlemen still remained unconvinced of the value of such work."

Prof. Peckham offers a system of classification, arranged on the basis of chemical composition alone. "If it is urged," he says, "that such a system is too intricate for the petroleum exchange, and that commercial differences exist among the petroleums and other forms of bitumen, I insist that commerce has assumed a lofty intelligence above the scientific world, of which the latter can take no account, because there are no points of contact between the two spheres of human activity. There is, however, a limit to this divergence of interest that appears when a petroleum chemist is called upon to examine petroleum from a new locality."

There are now four types of commercial petroleum that rank in commerce relatively as follows:

First.—Paraffin petroleum.
Second.—Russian petroleum.
Third.—Sulphur petroleum.
Fourth.—Nitrogen petroleum.

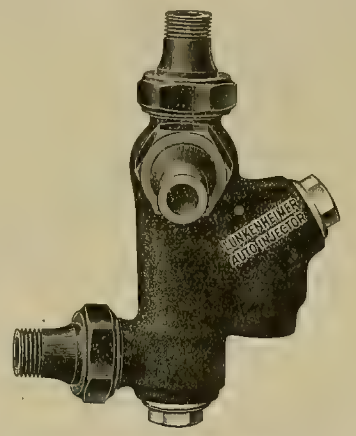
"The differences in these crude oils may certainly be regarded as specific, and they have been established upon the results of very elaborate analytical researches. Perhaps for commercial purposes the bestowal of specific names upon these varieties would not be understood or appreciated, but for the purposes of the laboratory they might be. There is, however, in view of the knowledge we now possess, one aspect of this question that can well be considered and definite action by it urged by both the experts in petroleum and their clients. This aspect is the extent to which the expert or the client is justified in recommending or demanding an examination of a specimen from a new locality, which shall be made by the elaborate, analytical methods employed upon the researches on petroleum conducted during the last ten years.

"A crude petroleum is not necessarily determined as belonging absolutely to either of these types, but it must, I think, approximate one of them. It therefore becomes of importance, not only from the standpoint of pure science, but that of commercial utility as well, to ascertain from the most careful examination the composition and relation of the various compounds that constitute the sample under consideration. This course, while involving more time and expense, is in the end both more economical and more satisfactory than the time-honored expedient of distilling a pint from a glass retort and dividing the distillate into fractions of certain specific gravities, but of unknown composition."

What is being done in refining oil in California is referred to in an article on page 520 of the issue of November 10th, descriptive of operations in Sunset district, Kern Co., Cal.

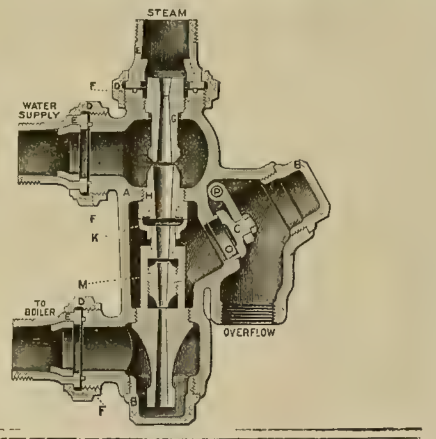
The Lunkenheimer Automatic Injector.

The Lunkenheimer automatic injector, herewith illustrated, is guaranteed by the manufacturers. The body is cast iron, the tubes of a special hard bronze composition made expressly for the purpose.



These tubes do away with spill holes in the walls; the internal areas of the tubes are smaller than some others, for capacities claimed to be equal.

The external appearance of the injector is pleasing, as the entire surface is heavily enameled. The steam, suction and discharge connections are provided with male unions. The joints where the unions connect to the body are made with seamless copper rings forced into grooves cut into the faces of the body part of the injector (see sectional cut. These injectors will operate under the following range of steam pressure and lifts with the feed water at 75°:



Lifts 2 to 4 feet, at steam pressures 20 to 180
Lifts 4 to 8 feet, at steam pressures 25 to 165
Lifts 8 to 12 feet, at steam pressures 30 to 140
Lifts 12 to 16 feet, at steam pressures 50 to 120
Lifts 16 to 18 feet, at steam pressures 60 to 100
Lifts 18 to 20 feet, at steam pressures 70 to 90

With steam pressures at 60 to 100, and feed water at 75°, the capacity of this injector can be graded over 50%.

Further information will be furnished on application by the Lunkenheimer Co., Bank building, Denver, Colo., or Cincinnati, Ohio.

A WRITER in the Australasian Ironmonger says: "I saw a man unpacking some American merchandise the other day, and, being a patriotic individual, I exclaimed: 'Hello, where do these come from?" 'America,' said he. 'Cheaper than English?' said I. 'No.' 'Better?' 'No.' 'What's the reason, then?' 'Americans pack better, parcel better, label better and usually send out plenty of printed matter.' There are more ways than one of advertising; this is an excellent way."

Protecting Shaft Timbers When Blasting.

Written for the MINING AND SCIENTIFIC PRESS by J. P. MUNGER, Supt. Harvard G. M. Co., Jamestown, Cal.

Having had considerable experience in shaft building on the mother lode, I have had the same trouble in protecting my shaft timbers when blasting that doubtless all other mine managers have had. In hand drilling we have but little trouble when proper care is taken; but when power drills are used it is extremely difficult to timber close to the work, as often has to be done in unsafe ground, without the danger of shooting out or damaging our timbers when blasting, and more especially when the electric battery is used.

Experiencing some trouble in this line, I conceived the idea of covering the timbers with a steel plate. It struck me so forcibly as being a good plan that I put it into use as soon as I could make my plans and have them constructed. If our battleships can be protected by the use of steel plates, why not protect our shaft timbers from the deadly shot of the miner in the same manner?

Not knowing of any one using a device of this kind before me, I gave it the name of "armor plate."

As mining men, we are certainly under obligations to our neighbors and fellow workmen for any and all pointers, coming from whatsoever source, as the experience and experiments of others inure to our good. Consequently, I contribute this simple device and my experiments for the good of the readers of the MINING AND SCIENTIFIC PRESS.

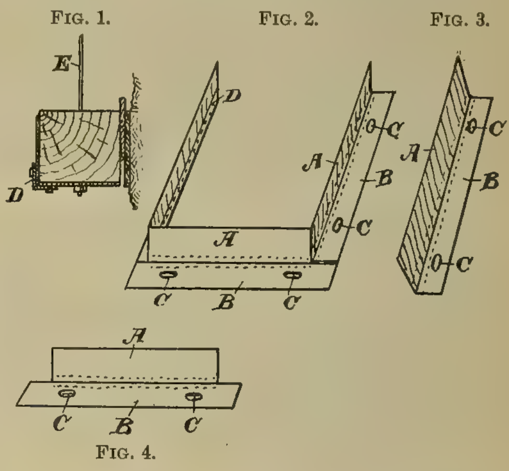


Fig. 1.—End view of timber, with side armor plate in place.

Fig. 2.—Sectional view, showing armor, end and side plates in position; also showing angle iron, with heads of rivets.

Fig. 3.—Side section of armor plate.

Fig. 4.—End section of armor plate.

A.—Inside plate, $\frac{1}{4}$ inch thick. B.—Bottom plate, $\frac{3}{8}$ inch thick. C.—Slotted or round hole for hanging rods. D.—Angle iron, showing heads of rivets. E.—Hanging rod, holding timber and armor plate.

Armor Plates for the Protection of Shaft Timbers Where Blasting in Shaft Sinking.

DIRECTIONS FOR CONSTRUCTION AND USE.—Have steel plates cut the proper width to fit the bottom and inside of wall plates, and the length of wall plate inside of end timbers, and fasten them together by means of angle iron and rivets, heads of rivets outside of plates, so that inner side will be smooth to fit timbers. In putting plates together, have bottom plate extend through or under side plate, or, better, setting edgewise on top of bottom plate. It will receive a harder shot with less damage in this way. Use good weight angle iron, and put rivets about 4 inches apart. The bottom plates (B) are constructed with round or slotted holes to receive hanging rods. The slotted holes are perforated, as it will allow for any variation that might occur in boring the holes in timbers for hanging rods, and cause no delay in placing armor plates in position.

The end plates are constructed with the bottom plate (B) the full width of the shaft timbers when together. The inside plate is cut proper length to fit between the wall plates and put together with angle iron, the same as side plates, cutting angle iron the length of plate (A) only. The side plates are quite heavy, but can be raised or lowered by use of cable, or, when timbering platforms are in place, they can be handled quite easily by hand. We found they could be handled much quicker and easier than the old plank of bulkheads, and when we removed the plates we found our timbers in as nice condition as when put in, and we worked for months at a time without injuring a timber, and no loss of time or material retimbering. In sinking a three-compartment shaft 750 feet we wore out two sets of these armor plates, which cost us less than $100 in San Francisco. Any foundry can construct to order, or the same can be built at any mine where a power drill is in use.

Some Questions Answered.

The following are of the class usually answered in "Concentrates," but seem to require the publication of the question as well as the answer:

A man here has a water tunnel and a pipe line on a piece of mineral land, but has made no filings or record of any claim of rights. A second individual has found mineral near the water tunnel and has made a regular mining location and claim of 1500x600 feet, including tunnel and portion of pipe line, and has also done assessment work and recorded the same. Can the second party claim the water in said tunnel for mining and milling purposes? The water at present is being piped to the town and sold to consumers.
Cherry Creek, Nev.

On this subject "Lindley on Mines" says: "Mining locations made upon the public lands must be made subject to any easements therefor lawfully acquired and subsisting, and held for the purposes of conducting water over them. * * * * The miner who selects a piece of ground must take it as he finds it, subject to prior rights which have an equal equity."

It is to be said, in general, that any land to which any claim or right of others has legally attached does not come within the definition of "public land," and only public mineral land can be entered under the federal mining law.

I am looking for a stone called magnet stone—not lodestone; comes 1 inch thick; varies from 10x10 to 10x20 in size; very fine, porous, light in weight and dark steel-gray in color. I have been referred to you by several in Nevada, California, Colorado and Utah. I think it was mined in Nevada.
Philadelphia, Pa.

The inquirer has probably been reading the Sunday newspapers and illustrated "science" articles therein. The gentleman from Leisenring, Pa., who wants further information regarding the "mountain of quartz in San Bernardino county, Cal., which was recently entirely transformed into a mountain of gold by a great electric discharge," seems equally unfortunate in his selection of "scientific" reading.

Will you please consider the following problem in concentration of silver-lead ores? The ore is galena carrying gray copper, which in turn seems to carry the silver. The gangue matter is heavy spar, or barytes. Analysis shows the ore to run: Silver, 19 ounces; lead, 13.7%; silica, 43.9; $BaSO_4$, 23.9. In order to effect separation from the barytes we have found it necessary to grind to 40 mesh. By doing this and concentrating at the rate of 4.25 to 1 we save 99% of the lead, but our tailings assay 17.50 ounces silver. The gray copper and the barytes seem to pass off together. Our neighbors, who have quartz instead of barytes, have the same difficulty in attempting to save the silver.
Colorado Springs, Colo.

Such ore as this would probably come under the head of an ore subject to a double treatment. In ores of that character the silver that is not susceptible to concentration is very often susceptible to cyaniding, and by cyaniding the crude ore first and then concentrating the tailings have been produced good results. It is almost entirely a question of the ore, and one can only tell by continuous experience. Of course, the ore would have to be cyanided by the continuous process.

This whole subject was thoroughly treated in a series of special articles written for this paper that appeared in the issues of March 3, 10 and 17, 1900.

A man runs a tunnel into a mountain, presumably for water, and at the distance of 200 feet strikes quartz and locates a mining claim. Can he use this tunnel, which he made previous to the location of said claim, for the $500 of development necessary to secure a patent?
Wallace, Idaho.

Only work or development done after the date of location of a mining claim can be legally credited or applied to the amount of work necessary to be shown to entitle the locator to patent.

1. How many strictly silver-producing mines do you know of in the United States that are being worked at a profit under the low price of silver?
2. Do you know of any new silver district that has been opened up since 1893, or for some time before that?
3. Is there any increase in the production of silver since that time, and, if so, does it keep pace with the increased demand?
4. Do the copper mines of Butte, Mont., and the lead mines of the Cœur d'Alenes produce as much silver per ton of ore at depth as they did at surface?
5. Would the opening of China increase the demand for silver to any great extent?
6. With silver as a commodity and no new district having opened, how long do you think it would stay at the present low price?
7. Would you consider it a good investment to buy silver property now, at a reasonable price, that would pay a fair profit with silver at $1 per ounce?

Phillipsburg, Mont.

The above are interesting questions that are not all susceptible of accurate reply.

Which is the most efficient, stamps weighing 1050 pounds each and dropping 9 inches ninety per minute, or stamps of same weight dropping 7 inches 110 per minute. We run all our material through a breaker which reduces it to 1 inch, and aim to have about 1 inch of the same under the stamps.
Dutch Flat, Cal.

We have now in type an article covering this and similar questions regarding stamp milling of gold ores, that we expect to publish about the first issue in December. It is the most elaborate discussion of stamp milling of gold ores that has appeared in five years.

I am trying to utilize the exhaust of a power drill, so that I might get rid of the drillings made by the drill, either by suction or other ways, without the use of water, so that these drillings would not be constantly pounded up and choke the hole up; but the face of the drill might be against the rock to be drilled continually. Certainly there is a great deal of valuable power going to waste in the exhaust of a drill that should be utilized in some such way. It would make a remarkable difference in the capacity of a power drill and the power used.
Aspen, Colo.

It is universally conceded that these machines are wasteful of power; but this is accepted as an unpleasant, yet unavoidable, necessity. Two conditions will always have precedence over all others in the matter of machine drills: They must be powerful, i. e., do much work under reduced size, and they must be simple. Of course, if they could at the same time be of economical use, it would be a desirable and important feature. Tandem compound cylinders, with successive expansion of the air, would furnish a solution in this direction, but would make the machine heavy and intricate. Early cut-off in a single cylinder would reduce the force of the blow. The only promising attempt made, so far as we know, consisted in reheating the air before its admission into the machine by inserting a row of oil burners between the air hose and the valve chest. The pressure would then remain the same, but the volume could be increased from 40% to 50% at a very slight cost. This, however, was apparently found impracticable, as this process never progressed beyond the experimental stage. As to making the escaping air do some useful work of any kind, it necessarily amounts, in whatever shape it is done, to throttling the exhaust port, and creating a back pressure detrimental to the power of the blow. In a familiar way it would be, to some degree, equivalent to keeping an obstruction very close to the exhaust opening, which, of course, would not be calculated to improve the work of the machine. Our correspondent is right in condemning the uneconomical escape of a cylinder full of air at a high pressure, at each blow of the bit, but it is believed that in reducing the power absorbed by the machine he would also diminish its effectiveness.

Some Recent Additions to the Collection of the California State Mining Bureau.

Rich cobalt and copper ore, with gold and silver, the higher gold values appearing to accompany the cobalt, which occurs as linnæite, from Dixie creek, Grant county, Or.; J. F. Bachelder.

Gold quartz with free gold, from Lappin mine, Deadwood district, Trinity county, Cal.; M. A. Brady.

Gold quartz, from Chloride–Bailey mine, Canyon Creek district, Trinity county, Cal.; H. Wilson.

A very remarkable specimen of crystallized lead, from the Richmond Con. Smelting Works, Eureka, Nev.; Mrs. E. Probert.

Rich tin ores and tasmanite, from the celebrated Mount Bischoff mines, Tasmania; Thos. Stephens.

A number of specimens of copper and lead ores, gold quartz, etc., from the Tasmanian Museum, Hobart, Tasmania.

Emerald crystals, from Coffee Creek district, Trinity county, Cal.; J. Carr.

Auriferous talc and serpentine with free gold, from Blue Lead mine, Trinity county, Cal.

Auriferous quartz porphyry and granodiorite, from Coffee Creek district, Trinity county, Cal.

Rich gold quartz, from Delta, Dog Creek district, Shasta county, Cal.; Wm. Hveem.

Cuprite, fine specimen, from the Ludwig mine, Yerrington, Nev.; J. B. Somers.

Copper ores, several varieties, from Copper Hill mines, Rinconada, N. M.; Ph. Rearden, Supt.

Tin ores from six different mines, cerrusite, axinite, crocoite, chrysolite, etc., from Tasmania; Tasmanian Museum.

Molybdenite and rich copper ore, from the Mariposa mine, Sinaloa, Mexico; Gus Peterson.

Copper ores from seven claims in Waldo district, Josephine county, Or.; J. Waln Morgan Draper, M. E.

Hubnerite, from Osceola, White Pine county, Nev.; Gaby, Buntin & Doyle.

Cinnabar, from Saucillo, Chihuahua, Mexico; Wm. B. Gester.

Also, an interesting series of rocks, illustrating the gradual changes and alterations of rocks from crystalline to schistose and slaty, and numerous other specimens of quartz, ores, etc.

There has just been placed on exhibition a very handsome series of slabs of aragonite, popularly known as onyx, from Kesseler's quarry, San Luis Obispo county, Cal. These are all transparencies, or natural pictures in the rock, and well worthy of inspection.
Henry S. Durden, Curator.

Pyritic Smelting in the Black Hills.*

Pyritic smelting, so-called, as practiced in the Black Hills is pyritic smelting only in the sense that Dr. John Percy uses the expression in his "Metallurgy of Silver," where he describes a process for smelting dry silver ores in connection with iron pyrites, to form a regulus.

The ores treated by this process in the Black Hills are very siliceous, averaging about 74% of silica, from 10% to 20% of oxide of iron, 4% or 5% of alumina and from 2% to 4% of lime.

In 1889, while dean of the South Dakota School of Mines, I took up the question of their smelting. There were neither copper nor lead ores in the Hills, hence pyrite and pyrrhotite, of which there are large deposits, were employed to form a regulus. This mixture of pyrite and pyrrhotite, besides being absolutely barren of gold and silver, carried an average of 30% of silica. The only basic material available as a flux for the great excess of silica in the ores and in the flux was a dolomitic limestone. Moreover, the local coke gave 24% of ash, 60% of which was silica—as unpromising a set of conditions as can well be imagined.

We had before us the examples of W. Lawrence Austin of this Institute, who had experimented at Toston, Montana, and of Dr. Bartlett, now of Canyon City, Colorado.

The whole literature of the subject was studied, and the situation at Kongsberg, Norway, seemed to be nearest our problem; but at all places where pyritic smelting was followed one factor stood out prominently: the slags were always very siliceous, carrying about 50% of silica. We could not reduce them to any very definite formulæ. They did not resemble any of the typical lead smelter slags, nor did they always hit the oxygen ratio of any definite or recognized silicate. The best slags for the process were apparently those which, as Kerl expresses it in his Metallhuttenkunde, approached a bisilicate ratio.

The slags which we found best for our material approached a bisilicate ratio, if alumina was figured as an acid (as is done at Mansfield), but more nearly the sesqui-silicate if alumina was considered as a base.

Table I gives the widest variations of slags made during my administration. I have also calculated the oxygen ratio.

TABLE I.—ANALYSES OF DEADWOOD AND DELAWARE SLAGS.

DATE.	SiO_2.	FeO.	Al_2O_3.	CaO.	MgO.	Oxygen in acid.	Oxygen in base.	Silicate Degree. RO.	Silicate Degree. SiO_2.
USUAL SLAGS MADE WITH DOLOMITIC LIMESTONE.									
Jan. 4, 1898	50.6	16.3	2.3	18.3	11.9	1.84	1	1.09	2
Jan. 29, 1898	47.5	16.8	4.9	18.7	11.8	1.57	1	1.27	2
Feb. 17, 1898	45.7	17.6	6.1	17.9	10.1	1.53	1	1.31	2
Dec. 5, 1898	49.1	15.0	4.2	18.47	10.6	1.76	1	1.14	2
July 14, 1899	48.0	13.0	5.4	20.0	12.9	1.57	1	1.27	2
Sept. 9, 1895	49.0	11.11	5.86	22.6	12.04	1.58	1	1.26	2
April 23, 1896	47.5	9.64	7.00	22.6	9.10	1.63	1	1.23	2
EXPERIMENTAL SLAGS MADE WITH PURE LIMESTONE.									
July 24, 1894	51.6	19.50	5.83	17.1	3.2	2.08	1	0.96	2
July 31, 1894	48.1	26.91	9.10	11.4	1.9	1.79	1	1.11	2

In Table I the slags given under date of July, 1894, were made in an experiment with pure limestone. They were not so satisfactory as those made with dolomite. Their oxygen ratio probably gives the real reason.

It was seen very early in our experiments that iron for flux was out of the question, and that, save the little that the ores carried, we must rely upon lime and magnesia as bases. I was acquainted with the Mansfield slags, in which the iron sometimes falls as low as 4%, while the alumina may reach 15%.

---

*F. R. Carpenter, August Meeting, 1900, Transactions A. I. M. E.

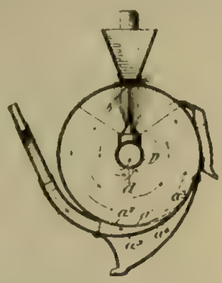
(TO BE CONTINUED.)

Mining and Metallurgical Patents.

Patents Issued November 6, 1900.

Specially Reported for the MINING AND SCIENTIFIC PRESS.

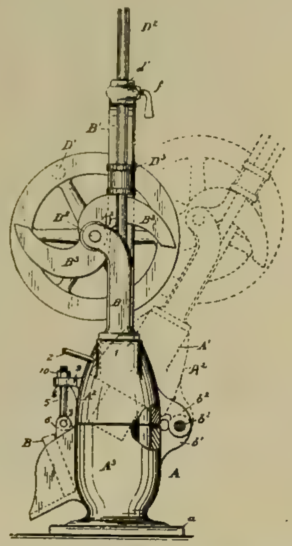
ORE CONCENTRATOR.—No. 661,086; A. H. Stebbins, Little Rock, Ark.



Combination of outer cylindrical drum, feed chute leading into drum in upper portion thereof, exhaust cylinder having opening through wall and extending axially length of drum, exhaust pipe connected with exhaust cylinder, air inlet extending through length of drum, arranged substantially tangential thereto, discharge opening in wall of drum over which incoming blast is directed, and concentrate box below drum.

◆

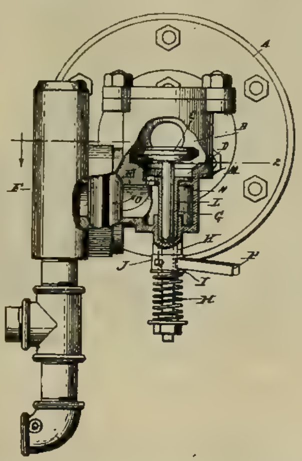
ORE STAMP MILL.—No. 661,144; M. H. Hamm, Petaluma, and H. R. Taylor, Oakland, Cal., assignors to J. Taylor & Co., San Francisco, Cal.



In ore stamp mill, combination with mortar comprising upper and lower section, hinged connection therebetween, of stamp working within mortar, standards secured to and projecting from upper mortar section, stamp stem extending through opening in upper mortar section, shaft mounted in bearings on standards, means operated by shaft for reciprocating stamp and device for locking stamp in raised position, mortar being provided with ore feed.

◆

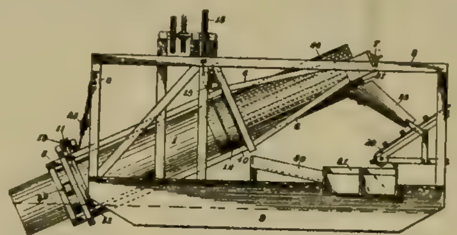
SPEED REGULATOR FOR GAS ENGINES.—No. 661,181; J. W. Lambert, Anderson, Ind.



In combination with gas engine, an igniting chamber connected to working cylinder thereof, gas supply conduit connected with chamber, main valve seated over opening therebetween, provided with stem extending through wall of supply conduit, an apertured auxiliary valve seat between main valve seat and supply passage, auxiliary disk valve seated against face adjacent to main valve provided with aperture, sleeve connected to disk valve surrounding main valve stem extending out through wall of gas passage; device for holding disk valve against seat, governor mechanism connected to projecting end of sleeve adapted to rotate same independently of main valve stem; means for intermittently operating main valve and its stem independently of auxiliary valve and its governor mechanism.

◆

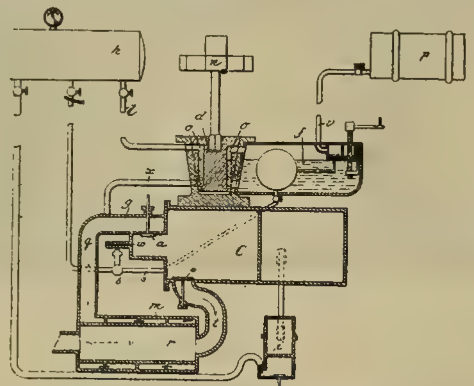
SUBAQUEOUS DREDGER.—No. 661,193; W. W. Priestly, Smartsville, Cal.



In dredging apparatus, main revoluble barrel set in inclined position having helical passage therein, inclosing frame 5 around barrel, means to prevent longitudinal movement of barrel therein, sustaining roller 19 mounted on frame and lateral bearing rollers 39 at its sides.

◆

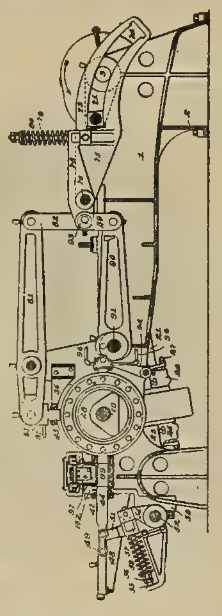
PETROLEUM MOTOR.—No. 661,235; L. Charon & F. Manaut, Paris, France.



In combination, cylinder and piston, vaporizer and storage chamber connected therewith, distribution valve for controlling flow of petroleum to vaporizer, gas valve controlling flow of explosive mixture to engine, means whereby in normal action of engine gas valve is held open during suction stroke and portion of compressing stroke, means whereby on excessive speed of engine distribution and gas valves are maintained closed, and means for preventing vacuum in cylinder during closure.

◆

MACHINE FOR FORMING PULVERIZED MATERIAL INTO BRIQUETTES.—No. 661,238; T. A. Edison, Llewellyn Park, N. J.



Machine for forming briquets of pulverized material, combination of mold, plunger co-operating therewith, rock shaft, an arm carried by rock shaft connected with plunger, main driving shaft, lever, cam on main shaft for operating lever, second arm carried by rock shaft, and connections between arm and lever.

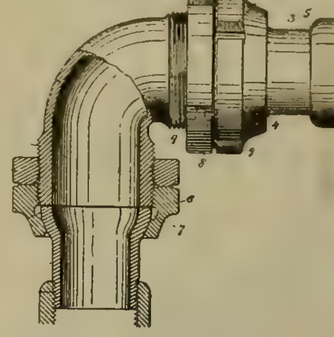
◆

PROCESS OF EXTRACTING PRECIOUS METALS FROM THEIR ORES.—No. 661,074; H. J. Phillips, London, England.

For extracting precious metal from their ores, which consists in pulverizing ores, subjecting same in closed vessel under heat to action of chloride of sulphur, amount of chloride of sulphur so employed being proportioned to amount of gold or other precious metals in ore and which it is desired to recover, raising temperature of mixed ore and chloride of sulphur until latter is dissociated, and chlorides of precious metals thereby formed, and recovering precious metals from chloride "in any well known manner."

◆

METALLIC FLEXIBLE JOINT.—No. 661,377; J. C. Martin, San Francisco, Cal.



Metallic flexible joint comprising curved pipe provided with threads on each end, nipple having enlarged end abutting one of the ends, enlarged end formed with smooth exterior spherical surface and socket ring fitting and forming joint with enlarged portion of nipple and provided with internal thread adapted to engage with thread on pipe and having recess or countercored internal enlargement between threads and spherical joint surface and lock nut adapted to engage with threaded socket to secure it in position and substantially similar nipple, threaded socket and lock nut on other end of curved pipe.

◆

Tempering Drills.*

I find that in order to make a good drill it requires close attention from start to finish.

I sharpened thirty-seven drills for a contest awhile ago, and this is the way I did it: I worked with a low heat, and at the very last I pounded the face of the drill over and over, first on one side and then on the other side, until it was black or showed no heat; then put it in the fire just long enough for it to show a slight color, and then pounded it in the same manner as before, and so on, several times.

At the time I did this last work upon it, I never struck it once on the edge; if it was too large, I ground it off; then, before chilling, I put a nice finish on the drill.

In hardening I heated the drill to a nice cherry-red, taking a long heat of about 3 inches. In taking this heat I always kept the drill moving in the fire, and towards the last had scarcely any blast on.

Just before taking it out of the fire I shut off the blast entirely, and then I plunged it in water and left it until thoroughly cold. I then polished it bright.

To temper I gave several old drills a long heat, and laid my drill on top of these, letting it project over about 2 inches, taking about fifteen minutes to temper, drawing to a straw or nearly a copper, and laid it down to cool without putting it in the water.

I treated all the drills in this way and not one of them broke, although they were used in Gunnison granite with an eight-pound hammer. A miner who saw them used stated that he had seen drilling contests in Leadville, Denver and Butte, but never saw chisel-shaped bits stand the racket as these did.

---

* John Raab, Ouray, Colo., in Crescent Anvil.

◆

Cost of Coal.

The price of coal at the pit's mouth varies a good deal in the different centers of production. The lowest point appears to have been touched in British India, viz., 92 cents per ton, while the dearest coal is met with in the Cape Colony, where the pit's-mouth price is $3.56 per ton. The corresponding price in Natal is much less, viz., $2.50 per ton. Coal can be obtained at the pit's mouth in New Zealand for $2.50 per ton; in Tasmania for $2 per ton; in Victoria for $1.79 per ton, and in New South Wales for $1.39 per ton. Transvaal coal costs $1.91 per ton at the pit's mouth. The United States ranks next to British India as a cheap coal-producing quarter, the average price at American pit's mouths being $1.15 per ton, though on the Pacific coast, and in California especially, it runs as high as $7 per ton. As regards European countries, the cheapest coal would appear to be available in Spain, where the pit's-mouth price is only $1.52 per ton; Austria comes next with $1.53 per ton; Great Britain third with $1.62 per ton; Russia fourth with $1.68 per ton, and Germany fifth with $1.84 per ton. The average pit's-mouth price in Belgium is $2.05 per ton. France figures to still less advantage with an average of $2.17 per ton.

The Smidth Ballmill.

On this page appear three illustrations of the Smidth ballmill, originally designed and used for reducing materials from a lump state to the market fineness in one operation. This involved the use of outside screens which bolted the material to the required fineness, and in the case of material like Portland cement clinker, where extreme fineness, such as 95% through 10,000 meshes per square inch, was demanded, the output of the ballmill was relatively small, though its low horse power, slow speed and slight cost of repairs made it more economical than buhr stones or the then popular ring and pendulous-head type of machine. But immediately after the invention of the tubemill, the ballmill was made use of for preliminary crushing only, its product being passed to the tubemill for fine grinding or pulverization, this system demonstrating further reduction in the cost of grinding.

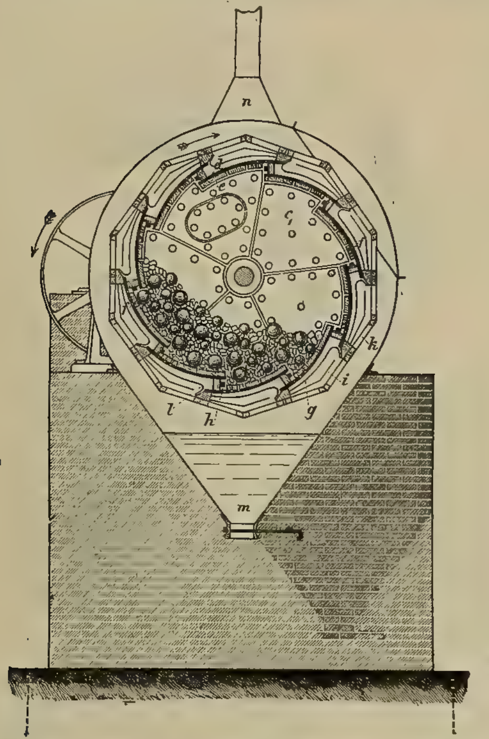


Fig. 1.—Type A, Showing Grinding Plate and Sieve Arrangement.

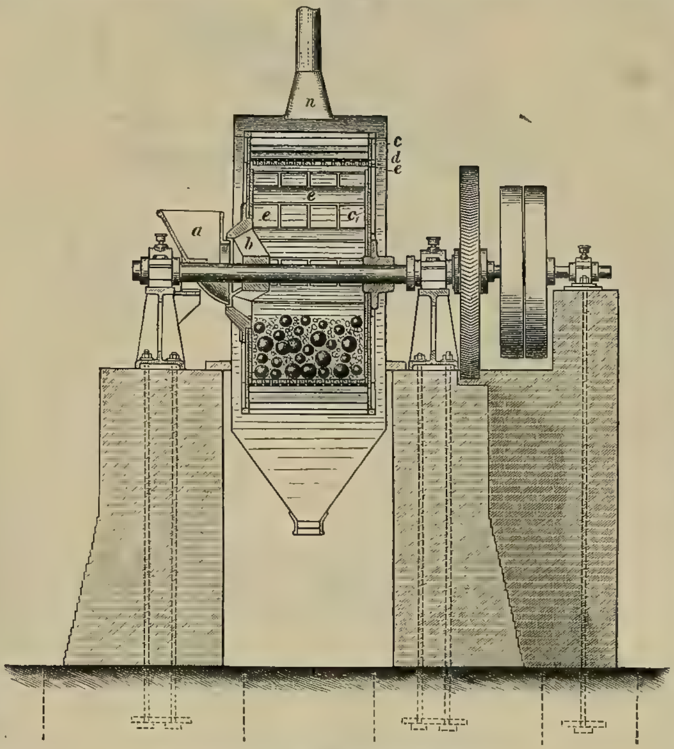


Fig. 2.—Type A, Showing Through Shaft.

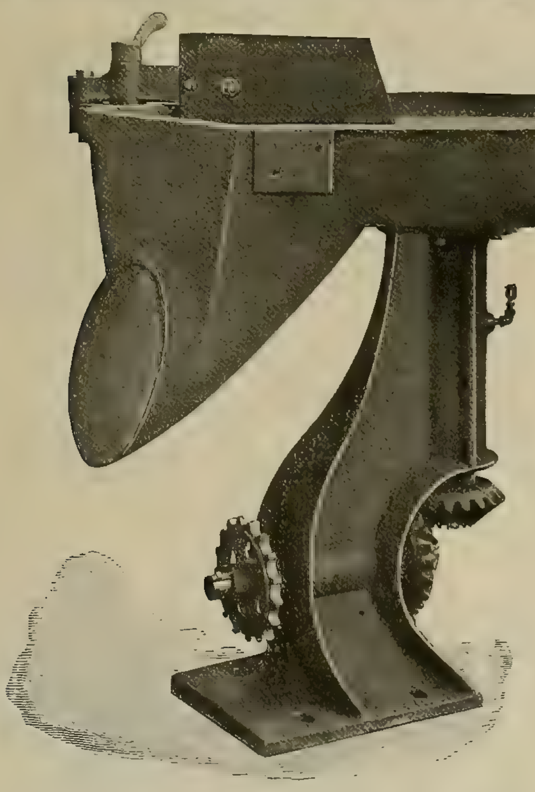


Fig. 4.—Smidth Automatic Ballmill Feeder.

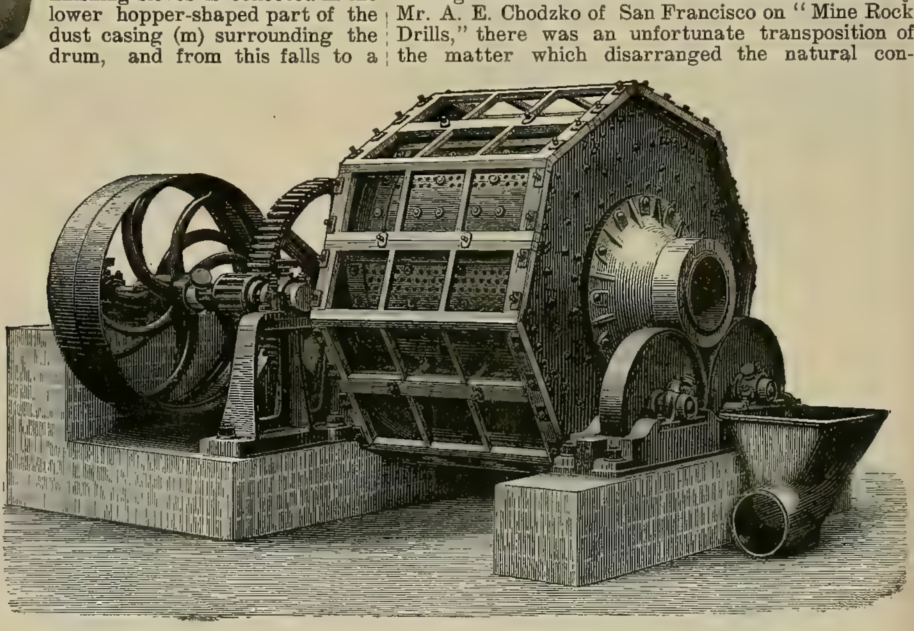


Fig. 3.—Smidth Ballmill, Type B, Showing Roller Bearing as Used on Type C.

The Smidth ballmill is stated by its makers to be the result of practical experience in using the original idea, the objectionable features of the earlier design having been eliminated and the maximum of convenience for access and repair developed and arranged. To meet the demand for several forms of the ballmill, the makers have designed types classified as A, B and C.

Figs. 1 and 2 show the internal arrangement of the type A ballmill. This machine has a through-shaft with journals running in bearings at both ends, and consists of a drum with two end plates (c), between which the curved drum plates (d) are fixed. These plates do not form a cylinder, but one end of each is set a few inches towards the center, forming steps. The balls and materials tumble over these steps, when the drum revolves, the pounding action of the balls being designed to be increased thereby, the steps allowing residue from sieve to be caught and reenter drum. The curved drum plates are protected on the inside by thick steel plates (e) which are divided into several sections, so that each section can be separately renewed. The lining plates are fixed by means of bolts. The end plates (c) are also lined with thick plates (c1).

The grinding plates have rows of perforations (f) through which the crushed material constantly falls on slotted steel screen plates (g). Whatever is fine enough to pass these screen plates falls on the inner sieves (l), coarse and strong; that which passes through these falls on the finishing sieves (k). The material passing through the finishing sieves is collected in the lower hopper-shaped part of the dust casing (m) surrounding the drum, and from this falls to a conveyor or elevator, or may be dropped direct into the containers. The outlet of the dust casing is provided with a slide gate.

The residue from the sieves, coarse and fine, is carried up with the mill, until it falls through large holes in the curved part (l) of slotted steel screen-plates and together with residue from these falls into the drum again through the steps. In one of the end plates a man-hole is fitted and in the dust casing a door corresponding to the man-hole, giving access to the interior of the mill. The dust casing is made in three parts, a small section being easily removable for brushing the sieves. The top half may be removed for repair of the drum.

Fig. 3 shows the type B machine, the same as A, except that the shaft, instead of going through the feed-hopper, is stopped short inside the drum and there fixed in a spider, the external part of which runs on a roller bearing. By means of this arrangement lumps up to 10 inches each way can be fed into the mill, and the feed opening itself at the same time is reduced in diameter, which allows a heavier charge of balls to be used.

Fig. 4 shows the automatic ballmill feeder for the ballmill, which is attached to and operated from it. About 90% of these ballmills in operation are being fed with these automatic feeders. The apparatus illustrated is made and furnished by F. L. Smidth & Co., 66 Maiden Lane, New York City.

The Power Behind Nature.

Dr. Carpenter once wrote an essay on "The Power Behind Nature," in which he compared the production of the various natural phenomena of the external world to the working of the machinery in a large and well equipped factory. In this factory hundreds of wheels are kept in operation in one immense room by a system of bands, which connect them all with a common source of motion. That common source is simply a revolving beam. But there is nothing in the room that could turn it. Evidently, it must be connected with something outside that is invisible inside the room. Going outside, one finds what, perhaps, strikes him as an easy solution of the problem. The beam is turned by a huge wheel, which, in its turn, is moved by a constant stream of water. But what is that which feeds the unfailing sources of this stream? Well, the whole process—as far, at least, as science can follow it—is traced at last to the sun, which lifts the water, in the form of vapor, from the sea, and returns it as rain, or hail or snow to the land. There, indeed, is the power outside the factory that turns the wheels within. If the motive power were steam, instead of running water, this answer would still hold good. The power, the force or the energy is in either case derived from the sun. But the sun is part of a system, and has had a beginning in time. Speculative astronomy attempts to account for its origin by the theory known as the nebular hypothesis. This theory, however, points to no absolute beginning. To explain the making of the solar system it assumes conditions that are still left unexplained. The mind of man, after science has said its last word, is left to look for "the power behind nature."

In the issue of the 10th inst., in the fifth and concluding installment of the admirable article by Mr. A. E. Chodzko of San Francisco on "Mine Rock Drills," there was an unfortunate transposition of the matter which disarranged the natural continuity of the article as written. That portion of it styled "Appendix" should have followed, instead of preceding, the reference to the types of machine drills mentioned therein.

The richest countries in the world are where mining is prosecuted most vigorously. The poorest countries are those where there is no mining. The richest men in the world are and always have been great miners, from King Solomon down to the Rothschilds and Rockefeller, who are now largely interested in mining gold, silver, copper, lead and nickel.

MINING SUMMARY.

ALASKA.

(Special Correspondence).—Another big storm has struck us, resulting in much damage to shipping and property. Eight thousand people will winter here, and much suffering may ensue, as coal is scarce and price of same is high, having been put up to $100 per ton to-day. From present outlook, a rush will be made next spring to the Kougarok country. The arrest and return to the United States of Receiver McKenzie has had an encouraging effect upon everyone here; confidence has been somewhat restored and prospects for the future look brighter.

Nome, Oct. 22.

It is expected by next summer that through telegraphic service will be in operation between the United States and Nome, via Dawson and St. Michaels.

A semi-official statement from Nome bankers gives the gold output of that district as $5,000,000 for the past season, as compared with $2,000,000 for 1899. Most of the gold was from Anvil creek.

The Nome Gold Digger states that fourteen quartz claims near Bluff City, Chenik district, have been sold to Pittsburg, Pa., men, for $500,000. It is said that mills and a cyanide plant will be put in next year. D. F. Clinton of Pittsburg, Pa., represents purchasers. C. W. Johnson, Supt. Heid & Sandstone property, near Taku, is prospecting the property with diamond drill; 180 feet of core has been taken out.

G. Skeavington of the Mellen M. Co., Juneau, says that it will be necessary to put in electric plant for power; the mine has closed down for the season.

Thirty-five stamps are dropping at the Nowell, near Seward City, and thirty men are working.

ARIZONA.

COCHISE COUNTY.

The Bisbee West Copper M. Co., Bisbee, will develop property near the Copper Queen.

The Copper Crown of Arizona M. Co., now developing property in the Dragoons, near the Black Diamond, have the Boxer and the Expansionist claims, giving them about 160 acres. The company are taking out ore from the Copper Chief, and have let a contract for a large working shaft.

Good ore has been struck on the 700-foot level of the Lake Superior & Western, Cochise. A new hoist will be put in, and a three-compartment shaft will be sunk.

A new plant is going in at the Pearce or Commonwealth mines, near Pearce, to replace the one recently burned.

The Copper Queen (copper), Bisbee, W. Douglas manager, is producing 500 tons of ore per day. Nearly 1000 men are employed.

GRAHAM COUNTY.

The Mexican–Arizona Copper Co., capital $500,000, is incorporated at Clifton.

MOJAVE COUNTY.

The Connor, near Chloride, has several men at work. Work is being pushed.

At the Gold Road mines, near Kingman, timbering of two shafts is completed and sinking is resumed.

A lapidary will be employed at the turquoise mines, near Mineral Park.

The Lone Star, Mineral Park, is producing good ore from the 150-foot level.

H. S. Mackay of Boston, Mass., who has bonded the C. O. D., near Kingman, will begin unwatering the mine on Dec. 1st. A new plant will probably be put in.

Men are at work on the Draper group (gold), 2 miles from Pyramid.

PIMA COUNTY.

The Duquesne M. & R. Co., at Washington Camp, will put in a new plant and railway; J. F. Tenor general agent.

The Helvetia Copper Co., 36 miles south of Tucson, has 150 men working. The output is 250 tons daily of 14% copper ore. General Manager R. N. Seagur, Supt. B. J. Close.

There are two 30-ton copper smelters in San Xavier district, 30 miles from Tucson.

Scott & Gaff are sinking a 500-foot compartment shaft in Silver Bell district, 40 miles west of Tucson.

PINAL COUNTY.

At the Mammoth gold mines, G. P. Blair manager, at Mammoth, near the San Pedro river, 52 miles from Tucson, the 70-stamp mill is running. They have also a good cyanide plant.

The Mohawk, an extension of the Mammoth, has a 30-stamp mill.

The Cornelia Copper Co., in Ajo district, near Florence, have machinery in place to sink the shaft, now down 300 feet, to the 1000-foot level. A 100-ton mill may be put in soon.

H. M. Finley of Muncie, Ind., will open up the Double Standard mines, Old Hat mining district.

YUMA COUNTY.

T. Drennan is putting his mill, near Parker, in shape to run.

CALIFORNIA.

AMADOR COUNTY.

The Democrat says the closing of work by the Standard Electric Co. has caused much surprise.

Supt. Derby of the Oneida, near Jackson, states that capacity of mill will be increased to fifty stamps by putting in a 75 H. P. electric motor. Water power now runs twenty-five stamps.

At the South Eureka the new hoisting plant is working successfully; sinking will be continued 200 feet deeper, making total of 2000 feet on the incline.

A good body of ore is opened up on the 400-foot level of the Mutual, near Sutter Creek.

Sinking on the Kirkwood, near Jackson, will resume as soon as the new engine is placed.

Sinking on the Peerless shaft, now down 500 feet, is in progress.

The new east shaft at the Kennedy is down 1700 feet and forty stamps are dropping.

A recent cleanup of 580 tons of ore from the second, third and fifth levels of the Lincoln gave the following: 227.75 ounces valued at $3813.49; 14.75 tons sulphurets valued at $859.52. Total net value, $4673.01.

A stamp mill has been put in on the Bellwether, near Jackson.

CALAVERAS COUNTY.

The Sunrise, at Railroad, is bonded to K. B. Weatherwax of Washington, D. C., for $8000, and $5000 of the amount is paid. A hoist will be put in and work started.

The old Finnegan, Carson Hill, is being worked by Fenton & Rolleri.

Work on the Lone Star, near West Point, is resumed and men are sinking the shaft.

The Vorlander, at Middle Bar, has resumed.

At the Gwin, near Mokelumne Hill, water power is being used instead of steam. Eighty stamps are dropping.

The shaft at the Tulloch–Magruder, Angels, will be sunk to 600-foot level. A new plant will be put in also.

At the Morning Star, Supt. Jennings, ore running $15 per ton is opened up.

EL DORADO COUNTY.

The El Dorado Republican states that the Tin Cup, El Dorado, is sold to Hayward & Lane for $15,000.

W. Crocker and C. A. Robert, operating the Lilly Emma (copper), near Pilot Hill, recently sent 180 pounds of ore from the mine to the State Mining Bureau at San Francisco for an exhibit.

Mr. Lake will resume hydraulic operations in Coarse Gold gulch, near Echo.

KERN COUNTY.

The Pacific Con. is down 1162 feet on 2, 32–22, 6 miles from McKittrick, and the well will be finished at that depth.

The Peerless No 6, on 31, 28–28, Bakersfield, is pumping 720 barrels every twenty-four hours.

The Lion of Arizona, at Sunset, is yielding 500 barrels per day.

The Yellow Aster M. Co. is getting foundations, etc., ready for the placing of the new 100-stamp mill. The contract for the latter was awarded the Union Iron Works of San Francisco on the 10th inst. The stamps are to be 850 pounds each.

The Sunset Czar Oil Co., on 19–10–23, Sunset district, produces forty barrels daily.

The Sunset King Oil Co. will begin drilling on 19–10–23.

LOS ANGELES COUNTY.

J. H. Alderson has a 25-barrel producer corner Toluca and Court streets, Los Angeles. The well was drilled 950 feet in one week.

MARIPOSA COUNTY.

The Virginia, Coulterville, has resumed. Supt. M. C. Randolph has twelve men working.

MONTEREY COUNTY.

F. J. Horswill has leased the Stacks canyon coal fields, 330 acres, to prospect for coal and develop, with an option to purchase at the end of the year for $300,000. The mine was formerly worked by the Pacific Improvement Co. The main tunnel has been cleaned out and exposes a 14-foot vertical vein.

NEVADA COUNTY.

The management of the old Banner, Nevada City, have decided to erect a new hoisting plant and a 20-stamp mill on the property.

New machinery is in place at the Nevada County, Grass Valley. The drain tunnel and shaft have been cleaned. Good ore, showing free gold, has been opened up.

A new air compressor and flywheel are being installed at the Champion–Columbia mine in Washington district.

The La Suerte G. M. Co. has levied an assessment of 2½ cents per share, delinquent Dec. 10.

At the Nevada County mine the shaft is cleaned out to the depth of 80 feet.

The Live Oak Con. G. M. Co. has levied an assessment of 5 cents per share, delinquent Dec. 3.

Ogden Bros., working the Federal Loan, near Willow Valley, recently shipped six tons of ore to the Selby Smelting Works, San Francisco, which returned $250 to the ton.

Five tons of ore from the Tilley, Grass Valley, returned $28.25 recently. New machinery will be put in and more men will be put on.

G. C. Sargeant has started a free library at his Quaker City gravel mine.

A large hoisting and pumping plant will be put in on the Washington, Nevada City, to replace the old plant, which has been shipped to San Francisco.

The new 2-stamp, triple-discharge mill for the Reward will soon be in place and running.

The Union Hill, Grass Valley, E. Creller Supt., is closed down. Over $80,000 has been spent in development.

PLACER COUNTY.

G. F. Stone, Supt. Herman, near Westville, has finished the work of placing a 10-stamp mill in the lower tunnel and work is in progress.

Colfax Sentinel: The main tunnel at the Eureka Con. drift mine, 12 miles above Forest Hill, is in over 4000 feet. The company owns 6½ miles of channel. F. Chappellet Jr. is Supt.

The Morning Star mine of Iowa Hill closed down this week, the pay channel being exhausted.

PLUMAS COUNTY.

T. Richards of San Francisco is getting things in shape at the Pioneer, on Bear creek, Quincy, for next season's run.

SAN BERNARDINO COUNTY.

The mill of the Parker Milling Co., 65 miles from The Needles, is progressing; men are working in the mine, 4 miles from the mill, getting out ore.

The owners of the Leoti, near Dale, will put in a cyanide plant.

SHASTA COUNTY.

The 20-stamp mill on the Gladstone, French Gulch, is being repaired, preparatory to starting. Nine hundred pounds of silver-plated mining plates were received recently.

The 10-stamp mill at the American is being put in shape to run.

Fox & Co., operating the Shafter, under lease from the Niagara M. Co., have a 3-foot vein of ore.

The mill on the Brunswick will soon start up.

A. di Nola of San Francisco has been confirmed as owner of the Clipper gold mine, in Backbone district, by a decision of Judge Sweeney.

F. P. Mitchell and T. Harrison have bonded the Cross Bow, near Redding, and will begin development work.

In the Iron Mountain fire a body of sulphide ore in Peck tunnel is still smoldering. Miners say it will not continue. Men are working.

SIERRA COUNTY.

The Orient G. P. M. Co. has levied a 30-cent assessment, delinquent Dec. 4.

W. W. York and sons are sinking on the Forest Queen, in Slug canyon, near Downieville.

SISKIYOU COUNTY.

(Special Correspondence).—The Black Bear mine has been sold to an Eastern company for $150,000. Mr. Daggett still retains the White Bear mine, upon which development work is being done.

The Yreka M. & M. Co. (Ball mine) have bought the air compressor and entire hoisting outfit, drills, pump, etc., of the Know Nothing mine. The compressor will be in operation at the Mountain Laurel mine by Jan. 1st.

There is considerable water from the last storms. The Ball Co.'s mill started Nov. 1st. The twenty stamps and five concentrators run smoothly. Mr. Pierpoint is mill foreman and has charge of the day shift and Mr. Hubbard the night shift. The mine is producing ore, and the output will be increased when Supt. Ball has the compressor installed.

The Salmon River Co. are working on their flume extension to the Meyers claim.

Rollin, Nov. 10.

Miners are at work on the Cherry Hill, on Cherry creek, getting out ore for winter crushing.

At the King Solomon, near Cecilville, it is said that only one pound of quicksilver to every 150 tons of ore treated is lost, the California average being about one pound of quicksilver to every thirty-five tons of ore.

TUOLUMNE COUNTY.

The development in the Golden West mine, situated on the Comstock Ranch, has reached such a stage as to, in the judgment of its directors, warrant the erection of a mill on the property. A carload of machinery is reported at the Sonora depot for the company.

The main building for the chlorination plant at the Shawmut, Jamestown, is completed. The foundation for the furnace has been laid and the ironwork is being put in place.

Seventy-five men are working at the Confidence, Jamestown.

More men will be put on at the High Point, near Stent. The drift on the 300-foot level is in 115 feet.

The 20-stamp mill at the Dutch mine, Quartz, is running. Forty men are employed and more will be put on as development progresses.

A 10-stamp mill is going up on the Hope, near Sonora, S. Ralston Supt.

It is stated that the Seminole, C. H. Thomas Supt., may resume, and that either electricity or compressed air will be used for power—probably the latter.

The new mill on the Poison Oak is nearly completed. The shaft is down 247 feet.

Work on the Mack shaft, Big Oak district, is discontinued until the mill is completed.

L. Barrone has men driving a crosscut tunnel on the Blue Bird extension, near Carters.

Assays of ore from the Blue Bird, recently made by the Selbys, gave $217.50 per ton. It is locally understood that a company may take over the Blue Bird.

Men are putting in an engine and boiler at the Crystalline, near Sonora.

The Confidence mill is running and many men are employed.

The Clio mill will be run day and night, instead of twelve hours daily, as now.

A circular from H. B. Stearns, covering the listing of Santa Ysabel G. M. stock, shows that the 130,000 shares issued, of the 150,000 shares of capital stock, have been admitted to the listed department. The present company succeeded the Santa Ysabel G. M. Co. of Wyoming, and the stockholders of the latter company were allowed to exchange their stock for stock in the new company on payment of $1 per share bonus. Twenty thousand shares are reserved in the treasury to provide funds if needed. In a letter of Nov. 7 the company states that all its outstanding notes have been paid and there is on hand a cash balance of $44,389. The balance sheet, dated Sept. 1, 1900, shows: Debit—Treasury stock, $20,000; mining property account, $73,997; expense account at mine, $607; expense account (general), $456; Haas Bros., $938; cash on hand, $91,547; total, $187,545. Credit—Capital stock, $150,000; notes payable, $36,000; mining sales account, $1545; total, $187,545.

TRINITY COUNTY.

The mill at the Ralston mine, near Dedrick, has been closed for the season. The mine is being operated.

COLORADO.

BOULDER COUNTY.

The new 30-ton concentrating mill at the Success, near Ward, W. B. Rundle manager, is running.

The Alaska tunnel is in 1500 feet.

The 40-stamp mill at the Boston is running steadily. A 20-stamp mill may be added.

The Pennsylvania mill at Sunnyside is closed down temporarily.

Plans are on foot for the consolidation of the Mogul tunnel, the Enterprise mine and the Bailey chlorination mill at Boulder. Should the deal go through, the new company will probably enlarge the mill and put in a surface motor tramway from the foot of Spence mountain to the mill.

CHAFFEE COUNTY.

Rea & Larson will resume operations on the Harrison group, in Fleming gulch, near Turret.

The new air compressor at the Queen City is running.

Galvin & Bradberry are drifting on the 80-foot level at the Spondulix, near Granite.

The Florence-Elmo M. Co., of Florence, capital $500,000, is incorporated to work property near Buena Vista, in St. Elmo district. C. R. Bernard, president and general manager. The company has three shifts of men on development work.

W. Wallace, Sr., has made a strike in the Red Rover tunnel, on South Clear Creek, near Winfield. He has opened a 7-foot body of copper-iron sulphides, carrying lead.

CLEAR CREEK COUNTY.

The upraise from the Knickerbocker

tunnel to connection with the Emerson shaft was successfully completed on the 3rd inst.

The Pioneer Co., Idaho Springs, is advertising for twenty-five miners. A new gasoline hoist is in and sinking will be pushed.

The Lemartine plant, Mgr. Hanchett, is now run by electricity from Georgetown. The hoist and compressor will be driven by air.

A new 80 H. P. boiler and compressor have been placed in Empress mill, Empire.

Five cords of ore from the Lombard-Polaris, near Yankee, returned twenty-five ounces gold; A. Ashbaugh owner.

The Toledo group, in East Argentine district, is bonded to Bonham & Son for $10,000. They will push work.

The Aududdel, near Idaho Springs, is sold to the John Owens M. & M. Co. for $75,000. The first payment of $15,000 is made. It is said that $200,000 will be spent in development by the new company.

Manager T. A. Irvin of the Garden, on Seaton hill, near Idaho Springs, states that he is drifting and opening new ground at 400 feet with good showing.

COSTELLA COUNTY.

The Trinchera Estate Co., owning a large portion of ground in Grayback district, has issued a series of mining regulations of its own. The locator is required after filling his location certificate at company's office, to do an assessment equivalent to the removal of 240 cubic feet of material. Within a year from date of location claimant is required to do $100 worth of work on his claim and also to file with company his written application for right to purchase claim, accompanied by $50 for payment of survey, and within sixty days after delivery of plat of survey to claimant he is required to pay for his claim at the rate of $10 per acre. Extensions of locations are reserved at pleasure of the company. Under these regulations a claim 1500x300 feet can be secured within a year at a cost of not to exceed $300.

DOLORES COUNTY.

G. Sanborn will resume work on the Puzzle Extension, Horse gulch, near Rico.

A body of zinc ore was recently opened up at the Silver Swan group, on Expectation mountain. The company is remodeling the Norton concentrator and will treat ores from the Silver Swan and Derby–Evans groups by Jan. 1; Nicholson Spelter Works, Iola, Kansas, lessees; T. Jones manager.

The Emma, Dunton district, R. Keller Supt., may double the capacity of the mill soon.

EAGLE COUNTY.

At the Wilkesbarre, Red Cliff, Supt. E. Dale, a new plant of machinery is in, and sinking of 4x5x9 double-compartment shaft goes on.

EL PASO COUNTY.

The new plant at the Elkton, costing $65,000, is running.

The Hartman, near Lanter City, 6 miles south of Woodland Park, has ten men at work. The shaft is down 100 feet, the bottom being in 17 inches of ore averaging one ounce to the ton.

FREMONT COUNTY.

(Special Correspondence).—The importance of Florence as an ore reduction center is increasing. The National and El Paso chlorination mills are operating on 150 and 100 tons per day, respectively, the Metallic (cyanide) running at the rate of about 300 tons per day. The chlorination plant of the Union Gold Extraction Co. is one of the most modern in existence and will be in operation before Jan. 1st. Its capacity is about 500 tons. A technical article descriptive of this property will be furnished the readers of this paper a little later. W. B. Milliken is manager and John E. Rothwell Supt.

The new cyanide plant of the Dorcas M., M. & D. Co. is rapidly nearing completion. Its capacity will be 125 to 150 tons and will be a custom mill. The ore will pass through a 10x20-inch Blake crusher, thence to $\frac{3}{16}$-inch mesh crushing rolls, thence through an automatic sampler, and is then conveyed by belt conveyors and distributed to ten V-shaped ore bins, having fifty-five tons capacity each. The material then passes through the cylindrical drier of the usual pattern, thence through screens and fine crushing rolls, which prepare it for the roaster, which is of the Holthoff–Wethey type. From the roaster the material is delivered to hoppers above the cyanide leaching vats, through which it is distributed, as required, to the vats. The vats are of steel, six in number, size 4x30 feet. They will be equipped with a pneumatic device for supplying air through the pulp. The precipitating room and bullion furnace are being well arranged on a floor below.

The usual vacuum tanks for drawing off the solution and the sump tanks to catch the exhaust are provided. On the lower floor is a row of eight Wilfley tables. The pulp passes from the vats through agitating tanks to the tables for concentration. To obviate the harmful effect of dust and also as a saving device, dust collectors are being put in on the crushing floor. After the roast a certain per cent of lime is added by means of Janin's automatic ore feeder. This company is made up largely of Boston and Cleveland people, J. M. Hower being manager and Louis Janin Supt.

The cyanide and chlorination plants handle Cripple Creek ores that run from $10 to $40 per ton—none that run below $10. As greater depth is gained in Cripple Creek mines, an increasing percentage of sulphur is observed. At present the ores may be said to average 2% sulphur or over, the silica running about 58% to 60%.

Some four or five months ago the mills made a reduction of treatment charges, and they now stand at $6 to $9 per ton delivered at the mills, the railroad rate being $1.50 to $3 per ton from Cripple Creek to the mills at Florence, Cyanide and Colorado City. The $6-dollar charge at the mills is on ore running $\frac{3}{4}$-ounce and below; the $9 rate being on ore running from 2 ounces up to 5 ounces gold.

The Rocky Mountain Smelter, being erected at Florence on plans prepared by Dr. R. F. Carpenter, will be a general smelter—that is, it will handle ores from all sections. The plant is built of structural steel, supported by heavy retaining walls of masonry, and includes two 36x180-inch furnaces, with two Connellsville blowers and two engines and three boilers. By Jan. 1, or sooner, this plant will doubtless take its place as one of the potent factors in the field of applied metallurgy.

The old Beam mill, now in the hands of the Florence M. & R. Co., is being changed and repaired with the idea of using the Beam roasting furnaces and applying what is known as the continuous system of cyanide treatment, with some features of amalgamation and concentration.

Manager John Jacobs of the El Paso Reduction Works states that the ore handled by that plant, amounting to 3000 tons per month, will average $25 per ton.

A feature of the National is the concentration of the refuse after chlorination by ten double-decked tables, by which, Manager J. R. McDonald states, a saving of 40% of the values left in tailings after chlorinating, is made.

All the Florence plants are equipped to use crude petroleum as fuel for the roasters, though they are also equipped to use coal. The consumption of this grade of oil product keeps up to the limit of production most of the time. When coal is used, the better grade is obtained, as the operators say they do not find much economy in using the cheap grade of slack.

The reduction works at Florence, Cyanide, Colorado City, Victor and Cripple Creek, including those nearing completion, will have a capacity of nearly 3000 tons of ore per day, or 90,000 tons per month, which is a greater tonnage than the district ever has produced; and it must be conceded that the Denver and Pueblo smelters will continue to get a considerable share of the district's output. But this abundance of reduction facilities must be regarded as favorable to the stimulation of ore production. The transportation facilities for reaching the reduction works with district ores are reaching a point of excellence hitherto unequaled.

Florence, Nov. 9. WASCOTT.

GILPIN COUNTY.

Shipments of ore from Central City for October were 344 cars, or 6365 tons.

The new hoister for the Kansas-Burroughs is running.

A 6 H. P. gasoline engine is to be put in on 1100-foot level of the Grand Army mine, Gunnell G. M. & M. Co. Sinking will be continued.

Jenkins, Lightbourn & Co., operating the old Gold Dirt at Perigo, near Gilpin, will run the Peterson & Daisy 15-stamp, slow-drop mills during the winter, requiring a daily output of thirty tons ore.

The Wizard M. Co. of Boulder are running a 350-foot crosscut tunnel into War Eagle hill, Central City.

Manager McCann of the Phœnix–Burroughs has the new 125 H. P. double-engine hoister in place, and sinking will be continued to 1165-foot level. October output of the Kansas–Burroughs Con. M. Co., operating the Phœnix–Burroughs, was 2449 tons ore.

The Peterson mill building is remodeled. New ore bins and a tailings house have been put in and a dam across the creek is finished.

The Gettysburg shaft, now down 185 feet, will be sunk to the 200-foot level. Three eight-hour shifts are working.

The Register-Call says that there are more miners at work on day's pay in Gilpin county than ever before in the history of the camp.

At the Clark-Gardner, on Quartz hill, near Central City, Manager J. W. Bostwick has day and night shifts drifting, etc. A 50-ton lot of ore will be shipped to Idaho Springs to be treated by concentration. At the Jones, near Nevadaville, work is in progress on the fifth and sixth levels. Ore is being treated at the Randolph mill. Supt. J. Hooper of the Gold Collar, in Prosser gulch, will resume sinking shaft, now down 660 feet, upon completion of a drift to hold water which has rushed in in last 200 feet of sinking. Shaft will be sunk 100 feet deeper. A new coal building is going up.

About twenty-five leasers are employed at the Bonanza tunnel property in Chase gulch, all on tribute system. Enough ore is being taken out to make daily shipments of twenty tons to Blackhawk mills with fairly good returns.

The Colorado-Ontario G. M. Co. has day and night shifts sinking shaft, now down 500 feet, on the O'Neil, in Gregory district; forty-eight men are employed. Supt. Loth of the East Boston & Gilpin G. M. Co., operating the East Boston, Gregory district, is shipping ore to Blackhawk. Supt. Harris reports a 10-inch streak of iron ore in shaft at the National, carrying values estimated at $60 per ton. Shaft is down 500 feet.

During the first week of November shipments of smelting and crude ores, mill tailings and concentrates from Blackhawk to outside points were ninety-six cars, or 1776 tons.

The Justice, in Lake district, Central City, will be operated by the New Haven & Denver Con. M. Co. Extensive developments are contemplated. L. Jones of Russell gulch will be underground foreman. The Hillsdale M. Co. has taken a three-year lease and bond on the Hamlet and Number One properties, on German hill, near Central City. A new shaft building has been erected on Number One, and shaft now down 70 feet will be sunk to 160-foot level to cut Hamlet vein. Nicolls Bros. are in charge.

GUNNISON COUNTY.

The work in progress on the big Reynolds group at Pitkin is nearly completed. The surface buildings are about finished and the four-drill compressor and boilers on West mountain are in place on old Islet millsite. Six-inch air-line pipe is laid from compressor to mouth of tunnel, a distance of 1200-feet. The powder house is completed; tunnel building is 40x45. An air stack is being built for ventilating tunnel.

At the Silver Basin, the powder house has been completed, and shaft house, 22x50, with compressor and timber room, 12x50, are nearly finished. The drainage tunnel has been connected with shaft and latter retimbered. The air drills will be started Dec. 1.

I. S. Johnson, lessee of the Gold Cup mine, will sink the incline 200 feet. The incline is down 800 feet, with a 50-foot winze.

J. J. Murphy has leased the Lamphier group, Ohio City. If developments are satisfactory he will put up a concentrating plant on property.

The Pittsburg-Gunnison Co., Ohio City, is shipping ore from the Granite Mountain to the Jersey Blue mill.

A new hoist and other machinery have been put in on the Lilly, near White Pine. Eight men are employed.

Supt. K. Gillespie of the Star, on Italian mountain, near Aspen, is pushing work on buildings, etc., to completion, and production of ore will soon begin.

The Doctor, on Spring creek, has closed down for the season. It will resume about April 1.

A whim is in on the Wizard Oil group, near the Doctor, and work will be pushed as long as weather permits. A good lead of ore was opened up recently.

A. R. Burnett will work the Lead King, near Crystal, during the winter.

The Ben Franklin, near Pitkin, is bonded to the Citizens' M. Co. for $50,000.

HUERFANO COUNTY.

The Colorado & Western Fuel Co., capital $350,000, are working coal mines in Bear Creek district, 2 miles west of Walsenburg. The company is figuring on the erection of a big plant and the employment of 200 men.

At the Ojo mines (copper), near La Veta, many men are working.

LAKE COUNTY.

(Special Correspondence).—The output of Leadville is running about 2400 tons a day, only about 500 tons of which are lead carbonates. The tonnage of the district comprises a considerable amount of iron oxides, but the bulk of the product consists of siliceous sulphides, carrying gold and silver.

Leadville, Nov. 10.

Mrs. J. E. Dunn of Leadville projects a mill on the St. Anthony next spring.

Another 80 H. P. boiler is being put in at the Valentine. A large double expansion pump will be placed on the 500-foot level.

The shaft at the Catalpa, Leadville, is down 500 feet.

E. D. Dickerman and others, operating the Pittsburg, on Fryer hill, have put in new machinery, retimbered the shaft, etc., and ore is being taken out.

Regular shipments are now being made from the P. O. S. shaft of the Nubian Co., Leadville.

The output of mines of Leadville district has increased 40% during the past year and amount of actual mining has almost doubled during that period. In 1899 the daily output was about 2000 tons. It is now between 3000 and 3500 tons.

The Northern, Leadville, J. W. Newell, manager, is getting out silver-iron ore, carrying 56% iron, silver values, and about 2% silica per ton. Output is about twenty-five tons per day.

On the California, Leadville, in eight months the company has erected a surface plant, has sunk shaft 530 feet, has cut two stations and put pumps therein, and has done considerable drifting. Sixty feet of shaft was sunk through dolomite.

The Home M. Co., Leadville, has put in a new fuel plant on the Penrose, to cost 25% less than that in ordinary use. It is a gas produced by pumping air through heated petroleum which carries with it one part of hydro-carbon gas to nine parts of air. At the Penrose boiler house five air-tight steel cylindrical tanks, 10 feet high by 5 feet in diameter standing on end, have been erected. Coiled steam pipes in these heat petroleum to 185° F. and hydro-carbon gas is thrown off. Air is then forced through a finely perforated false bottom, and, passing through the oil, carries with it the gas, which combines with air and is carried off to fire boxes under boilers. The tanks now being put in will be of 400 H. P. and will supply fuel for four large boilers at the Penrose and one at the Starr shaft.

A new plant is going in on the Little Chief, Leadville, and operations will resume.

The A. Y. & Minnie mill is treating 100 tons of ore daily from that mine.

A new plant is going in on the Robert E. Lee.

It is probable that a large hoisting plant will be put in on the Doris, Leadville, Manager Mamlock.

A new 13,000-pound pump, with capacity of 700 gallons on a 500-foot lift, is being placed at the Home Extension. A new 12x12 double-friction hoister is also going in. Manager Gaines reports shaft down 420 feet and that sinking progresses at the rate of 6 feet per day. A station will probably be cut on 450 or 475-foot level.

The shaft at the California Gulch, Leadville, is down 530 feet.

OURAY COUNTY.

J. M. Blatt and associates of Cleveland, O., who bought the Smelter Trust, Iowa and other properties near Ouray, Oct. 22, have begun sinking and development will be pushed.

The Camp Bird Extension M. Co., capital $2,500,000, owning nineteen claims adjoining the Camp Bird, will push development during the winter.

Work on the Black Diamond group, in Yankee basin, near Ouray, is being pushed by Manager L. D. Chelders. Machinery will be put in next spring and a tunnel run on the 200-foot level.

The report from Salt Lake City to effect that T. A. Rickard, while there, announced that sale of the Camp Bird had been concluded for sum of $6,500,000, is denied by Mr. Rickard, who wires from New York: "The statement quoted by The Times was entirely unwarranted. I said at Salt Lake City that the deal was still pending and that the original price was $6,500,000."

C. Newman, of Durango, is developing the Mono group, near Red mountain, Ouray. He has opened up a body of iron sulphides carrying from $8 to $15 gold to the ton.

Ore from the Matthews, near Red Mountain, recently assayed $\frac{8}{100}$ ounce gold, 22 ounces silver, and 74% lead per ton.

The Mountain Lion group, G. C. Franklin manager, will work three shifts—sinking, crosscutting, etc.

It is locally reported that T. A. Rickard, consulting engineer of the Venture Corporation of London, Eng., has announced that the price of the Camp Bird, Ouray, has been raised on account of recent successful developments.

PARK COUNTY.

Cincinnati men will develop property near Guffey, recently bought from Morath Bros. Mine will be equipped and work continued during the winter.

PITKIN COUNTY.

The branch railroad from Aspen to the

Newman tunnel is completed, and the new reservoir to supply power for air compressors will be finished next month, when it is expected shipments of ore will begin.

SAGUACHE COUNTY.

The Lucrative M. Co., operating the Eagle (silver) in San Luis valley, near Villa Grove, is sinking shaft, now down 250 feet, to 500-foot level. Many men are working and development will be pushed.

SAN JUAN COUNTY.

The Sunnyside Extension mill, Silverton, is running twelve hours daily. There are thirty men employed in the mine and mill.

The Freeport & Cripple Creek Leasing Co. has bought forty acres of land near Freeport, and will, it is said, put up a 100-ton mill.

The San Juan Chief, Mineral Point, E. M. Brown manager, is closed down for the season.

The Minnie Gulch M. & T. Co., in Minnie gulch, S. Martin manager, has eighty men at work.

The Ridgway, in Maggie gulch, is reported sold for $60,000. Twelve men will be kept on during the winter, and next spring an air compressor will probably go in and three tunnels be run.

Snow has prevented the "blowing in" of the Kendrick & Gilder smelters at Silverton. It is thought, however, that smelting will be begun Dec. 1.

SAN MIGUEL COUNTY.

The Shenandoah Gold Mines & Smelting Co. has bought the Shenandoah and Iron mines in Mt. Wilson district. It is said the company will put up a stamp mill with capacity of concentrating ten to twelve tons daily. Mill will be built about a mile from the mine and ores will be conveyed from latter by means of a 7000-foot aerial tramway at an estimated cost of 8 cents per ton.

SUMMIT COUNTY.

The 7x7 tunnel of the Gold Run Milling Co., Breckenridge, is in 150 feet.

TELLER COUNTY.

(Special Correspondence).—The output of Cripple Creek district for month of October is placed at 30,000 tons ore—6000 tons going to smelters and 24,000 tons to cyanide and chlorination plants, while that for November is estimated at 15% increase over that of October.

The Independence T. & M. Co., locally known as the Hull City, will increase its production, and the same is reported as to the Isabella. In general, it may be said that by Jan. 1, 1901, the big mines of the district will be in condition to work steadily and at their greatest capacity; every existing condition indicates a pronounced increase of ore tonnage for next year. The year 1900 will be noted for the numerous consolidations and for the large expenditures made for new equipment and betterments about the leading mines of the district, with result that the principal producers of the camp have to-day a class of boilers, hoisting engines, air compressors, electrical machinery, shaft houses and ore houses and other equipment that takes rank with the best in any part of the world.

In an article written from Florence, in this issue, the growth of milling facilities at valley points is noted. In this connection it may be predicted, with some degree of certainty, that there will be no more mills or reduction plants erected in Cripple Creek district. The disadvantage of operating them here, as regards water supply, fuel and other conditions, has been demonstrated, especially as custom plants. The largest mill in the district is the Economic and that is designed to operate solely on ores produced by one group of mines.

Despite the fact that the tendency of the mills is to have their own sampling works, the public sampler is and likely will continue to be a factor in the district. At present there are four or five of this class operating within the district. Among these the Rio Grande handled for October about 7000 tons, which will be increased for November.

The Oneida mill, not proving a success, has been abandoned and will be dismantled. WASCOTT.

Victor, Nov. 10.

(Special Correspondence).—A strike of rich ore was made by the Ophelia tunnel in its course through Mary McKinney grounds. The vein discovered will be thoroughly exploited by the Anaconda and Mary McKinney companies, as both are believed to possess an interest in it.

The Gold Dollar shipments for October amounted to 600 tons, worth $25,000.

The Last Dollar mine will pay a dividend of 2 cents per share on Nov. 21, amounting to $30,000. This is the first dividend paid since last February.

Cripple Creek, Nov. 10.

Mr. Jackson, leasing the Gold Sovereign, Victor, is pushing development. The shaft, present depth 375 feet, will be sunk an additional 100 feet.

Cripple Creek reports a strike in the property of the Gold Bond Con. M. Co., on Gold Hill. The vein has a width of 4 feet with an average assay of $200 per ton.

The Bonanza Leasing Co. are down 450 feet on the Temony, Cripple Creek; sinking will be continued. The lessees of the Indicator will probably put in new steam plant soon. Results are good, dyke matter $6.25, phonolite $11.80, and screenings from both have run $8.60 to ton. A new plant is going in on the Speeler, on Bull hill, Cripple Creek.

At the Princess Alice, Cripple Creek, foundations are under construction for a 10-drill compressor. The new electric hoist on the Gold Sovereign is hoisting ore from 400-foot level.

A strike has been made upon the 72-foot level of the Dante, Victor, by Sebeck and others, one assay yielding $1320 gold to the ton. An ore house is up and 10-ton shipments are made weekly. The Crest City Leasing Co. are drifting on 250-foot level on blocks 2 and 3 of the Dexter.

The 500-foot shaft on the Coriolanus, on Battle mountain, Victor, is completed. The Denver M. & Leasing Co. on the Victor Con. are crosscutting on 160-foot level. Ore runs about $8 to ton. The battery of boilers at the Portland shaft No. 2 are in ready for new hoist, which will be in place next month.

The Frankie S. Co. on Raven hill, Cripple Creek, have put in new steam plant and are crosscutting for the Joe Dandy vein at 100-foot level. The Elkton shipped 1057 tons ore during September, for which it received $98,994.24.

The Gilpin & Cripple Creek G. M. Co. have leased block 2 of the Atlanta, Cripple Creek, to C. Myers. Block 1 is leased to T. A. Collins and others. Work is in progress on both blocks and both lessees will put in steam plants.

The Blue Bird, Victor, will sink its shaft, now down 500 feet, to 1000-foot level.

The Jolly Jane, South Victor, has new gallows-frame in place and other improvements are nearly completed.

The new pumps are in at the Santa Rita, Cripple Creek, and drifting on 550-foot level is being pushed.

McNeil & Dingman, leasing the Zeolite & Bloomington claims, on Battle mountain, Victor, are pushing development.

The machinery at the John A. Logan, Cripple Creek, is running and work of connecting the Eagle with the Orpha May is progressing.

The Tipton is sold to D. Woodruff for $12,000.

Work at the Princess Alice is temporarily suspended while new air compressor is being put in. Operations will resume in about two weeks, it is thought.

A steam plant will be put in on the Bonzai, on Squaw mountain, Cripple Creek. Sinking is in progress, and at 100-foot level a crosscut will be driven.

J. Crawford has leased a block on the Australia, on Beacon hill, and has commenced development.

A new vein has been opened up on the 415-foot level in the Ironclad, Victor.

The plant at the Yellowbird, Cripple Creek, T. J. Moynahan operator, is running.

The shaft at the Tenderfoot, now down 300 feet, will be sunk to 400-foot level.

The machinery from the old shaft of the Eclipse has been moved to new shaft, and operations have resumed.

The Theresa Leasing Co. has opened up ore on 400-foot level of the Theresa.

The Anchor group, near Freeland, is reported sold to Colorado Springs and Eastern men for $50,000.

The Molly Dwyre, Cripple Creek, has closed down temporarily.

The controlling interest of the Comanche Plume Co. has passed into the hands of the Colorado Western Co., which will sink a deep shaft.

IDAHO.

CUSTER COUNTY.

The mills on the property of the Lucky Boy M. Co. at Custer have suspended operations for the season; M. Bamberger Supt. They will resume early next spring.

ELMORE COUNTY.

The Golden Age M. Co., Ltd., of Lincoln, Neb., H. St. Cyr manager, will work the Atlanta Con. mines at Atlanta. It is probable that they will put in a large plant. About thirty men will be kept on during the winter.

IDAHO COUNTY.

Near Buffalo forty men are working on the Big Buffalo. The Vesuvius employs twenty men.

SHOSHONE COUNTY.

Four new 5-stamp mills will be running next spring in the Pierce district.

MICHIGAN.

HOUGHTON COUNTY.

The reverberatory furnaces at the Calumet & Hecla smelting works at South Linden have been increased to more economically smelt low-grade ore. Each furnace has a steel-charging platform. The new stacks are 93 feet high. A 40x96 cupola will be ready by Dec. 15.

MONTANA.

FLATHEAD COUNTY.

Johnstone & Scarlett will put up a stamp mill on the Cedar gold claims, on Libby creek, near Libby, next spring.

MISSOULA COUNTY.

Missoula says: "This is the busy time for the mine owners, who have to perform their annual representation work. The number of affidavits that have already been filed with the county clerk and recorder show that hundreds of dollars' worth of work has been performed. All the old prospectors and miners are now being employed. Owners of mines who reside in other parts of the country secure all the idle men in this section to perform the work, and, as a result, very few idle miners are now in the city. Most of the work that has been performed so far this year has been in the district along the Cœur d'Alene branch. Judging from the affidavits already filed, the country is full of miners, who are rushing the work, that it may be finished before the cold weather sets in. The class of work that is being done depends on whether the mine is a quartz or a placer mine. The owners of placer claims in a majority of instances in their affidavits report the building of new sluice boxes. One or two have reported that several miles of this class of work have been done this summer."

PARK COUNTY.

The St. Julien M. Co., Livingston, is adding improvements to the mill. The latest consisted of an ore feeder.

SILVER BOW COUNTY.

On the 10th inst. fire broke out in the 200-foot level of the Bell, at Butte, and is still burning.

NEVADA.

ELKO COUNTY.

Output of the Dexter, Tuscarora, is 140 tons ore daily.

The new 10-stamp mill and cyanide plant of the Bull Run M. Co., near Tuscarora, are in successful operation. J. L. Powell is in charge of the mill and H. C. Messimer is in charge of the cyanide plant.

ESMERALDA COUNTY.

J. Chiatovich has ten men working on the Mary, near Silver Peak.

Supt. McCormick of the Vulcan, Hawthorne, says that the Parrott will resume and that thirty men will be employed. The shaft will be sunk to the 500-foot level and a 75-ton smelter will be placed on the property.

EUREKA COUNTY.

The Rocco-Homestake-Nevada, Eureka, has resumed payment of dividends.

The Eureka Tunnel mine and properties connected therewith are leased to M. Antoniazzi & Co. for two years.

The Whalen Con. Co. is putting on more men on properties near Eureka.

LINCOLN COUNTY.

The Quartette Co. at Searchlight has eighteen men working at the mine and sixty building the mill, on the Colorado river, 14 miles distant. A railroad to connect the mine and mill is projected.

STOREY COUNTY.

The main south drift on the Savage, Virginia, from the Gould & Curry tunnel, on the 425-foot level, is in a distance of 200 feet. The face is in vein porphyry, with seams of low-grade quartz through it.

WASHOE COUNTY.

On the 8th inst. the following board of directors for the Reno Smelting & Milling Co., Reno, was elected to succeed the old: H. M. Martin, J. B. McCullough, G. H. Taylor and O. J. Smith.

Mr. Curnow of Reno will run a 300-foot tunnel to tap ledge on property near Spanish Springs. Ore assays 24% copper.

NEW MEXICO.

SANTA FE COUNTY.

S. G. Burn, manager Galisteo Co., operating on Ortiz grant, near Dolores, says that the Edison process of extracting gold from gravel has proved a success at the experimental mill put upon the property. It is said that Edison will be in Dolores this month to make preliminary arrangements for the erection of a large plant.

SOCORRO COUNTY.

The Lead King and Lead Queen mines, in the San Andreas mountains, are reported sold to the Salinas Peak M. Co. for $100,000.

TAOS COUNTY.

The Black Copper, 5 miles from Red River, will put in a new mill. The Red River Copper Co. is building an engine and hoist house. Sinking is in progress.

OREGON.

BAKER COUNTY.

A good body of silver ore has been opened up on the Tempest, in the Greenhorn's. Work has been started on a 150-foot tunnel at depth of 40 feet. More men will be put on and shipping of ore begun.

The new shaft and connections for the Red Boy, Baker City, are on the ground and they are being placed in position. The shaft is of steel 18 inches in diameter and will lift nine tons 2000 feet. A flat woven steel cable is used.

The Laclede Con. G. & C. M. Co. is sinking and drifting on properties in Powder River valley, about 32 miles from Baker City.

F. S. Lack and others have bonded property of the old Nelson Placer M. Co., near Auburn. The company intends to work property by the California method, and will put in a hydraulic elevator.

GRANT COUNTY.

G. Thornburg has men working on the Belcher group, near Granite.

JACKSON COUNTY.

Opp Bros. of St. Louis, Mo., operating the McWilliams & Casey, on Jackson creek, near Jacksonville, intend to put in a 20-stamp mill and a cyanide or chlorination plant. Fifty men will probably be employed.

The Wolverine M. Co. of Montreal, Quebec, have sent twenty-five tons ore from their copper mine, 2 miles south of Jacksonville, to the Selby Smelting & Lead Co. of San Francisco for test.

JOSEPHINE COUNTY.

The Beach & Platter placer mine at Althouse, containing 500 acres, has been bonded by J. Conant of Redding, Cal.

The C. & C. (hydraulic) on upper Jump-off Joe, Galice, is leased to W. E. Davis and others of Chicago, Ill. Work will be pushed; J. B. Wetherell Supt.

SOUTH DAKOTA.

LAWRENCE COUNTY.

At Deadwood the Homestake Co. expects to start up the new 1200-ton cyanide plant by Jan. 1st. It is the largest cyanide plant in the country, being 345x200 feet. There are twenty-four tanks, for various purposes, which will take care of all tailings from three stamp mills, or about 2400 tons daily. There will be no crushing machinery. The tailings contain about $1.50 in gold per ton. The company expects to erect another cyanide plant nearly as large, on the north side of Lead hill, a mile from the other plant.

The statement of the Homestake M. Co. of Lead, just published, gives complete record of the company since its organization. There have been shipped from mills 2609 bricks, of an average weight of 140 pounds each, making a grand total of 365,260 pounds of gold, valued at from $65,000,000 to $70,000,000. Of this amount the company has paid in dividends $9,193,750—nearly one-half the capitalization of the company. It is estimated that the mine now has more than sixty years' supply of ore in sight.

UTAH.

PIUTE COUNTY.

G. F. Dalton, manager Dalton Co., Marysvale, expects to put up a new mill next year. The main tunnel, now in 400 feet, will be run 800 feet farther.

The Ross M. & M. Co., capital $10,000, is incorporated to work the Ross group.

SALT LAKE COUNTY.

Supt. A. Mayberry of the U. S. M. Co., Bingham, is pushing work on the new tunnel, etc.

It is reported that L. B. Doe and F. W. Wood of San Francisco, Cal., will establish sampling works in Salt Lake City.

The Sunbeam and El Ray mining companies will consolidate.

The Bullion of the Helen M. Co., near Boulder Springs, Supt. Nesbit, will put on more men. A winze will be sunk to the 100-foot level.

The Dewey mill, Bingham, is running on ore from the Ashland, near there.

The Shawmut mill has shut down temporarily, owing to failure of electric power from Jordan Narrows; work in the mines is progressing, however, twenty-six men being employed.

Supt. Carruthers of the Shoebridge Bonanza, Tintic, has made a good strike on the 525-foot level. Shipments of ore will soon begin. The new refinery of Bothwell & McConaughty, at intersection of

Fourth South and Tenth West streets, Salt Lake City, will be 20x40 feet, and will be built of brick and stone. Erection is under way and projectors expect to have it turning out bullion early in December.

Supt. A. Clayton of the New State, in Little Cottonwood canyon, is taking out ore, yielding, it is said, 40% lead, 41 ounces silver and several dollars in gold per ton.

SUMMIT COUNTY.

The tramway and other improvements at the Silver King, Park City, will be finished Jan. 1.

The Park City Record reports shipments through the Mackintosh sampler for week ending Nov. 10th as follows:

	Pounds.
Silver King	1,369,000
Daly-West	1,046,000
Anchor Con	177,000
Ontario	160,000
Loring	88,000
Total	2,840,000

TOOELE COUNTY.

Supt. Stackpole of the Overland mill, near Sunshine, is pushing work of construction and it is expected that plant will soon be ready to run through 100 tons ore per day.

The Sacramento, Mercur, recently shipped East 300 pounds gold dust from its cyanide plant to be melted into bullion. Brickwork on roaster is under way and latter will probably be handling ore by Jan. 1st. The new pumping plant at the Honerine, Stockton, Manager Scheu, is running.

On the 8th inst. the property of the Geyser-Marion M. Co., Mercur, was sold at sheriff's sale by A. B. Sawyer, representing McCornick & Co., in whose favor judgment was recently confessed for $13,288.

UTAH COUNTY.

The Vira M. Co., capital $25,000, is incorporated at Provo, G. A. Storrs Pres.

WASHINGTON.

FERRY COUNTY.

The Bryan & Sewall, Republic, after a year's shut-down, has resumed. The ore is of a smelting quality carrying gold, silver and lead. Sinking will be done to the 300-foot level. P. O. Rothrock is manager.

The south drift on 300-foot level of the Chico, Republic, is in 163 feet.

Supt. D. I. Nickerson of the Butte & Boston has crosscut 140 feet, striking hanging wall at 100 feet and running 13 feet through ledge to foot wall.

Sinking on the Hercules shaft, Republic, progresses at the rate of 10 feet per week.

Supt. Downing of the Tom Thumb is sinking a shaft at the rate of about 3 feet per day. The shaft, now down 285 feet, will be sunk to the 400-foot level.

The Zela M., Sheridan Camp, is closed down for the winter.

At the Quilp, Republic, more men will be put on when mills are ready for ore.

The California shaft is down 100 feet; a 20-foot drift has been started eastward on vein. Road from the mine to Meyers Falls stage road is completed.

F. Gauthier says that the Golden Harvest will resume.

H. Hissel and J. Carmany are sinking on the Sailor Boy, Nine Mile creek. Ore averages $8 gold and six ounces silver per ton.

OKANOGAN COUNTY.

At the Puritan mines, near Loomis, Mgr. Jackson has everything in shape for winter work. Flume is nearly completed and the air compressor will soon be in. R. Baggaly, Supt.

The Golden Zone mill is shut down to put in new plant. Mgr. Meskimen is pushing work of mining and tunneling.

Mgr. Chilson, of the Utica-Oro Fino is pushing work on tunnel.

STEVENS COUNTY.

It is stated that a refinery will be built in connection with the smelter at Northport.

WYOMING.

The directors of the Wyoming D. & T. Co. have declined an offer of $100,000, for an option for one year, for the purchase of their Acme and Lakeside gold mines, Lakeside placer, saw mill and stamp mill at Gold Hill at a price of $1,250,000.

FREMONT COUNTY.

South Pass reports a strike of telluride of gold in the Carissa; Charles Van Sickle manager. The mill is running steadily and a contract for 2000 cords of wood for use this winter has been let.

FOREIGN.

BRITISH COLUMBIA.

At the Paradise group, in Windermere district, Manager Bruce says he has 2000 tons of ore sacked and ready for shipment. Rate per ton from mine to Golden is $7.

A six months' bond for $19,000 has been taken on the Iron Horse group, on Ten Mile creek, Slocan. Bonders are organizing company and will develop property; W. Manley, vice-president and general manager.

J. McGregor of Vancouver contemplates a 250-ton pyritic smelter in Boundary district.

The 18-drill compressor at the Columbia Kootenay, Kootenay, has been transferred to new foundations and operations have resumed. It is thought that forty additional men will be put on soon.

The output from the mines in the Rossland district to Nov. 1 is as follows:

Le Roi	135,078
Center Star	25,110
War Eagle	10,663
Le Roi No. 2	2,267
Iron Mask	1,875
I. X. L	420
Giant	414
Evening Star	351
Monte Christo	273
Iron Colt	80
Spitzee	20
Total	176,551

J. P. Graves, general manager Miner-Graves syndicate, says that the Granby smelter will be increased as soon as new furnaces can be built, to provide daily capacity of 1200 tons. He says: We are mining and smelting at a profit all ore that has a value of $6 per ton and upward.

The Boundary Creek M. & M. Co., Boundary Creek, will resume operations.

The second cleanup of the season of the Consolidated Cariboo Hydraulic M. Co., Ltd., of Cariboo district, made on Oct. 1 after sixty-eight days' run, amounted to 9040 ounces gold, valued at $154,765.

A. F. Rosenberger of Nelson proposes to take over property of the Anderson Lake M. & M. Co., near Ashcroft. If consummated, Mr. Rosenberger will put in a 40-stamp mill.

There are 500 men employed in and around the Trail smelter.

Supt. Martin of the City of Paris, Grand Forks, is shipping ore again.

Men are at work at the Betts group, Finch & Campbell, owners.

A diamond drill will be used on the Earthquake group, in Brown's Camp.

A machine drill will be put in on the Rainbow, on Lake Pend d'Oreille.

The Slocan-Sovereign Co. of Montreal has twelve men working on the Argenta, near Sandon.

Wilson Bros., owners Bird's Eye, near Nelson, contemplate erecting a stamp mill.

The Sailor & Minnehaha mines, Greenwood, will resume this month.

A new hoist goes in on the Waterloo.

MEXICO.

D. S. Cuilty, operating a copper mine near the Santo Domingo Placers, Chihuahua, has four shafts 70 to 90 feet deep. Ore taken out runs 23% copper per ton.

SOUTH AFRICA.

It is reported that a new diamond field has been found near Griquatown, Cape Colony.

Commercial Paragraphs.

The American Steel & Wire Co. have ordered from time to time eighteen Cross oil filters for use in their plant at Chicago, Ill.

The Gates Iron Works, Chicago, has an order for a complete gold milling plant for Borneo and a cement plant for Hongkong.

The Sandusky, O., Tool Co. has an order from a San Francisco company for 12,000 planes, with an extra iron for each plane, to be shipped to China.

The S. H. Supply Co. of Denver, Colo., recently shipped a carload of machinery to the Grand Ledge mine at Kelly, N. M.; also an air compressor to Pitkin, Colo. This company has purchased the machinery in the Royal George mill at Canyon City, the Colorado Experimental Works at Boulder, the Malichite mine at Morrison, Colo.

The Ericsson Telephone Co., New York, recently received the following from J. J. Sullivan, Supt. Pioneer G. M. Co., Towle, Placer county, Cal.: "The desk telephone purchased from you last month is connected up and is giving the best of satisfaction, and works better than any of the phones I have on any of my lines. I have several different makes of telephones on the different lines, but your Swedish phone beats them all, and your desk set is a beauty compared with the style of the ones I have seen."

Under date of Sept. 17th, W. Z. Kinney, Supt. Gold King Con. M. Co., writes to the Weber Gas & Gasoline Engine Co. of Kansas City, Mo.: "We have had one of your 25 H. P. gasoline hoisting engines in constant use at our mine, situated at an altitude of 12,125 feet above sea level, for the past year and a half, and have found it very satisfactory indeed, doing all that you claim for it, and being very much cheaper to operate than a steam plant. We have no hesitation in recommending it to any one requiring an economical hoisting plant."

The Colorado Iron Works of Denver, Colo., are furnishing the machinery for the new milling plant of the War Eagle Con. M. Co., near Placerville, Boise basin, Idaho, consisting of stamps, rolls, chlorinating barrels, Bruckner roaster and Bartlett tables. This company also have an order for a carload of water jackets for the Guggenheim smelting plant in Mexico. They are turning out from twenty to thirty Bartlett tables per month. The Portland G. M. Co. of Victor, Colo., has placed an order with them for several double-decked safety mine cages. They also have an order from the Globe smelting plant at Denver, Colo., for eleven sets of gearings for their Bruckner roasters. They also have an order from the Tezintlan Copper Co., Mexico, for the ironwork for a reverberatory matte furnace. Morris & Elspass, Pueblo, Colo., have placed an order with them for a crusher, boiler and engine. The Hoffman Smelting & Reduction Co. have ordered a 48-inch, round copper furnace, with necessary equipment to accompany it. They are filling an order of the Seminole Mining Co. of Georgia for a set of 27x14-inch crushing rolls, with elevators and screens.

Personal.

M. M. Van Fleet is in Denver, Colo.

Letson Balliet is in eastern Oregon.

T. Jennings of Salt Lake, Utah, is in Arizona.

V. P. Strange of Salt Lake, Utah, is in Idaho.

J. J. Cusick of Montana is in Salt Lake, Utah.

G. B. Brown is now manager Millinee, Aspen, Colo.

A. W. Huchins of Chicago, Ill., is in Auburn, Cal.

G. J. Weber of Kansas City, Mo., is in Willcox, Ariz.

H. E. Nieve of England is now located in Rossland, B. C.

A. C. Wagg of Portland, Or., is in Colorado Springs, Colo.

F. Drury of southern California has gone to Pitkin, Colo.

M. B. Greenwood of Anaconda, Mont., is in Salt Lake, Utah.

A. P. Schumacker of Denver, Colo., is in Salt Lake City, Utah.

C. Lowery of Salt Lake, Utah, has returned to Rossland, B. C.

W. A. Watson, late Supt. Economic mill, Victor, goes to Cuba.

C. Hull of Salt Lake City, Utah, has gone to Good Springs, Nev.

J. Dederichs of Salt Lake City, Utah, has gone to Spokane, Wash.

R. A. Huntley of Salt Lake City, Utah, is in South Pass, Wyo.

J. F. Korbel of the Texas, Grass Valley, Cal., is in San Francisco.

W. R. Beall, Supt. Bullychoop, Cal., property, is in San Francisco.

G. E. Turner & Son (R. H. Turner) of Grass Valley, Cal., go to Mexico.

F. Nagre of the La Grange M. Co., Redding, Cal,, is in San Francisco.

F. B. Turner of Butte, Mont., is examining mines near Prescott, Arizona.

C. D. Galvin of Weaverville, Cal., has returned there from San Francisco.

W. Weston, Cripple Creek, Colo., has returned from White Hills, Arizona.

J. Canning, late manager Millinee, Aspen, Colo., has gone to New York.

Supt. McMasters of the Clyde mine, Colorado Springs, Colo., has resigned.

President Cohen of the Con. Mercur, Mercur, Utah, is in Shasta county, Cal.

O. W. Klinger of the Standard, Silverton, Colo., leaves for California, Mo.

Supt. W. McG. Logan of the Old Home, Grass Valley, Cal., is in Oakland, Cal.

Loughbridge & Turner of Chicago, Ill., have returned there from Marble, Colo.

G. S. Wilson of Edinburgh, Scotland, has gone to Arizona from Elizabethtown, N. M.

W. H. Hile, manager Last Chance M. Co., has returned to Weaverville from San Francisco.

W. E. Hampton of the Pacific Tank Co. has returned to Los Angeles, Cal., from the East.

T. B. Scott of the Lucky Boy, near Chloride, Ariz., has returned there from San Francisco.

Simeon Wenban, an old successful Nevada miner, is seriously ill at his home in San Francisco.

W. T. Kendrick of Denver, Colo., Pres. Kendrick-Gelder Promotion Co., is in Silverton, Colo.

J. R. Phillips of the Banner mine, Grass Valley, Cal., has returned there from Stockton, Cal.

P. Edwards of the Reno Smelting & Milling Co., Reno, Nev., has returned there from the East.

A. Gassaway, formerly Supt. West Harmony, Grass Valley, Cal., has gone to North Bloomfield, Cal.

Supt. P. Tautphaus of the Providence, Grass Valley, Cal., has returned there from San Francisco.

S. T. Miller is elected secretary Rittenhouse G. M. Co., Cripple Creek, Colo., vice C. H. Bryan, resigned.

P. J. Quealey, manager Kemmerer Coal M. Co., Kemmerer, Wyo., has returned there from Salt Lake, Utah.

G. H. Sampson, president Rand Drill Co., 128 Broadway, New York, has returned from an extended trip abroad.

R. Billings of the new smelting company at Florence, Colo., has returned to the latter place from Salt Lake, Utah.

H. Stoecke of Greenwood, B. C., is back from a three months' trip to San Francisco, New York, Paris, Berlin, etc.

General Manager Truman of the Ray mine, Kelvin, Ariz., goes to New York on business connected with the company.

J. B. Hastings has resigned the superintendency War Eagle and Central Star mines, Rossland, B. C., and has gone to Victoria, B. C.

J. J. Guentherodt, during the past year mining editor Leadville, Colo., Herald-Democrat and Daily Leadville Miner, is in San Francisco.

W. F. De Camp has resigned the superintendency of the Lillie mine, Cripple Creek, Colo., and will make his future headquarters in Denver.

Spencer Miller of the cableway department of the Lidgerwood Mfg. Co., New York City, has returned from Europe after a four months' absence.

Mr. Stackpole, former Supt. Chloride Point mill, which was recently closed down for the winter, is now Supt. Overland mill, near Sunshine, Utah.

B. S. Phillips of Denver, Colo., an Prof. Bentz and Messrs. Longcoop an Pike of Philadelphia, Pa., have been look ing over mining properties near Grafton N. M.

Prof. W. H. Watts has finished Bu letin 19 on the "Oil Formations of Cal fornia." It will be published by the State Mining Bureau, and will be ready for distribution about Dec. 10.

Curtis H. Lindley, B. F. Lacey and Chas. G. Yale were on the 12th inst. elected president, vice-president and secretary, respectively, of the San Francisco County Miners' Association.

Charles Bagdonovitch, a Russian mining engineer, who left San Francisco on the steamer Samoa last May with others to explore mining concessions in Siberia, has returned to San Francisco.

W. C. Ralston declines to have his name considered in connection with reelection as president of the California State Miners' Association. He thinks it is a good idea to have a new man every year in that important position.

C. L. Cory of the San Francisco engineering firm of Benjamin, Meredith & Cory has been appointed consulting engineer of the San Francisco Board of Public Works, to investigate the problem of an electric lighting and power plant for the municipality of San Francisco.

Obituary.

MARCUS DALY.

Marcus Daly of Anaconda, Mont., president Amalgamated Copper Co., and one of the leading mine owners and operators of the country, died in New York City on the 12th inst., in the 59th year of his age.

A native of Ireland, he had been for twenty-five years a resident of Montana. He was manager Alice mine many years ago, and, later, came into prominence in connection with his copper holdings and the big mining and political fights with W. A. Clark. In the copper mining interests of Montana nearly every one was either a Clark or Daly man, and the successive victories or defeats of either faction made constant stir, while the magnitude of the financial interests involved lent considerable importance to the strife, to stockholders in the East.

List of U. S. Patents for Pacific Coast Inventors.

REPORTED BY DEWEY, STRONG & CO.,
PIONEER PATENT SOLICITORS
FOR PACIFIC COAST.

FOR WEEK ENDING NOV. 6, 1900.

661,135.—MORTISING MACHINE—G. F. Andrews, Riverside, Cal.
661,303.—AIR INJECTOR—J. S. Briggs, Los Angeles, Cal.
661,284.—GAS GENERATOR—H. E. Brunner, Haywards, Cal.
661,467.—SEAL LOCK—A. W. Coffin, S. F.
661,045.—LOCOMOTIVE—G. S. Fouts, S. F.
661,144.—STAMP MILL—Hamm & Taylor, S. F.
661,184.—AMMONIA COMPRESSOR—J. T. Ludlow, S. F.
661,377.—FLEXIBLE JOINT—J. C. & J. C. Martin, Jr., S. F.
661,190.—POT COVER—A. Olson, San Diego, Cal.
661,193.—DREDGER—W. W. Priestley, Smartsville, Cal.
661,277.—HYDRAULIC BRUSH—E. A. Rix, S. F.
661,160.—SWELLING TANK STAVES—J. M. Thorp, Alameda, Cal.
661,362.—PAVEMENT COMPOUND—H. F. Williams, S. F.
33,520.—DESIGN—J. T. Davis, S. F.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

AUTOMATIC WEIGHING SCALE.—No. 660,794. Oct. 30, 1900. E. Hanak and George Hoepner, San Francisco, Cal., assignors to Union Scale & Manufacturing Co. The object of this invention is to provide an automatic weighing scale, in which there is an oscillating tilting compartment, a weighing bucket movable with relation to a fixed discharge, so that the compartments are alternately filled and discharged. Latches are provided for holding the bucket in either position to which it may be tilted, and means for disengaging the latches after the bucket is filled. The invention also comprises a novel arrangement of feed or supply hopper.

WEATHER STRIPS FOR DOORS OR WINDOWS.—No. 660,839. Oct. 30, 1900. J. E. Bundy, San Francisco, Cal. This invention relates to a device for hermetically closing the bottoms of doors, windows or the like against the entrance of wind, rain and snow. It consists of a movable tilting strip forming a continuation of the threshold or seat over which the door normally closes and so guided that when the door is closed the inner edge of the strip will be tilted upwardly against the lower edge of the door and form a joint with a molding of suitable character which fits across the lower part of the door for that purpose. When the door is opened this piece falls by gravitation to its normal position where it forms a part of the threshold.

DEVICES FOR COLLECTING FINELY DIVIDED MINERALS AND SLIMES.—No. 660,844. Oct. 30, 1900. W. E. Darrow, Sonora, Cal. This invention relates to an improved apparatus for concentrating and collecting high-grade mineral. It consists of submerged inclined surfaces, upon which the mineral is concentrated, means for precipitating and eliminating the heavy waste gangue, while the fine particles in suspension flow on with the water and may be collected in reservoirs for future treatment. It comprises a stationary tank having surfaces inclined toward the longitudinal sides, so that the heavy material will slide therefrom and the lighter material will collect thereon. Means are provided for supplying water from below to fill the tanks and submerge the surfaces, and means for supplying material to pass through the tank and over the surfaces. There is a discharge at the opposite end, and a transversely corrugated or channeled bottom having openings through it, discharging into a closed receptacle which is also filled with water, so that the heavy sediment gradually passes through the openings into the lower compartment without agitation in the upper compartment.

San Francisco Stock Board Sales.

SAN FRANCISCO, Nov. 15, 1900.

100 C. C. & V.	$1 20	600 Savage	13c
100 G. & C.	92c	100 Silver Hill	41c
100 Mexican	23c	50 Standard	$3 40
500 Potosi	08c		

Latest Market Reports.

SAN FRANCISCO, Nov. 15, 1900.

SILVER—Per oz., Troy: London, 29¾d (standard ounce, 925 fine); New York, bar silver, 64¾c (1000 fine); San Francisco, 64¾c; Mexican dollars, 51c.

COPPER.—New York: Lake, 1 to 3 casks, $17.00 cash; carload lots, 16.75; Electrolytic, 1 to 3 casks, 16.87½; carload lots, 16.62½; Casting, 1 to 3 casks, 16.75; carload lots, 16.60. San Francisco: 18. Mill copper plates, 20c; bars, 22@23c.

LEAD.—New York, $4.35; Salt Lake City, $4.00; St. Louis, $4.22½; San Francisco $5.00, carload lots; 5½c 1000 to 4000 lbs.; pipe 6¾, sheet 7½, bar 6c; pig, $4.70 @5.10. London, £17 12s 6d.

SPELTER.—New York, $4.20; St. Louis, $4.05; San Francisco, ton lots, 5½c; 100-lb lots, 5¾c.

ANTIMONY.—New York, Cookson's, 10½c; Hallett's, 9½c; San Francisco, 1000-lb lots, 12c; 300 to 500 lbs., 13@14c; 100-lb lots, 15@18c.

IRON.—Pittsburg, Bessemer pig, $14.00; gray forge, $13.50; San Francisco, bar, per lb., 2½c in small quantities.

STEEL.—Bessemer billets, Pittsburg, $19.50; open hearth billets, $22.50; San Francisco, bar, 7c to 12c per lb.

TIN.—New York, pig, $27.50; San Francisco, ton lots, 30c; 1000 ℔s., 30½c; 500 ℔s., 30¾c; less, 31c; bar tin, ₱ ℔, 35c.

QUICKSILVER.—New York, $51.00; large lots: London, £9 2s 6d; San Francisco, local, $48.50 ₱ flask of 76½ ℔s.; Export, $45.

NICKEL.—New York, 50@60c ₱ ℔.

MAGNESIUM.—New York, $3.00 ₱ ℔.; San Francisco, $4.00.

ZINC.—San Francisco, 5¼c; slab, 5¾c; bar, 7c.

BABBITT METAL.—San Francisco, No. 1, 10c.

SOLDER.—Half-and-half, 100-℔. lots, 18.70c; San Francisco, Plumbers', 100-℔. lots, 15.85c.

ASSAY LITHARGE.—San Francisco, 10c ₱ ℔, small lots.

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 30c to 35c.

BISMUTH.—New York, ₱ ℔., $1.60 50-℔ lots; San Francisco, $2.50 to $2.75 ℔ lots.

PHOSPHORUS.—F. o. b. New York 50@60c ₱ ℔.

TUNGSTEN.—New York, ₱ ℔., 95c; San Francisco, $1.15.

FERRO-TUNGSTEN.—New York, 37%, 35c; San Francisco, 65c (60%).

FERRO-MANGANESE.—Pittsburg, 80%, domestic, $85, large lots.

PLATINUM.—San Francisco, crude, $17 ₱ oz.; New York, $18.20 per Troy oz

POWDER.—F. o. b. San Francisco: No 1. 70% nitro-glycerine, per ℔., in carload lots, 15½c; less than one ton, 17¼c. No. 1*, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1** 50%, carload lots, 11¾c; less than one ton, 13¾c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9½c; less than one ton, 11½c. No. 2** 30% carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9, in lots not less than 1000.

FUSE.—Triple tape, $3.60 per 1000 feet; double tape, $3.00; single tape, $2.65; Hemp, $2.10; Cement No. 2, $3.00; Cement No. 1, $2.65, in lots of 3000 feet and up.

CANDLES.—Granite 6s, 16 oz., 40s., 11¾c ₱ set; 14 oz., 40s., 10½c.

CHEMICALS.—Cyanide of potassium, 98%-99%, jobbing, 32½@33½c ₱ ℔.; carloads, 30@31c; in 10-℔. tins, 40c; sulphuric acid, 66% B, 2c ₱ ℔.; soda ash, $1.60 ₱ 100 ℔s. 58%; hyposulphite of soda, 2¾@3c ₱ ℔.; blue vitriol, 5½@6c ₱ ℔.; borax, concentrated, 7@8c ₱ ℔.; chlorate of potash, 12@13c; roll sulphur, 6c; alum, $1.90@2.00; flour sulphur, French, 2¼@2½c; California refined, 1¾@2c; nitric acid, in carboys, 8c ₱ ℔.; caustic soda, in drums, 3@4c ₱ ℔.; Cal. s. soda, bbls., $1.00; sks, 95c ₱ 100 ℔s.; chloride of lime, spot, $2.50@2.60; nitrate of potash, in kegs, 8c; caustic potash, 10c in 40-℔. tins.

Recently Declared Mining Dividends.

	Payable.
Grand Central M. Co., Utah, 10 cents per share, $25,000	Nov. 15
New York & Honduras Rosario M. Co., Honduras, Central America, 10 cents per share, $15;000	Nov. 19
Last Dollar G. M. Co., Colorado, 2 cents per share, $30,000	Nov. 21

ALPHABETICAL INDEX TO ADVERTISERS.

(—) Indicates every other week or monthly advertisements.

A PAGE.
Adams, W. J....13
Ainsworth & Sons, Wm....13
Aitchison Perforated Metal Co., Robert....11
Akers, Wm. A....13
Allis Co., Edward P.... 5
American Copper Mining & Extraction Co....14
American Diamond Rock Drill Co.... 9
American Injector Co....—
Ames, A. T.... 4
Atlas Pipe Wrench Co....11

B
Baird & Co., Henry Carey....17
Baker, F. D.... 1
Baker & Hamilton....12
Balliet, Letson....13
Barnhart, Geo. W....18
Bartlett & Co., C. O....10
Bell, J....13
Bell, Newton M....16
Benjamin, E. H....13
Birch & Co., W. H.... 1
Boesch Lamp Co....—
Bowes & Co.... 9
Box 376, Mining and Scientific Press.... 1
Bradley Pulverizer Co.... 6
Braun & Co F. W.... 5
Breitung, E. N.... 1
Bretherton Hot Blast Smelting Co.... 3
Brownell, J. S.... 19
Bucyrus Company....11
Bullock Mfg. Co., M. C.... 9
Burlingame & Co., E. E....—
Burt Mfg. Co.... 1
Burton, Howard E....13
Butters & Co., Ltd., Chas....13

C
California Anti-Caloric Co....11
California Debris Commission.... 1
California Perforating Screen Co....15
California Vigorit Powder Co.... 7
California Wire Works....19
Canton Steel Co.... 9
Cary Spring Works....14
Colorado Iron Works Co....8, 10
Colorado Midland Railway....15
Colorado & Southern Ry....15
Compressed Air Machinery Co....12
Con. Cal. & Virginia Mining Co....17
Cook, J H.... 1
Copper King, Ltd....19
Cory, C. L....13
Crane & Co....10
Crown Gold Milling Co.... 4

D
Davidge & Davidge....13
Davies & Co., D. Campbell....14
Dearborn Drug & Chemical Works....14
Denniston's San Francisco Plating Works....11
Denver Engineering Works....15
Denver Fire Clay Co....14
Denver & Rio Grande R. R....10
Detroit Lubricator Co....16
Dewey, Strong & Co....10, 19
Doble Co., Abner.... 9
Donaldson & Co., A. M.... 1
Dow Pumping Engine Co., Geo. E.... 2

E
Eby, Jno. D....—
Elkins, John T....13

PAGE.
Ericsson Telephone Co.... 1
Eureka Co.... 1
Evans & Co, C. H....18
Excelsior Redwood Co....15

F
Fairbanks, Morse & Co.... 6
Falkenau, Louis....13
For Sale.... 1
Fowler, G. C....17
Fraser, E. J.... 1
Fraser & Chalmers....15
Frue Vanning Machine Co....19
Fulda's Planing Mills....—

G
Garratt & Co., W. T.... 1
Gates Iron Works.... 3
General Electric Co....10
General Photo-Engraving Co.... 5
Gibson, Chas. B....13
Globe Engineering Co....17
Globe Iron Works....—
Gold & Silver Extraction Co. of America, Ltd....14
Goodell, Albert I....13
Goodyear Rubber Co....—
Gutta Percha Rubber & Mfg. Co....—

H
Haff, Edward L....13
Hallidie Ropeway....19
Hamilton Mfg. Co., Wm....18
Hanks, Abbot A....13
Harrigan, Jno....13
Harvey, F. H....13
Hayden & Co, J. M....17
Heald's Business College....15
Hendrie & Bolthoff Mfg. & Supply Co.... 3
Hendy Machine Works, Joshua....7, 16
Hercules Gas Engine Works....18
Hersey, Clarence....13
Heyl & Patterson.... 5
Hirsching, H....14
Hoskins, W....14
Hooper & Co, C. A....15
Hug, D....12
Hunt, A M....13
Huntington, F. A....18
Huntley, D. B....13

I
Independent Assay Office....13

J
Jackson Drill & Mfg. Co.... 9
Jackson, Geo. G....—
Jackson Machine Works, Byron....—
Jeanesville Iron Works Co....14
Jeffrey Mfg. Co., The....16
Jessop & Sons, Ltd., Wm.... 9
Jewett, Daniel G....13

K
Kent Mill Co.... 8
Keuffel & Esser Co....14
Keystone Driller Co.... 8
Knight & Co....—
Koppel, Arthur....18
Krogh Mfg. Co....16
Kyle & Co., T. D....13

L
Lallie, J. S. J....13

PAGE.
Langley & Co., S. Thornton.... 1
Larkin Mining Co....17
Leffel & Co., James....12
Leschen & Sons Rope Co., A.... 6
Lexow, Theodor.... 9
Leyner, J. Geo.... 9
Link-Belt Machinery Co....11
Lloyd, Benj T.... 1
Luckhardt Co., C. A....13
Ludlow-Saylor Wire Co....12
Lunkenheimer Co....16

M
Macdonald, Bernard....13
Madison, Bruce & Sellers....10
Main Belting Co....11
Mammoth Garfield Gold Mining Co....17
Mandell, Frank C....13
Mariner & Hoskins....14
Marion Steam Shovel Co....18
Mariposa Commercial & Mining Co.... 17
Marshutz & Cantrell....17
McFarlane & Co....18
Meredith, Wynn....13
Mine & Smelter Supply Co.... 3
Miners' Assay Office....13
Montgomery Machinery Co., J. H....11
Moore & Co., Chas. C.... 8
Morris, H. D. & H. W.... 3

N
National Iron Works....17
Nevada Metallurgical Works....13
New Process Raw Hide Co....12
Nicholson, Hudson H....13
Novelty Mining & Milling Machinery Co.... 6

O
Ogden Assay Co....13
Oregon Railroad & Navigation Co....15
Oriental Gas Engine Co....—
Osceola Con. Mining Co....17

P
Pacific Coast Smelting & Refining Works....19
Pacific Tank Co....12
Paraffine Paint Co.... 8
Parke & Lacy Co....19
Paul, Almarin B....1, 13
Pelton Water Wheel Co....12
Penberthy Injector Co....—
Pennington & Sons, Geo. W....16
Perez, Richard A....13
Peterson, L....16
Phillips & Co., Alvin....14
Pneumatic Cyanide Process Co....14
Postlethwaite, R. H....13
Powell Co., Wm....16
Price & Son, Thomas....13

Q
Quick, Jno. W....15

R
Rand Drill Co.... 9
Rank, Sam'l A....13
Reckhart, D. W....13
Richards, J. W....13
Risdon Iron Works.... 7
Robins Conveying Belt Co....11
Roebling's Sons Co., John A.... 7
Roessler & Hasslacher Chemical Co....14
Runkle, H E.... 1

S PAGE.
San Francisco N. velty & Plating Works....15
San Francisco Pioneer Screen Works....15
Schaw, Ingram, Batcher & Co....11
Schilling & Sons, Adam....18
School of Practical Mining....13
Se by Smelting & Lead Co.... 8
Shaw, Willis.... 9
Shepard & Searing....15
S. H. Supply Co.... 1
Sierra Nevada Silver Mining Co....17
Simonds, Ernest H....13
Simonds & Wainwright....13
Situations Wanted.... 1
Smidth & Co., F. L....17
Smith & Co., Francis.... 1, 10
Smith & Thompson....14
Smooth-On Mfg. Co....10
Snedaker, James Angus....13
S. O.... 1
Star Drilling Machine Co....10
State Ore Sampling Co....—
Stevens, Ralph E....13
Stillwell-Bierce & Smith-Vaile Co....—
St. Louis Sampling & Testing Works....14
Sturtevant Mill Co....12
Sullivan Machinery Co.... 9

T
Tallon, C. J.... 1
Tatum & Bowen....11
Taylor Iron & Steel Co....16
Taylor & Co., John....14
Thomson & Boyle Co.... 8
Trenton Iron Co....16
Truax Mfg Co.... 3
Tyler, S. W....13

U
Union Gas Engine Co.... 4
Union Iron Works.... 2
Union Photo-Engraving Co....12

V
Van Der Naillen, A....13
Van Dieren, Hermann J....13
Van Slooten, Wm....13
Van Wagenen, Theo. F....13
Volger, Wm. B....11
Vulcan Iron Works....11

W
Wade & Wade....1
Walter, R. J....18
Weber Gas & Gasoline Engine Co....18
Weigele Pipe Works.... 7
Western Chemical Co.... 8
Westinghouse Electric & Mfg. Co.... 2
Wetherill Separating Co....14
Wigmore & Sons, John.... 8
Wimmer, Geo....15
Witte Iron Works Co....18
Wohler, Bartning Suc's.... 1
Wolff & Zwicker Iron Works.... 5
Wood, Henry E....14
Woodbury, Geo. E....—
Woodin & Little.... 1
Wynkoop, W. C....13

Y
Yawger, I. C.... 9

Z
Zeller, Geo. A.... 1

SITUATIONS WANTED.

WANTED.—A position as superintendent for a mining company by a man of 16 years' practical mining experience; understands mining and milling (amalgamation, concentration and leaching); good assayer and accountant; would accept a subordinate position if good; references. Address "Advertiser," 1225 Webster St., Oakland, Cal.

A sober, industrious young man, who is a competent assayer, surveyor, draughtsman and bookkeeper. wishes a situation. Has had eighteen months' practical experience and two years' technical training. Is willing to make himself generally useful about a mine. Salary small object; opportunity to show ability considered first. References. Address "M." Mining and Scientific Press.

MINING ENGINEER (technical training), twenty years' experience as surveyor, assayer, superintendent and manager of mines and mills; business qualifications; linguist; at present general manager mining and milling proposition in Mexico; desires to make a change on account of health; best references. Address S. O., Mining and Scientific Press.

Mining engineer with ten years' experience in copper and lead mining, milling and smelting, desires to secure position as superintendent or manager of developing or producing property in this country or abroad. Good assayer, surveyor and bookkeeper. Address "Montana," care of Mining and Scientific Press.

EXPERIENCED MINE FOREMAN, who is a competent assayer and surveyor and has a good knowledge of Spanish, desires a position. Address O. R., care of Mining and Scientific Press.

WANTED.

A Second-Hand Diamond Drill.

Must be in first-class condition and complete in all respects. Address H. R., Mining and Scientific Press.

WANTED —The address of Thomas Watts, bricklayer and miner, formerly of Butte, Montana, and Denver, Colorado. If dead or alive, any information will be thankfully received by Will B. Cameron, 409 Main St., Seattle, Wash.

Charcoal Burner wanted. Must speak Spanish and be capable of burning 1200 cords of mesquite per month into charcoal for smelting. Healthy part of Sonora, Mexico. Salary $100 gold per month. Only sober man need apply. References and record of experience required. Address C. Coal, this office.

WANTED—FOR IMMEDIATE DELIVERY,

One Direct Acting, Double Drum Hoisting Engine; Cylinders about 18x40 or 20x42.

Equipment with post brakes and auxiliary engines preferred. Wire description and price. B. A. C., Rossland, B. C.

REFRACTORY ORES WANTED.

1000 TONS or more which will assay $75.00 Gold per ton and over, delivered free of charge at San Francisco, Cal. Correspondence solicited.

C. J. TALLON,
308 MARKET STREET, SAN FRANCISCO, CAL.

WANTED.

Experienced Promoters
—AND—
Mining Share Operators
TO SELL THE SHARES
—OF—
MERITORIOUS, DEVELOPED, SHIPPING Gold and Copper Mines.

S. THORNTON LANGLEY & CO.,
Rossland, British Columbia.

Quicksilver

—FOR SALE BY—
The Eureka Company,
OF SAN FRANCISCO.
ROOM 1, - - 320 SANSOME STREET,
SAN FRANCISCO.

AUTOMATIC SAMPLING

Mill Plans, Cyanide, Concentration, Smelter.
F. D. BAKER, Mech. Engr., DENVER.

Engineers, Firemen, Machinists and Electricians: New 40-page pamphlet containing Questions asked by Examining Board of Engineers. Sent free. GEO. A. ZELLER, Publisher, ST. LOUIS, MO.

FOR SALE.

Two Second-Hand PUNCHING MACHINES,

SUITABLE FOR PIPE MAKING.
FRANCIS SMITH & CO., 46 Fremont St., San Francisco, Cal.

FOR SALE.—A group of three high grade Gold Mines of free milling ore, situated on the mother lode in Tuolumne Co., Cal. A superior property at a very reasonable price. For full particulars, address E. J. FRASER, Parrott Building, San Francisco, Cal.

FOR SALE.

Lease and Bond, Eighteen Months, Easy Terms, Copper Property, New Mexico.

High grade ore with good gold values. Accessible. Plenty wood and water. Strong vein. Three shafts. Will pay from start. Adjoins large producing mine. **H. E. RUNKLE, El Paso, Texas.**

GUARANTEED MINING STOCK FOR SALE.

Excellent chance for profit, no chance for loss. Best of references and standing. For particulars, if you wish to purchase,

— ADDRESS —
E. N. BREITUNG,
MARQUETTE, MICH., or WASHINGTON, D. C.

FOR SALE.

AIR COMPRESSORS.

6x8 and 10x12 Knowles, belted, straight line, high duty Air Compressors.

THE S. H. SUPPLY CO.
WRITE FOR CATALOGUE OF MINING MACHINERY AND SUPPLIES.
22nd and Larimer Sts., DENVER, COLO.

FOR SALE.

One 10″x12″ Double Cylinder, Double Drum Mine Hoist.
One 14″x30″ Duplex Air Compressor, Corliss Steam ends.
Two 54″x16′ Return Tubular Boilers.
One No. 6 Llewellyn Feed Water Heater.
One 36″x9′ Air Receiver.
One Duplex Boiler Feed Pump.

All in good working order and nearly new. Also Rock Drills, Sinking and Station Pumps, Air Pipe, Ore Cars, Skips, Wire Rope, Blacksmith and Carpenter Tools. A bargain for anyone wanting an up-to-date mine equipment. Address Box 376, this office.

FOR SALE.

A group of manganese mines, five in number; 100 acres of mineral land on Government land. Timber and water; 22 miles from railroad depot at Ukiah or 4 miles from railroad track or depot in Redwood valley. The Cave and Franklin mines are from 5 to 12 feet wide, solid manganese ore, high grade. The Black Jack mine is over 20 feet wide on the surface. These mines can be bought very cheap, with many other mines in the same vicinity. For further information, apply to

J. H. COOK,
POTTER VALLEY, MENDOCINO CO., CAL

California Miners

having well developed, or fairly so, **GOLD QUARTZ** property which they are disposed to sell at sensible figures, with reasonable terms for payment, and time for negotiations, may benefit themselves by corresponding with me.

ALMARIN B. PAUL,
27 Crocker Building,........San Francisco, Cal.

WE BUY very rich Ores, Dental Scraps, Tellurium Ores, Mill Wastes, Jewelers' Sweeps, Gold Retorts, Old Iron Retorts, Base Amalgam, Quicksilver, Amalgamated Plates, Gold and Silver, Old Slags.

A. M. DONALDSON & CO.,
ASSAYERS AND WASTE PRODUCT SMELTERS,
1661 Larimer St., Denver, Colo.

Donaldson's Assayers' Slag Hammer {1 lb......$1.10 / 1 lb. 3 oz. $1.25}

BENJAMIN T. LLOYD, STOCKS, BONDS AND MINES.

Have immediate customers for well-developed Gold and Copper Properties.

P. O. Box 608, SALT LAKE CITY, UTAH.

WEST COAST OF MEXICO.

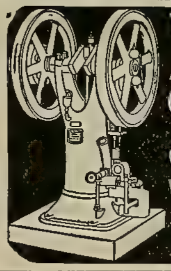
WÖHLER, BARTNING Suc's, Mazatlan (Sinaloa), Mex.

Bankers, Importers, Exporters and Commission Merchants.

Representatives and Agents of the principal Mining Companies in the State of Sinaloa and the dependencies of the Pacific coast in the States of Durango, Chihuahua, Sonora, Lower California and Jalisco.

ORE BUYERS AND EXPORTERS. - MINING SUPPLIES.

THE CALIFORNIA DEBRIS COMMISSION, HAVING received applications to mine by the hydraulic process from F. D. Soward et als., in the Undine and May Day Placer Mines, Consolidated, near Gold Lake, Sierra Co., to deposit tailings in a worked-out pit; from Mrs. Annie E. Jones, in the Nugget Placer Mine, near Johnsville, Plumas Co., to deposit tailings in Hopkins Creek; from C. D. Hazzard, in the Plumas Imperial Mine No. 2, near Quincy, Plumas Co., to deposit tailings in Slate Creek; from David Corbett, in the Golden Gate Mine, near Gibsonville, Sierra Co., to deposit tailings in Wisconsin Ravine; and from Chas. Schneider, in the American Mine, near Spanish Ranch, Plumas Co., to deposit tailings in a ravine, gives notice that a meeting will be held at Room 59, Flood Building, San Francisco, Cal., on December 3, 1900, at 1:30 P. M.



THE WEBSTER
2 ½
ACTUAL HORSE POWER
GASOLINE ENGINE
GUARANTEED
CATALOGUE MAILED FREE
WOODIN & LITTLE
312 MARKET ST.
SAN FRANCISCO,
— CAL. —

Perfectly Satisfactory.

Aug. 31, 1900.

THE BURT MFG. CO.,
Akron, Ohio.

GENTLEMEN:—

Replying to your letter of the 29th inst., we beg to advise you that the Cross Oil Filter we have is cleaning the oil and doing its work in a manner perfectly satisfactory to us.

Very truly yours,
Buckeye Engine Co.
Salem, Ohio.

It will save half your oil bills.

THE BURT MFG. CO.,
Akron, Ohio, U. S. A.
Largest Mfrs. of Oil Filters in the World.

We also manufacture the BURT EXHAUST HEAD.

Globe Engineering Company,

(INCORPORATED.)

STIRLING WATER-TUBE BOILERS.

Unequaled for Mines and Mills.
Easily Transported. Quickly Cleaned.

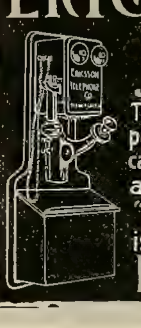
EXETER HOISTING ENGINES; CORLISS, SLIDE VALVE AND AUTOMATIC CUT-OFF ENGINES; BOILERS; STEAM PUMPS; SINKING PUMPS; HIGH DUTY PUMPING ENGINES; AIR COMPRESSORS; FEED WATER HEATERS AND PURIFIERS; JET AND SURFACE CONDENSERS; WALKER'S METALLIC PISTON ROD PACKING; LOCKE DAMPER REGULATORS; REFRIGERATING MACHINERY.

STEEL MILLS, ROCK AND SHAFT HOUSES.
OTTO AERIAL ROPEWAYS.

COMPLETE DESIGNS for STEAM PLANTS for MINES and MILLS.

GLOBE ENGINEERING COMPANY,
Mechanical, Civil and Mining Engineers, 509 Mission St., San Francisco, Cal.

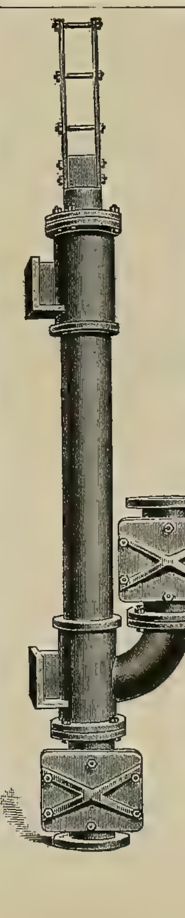
ERICSSON SWEDISH TELEPHONES



ERICSSON TELEPHONE CO.

Seem to possess almost human intelligence. They respond to every requirement in a smooth, positive fashion that shows what a perfect telephone can do. Besides this they have unequalled strength and durability. Their reputation as *"STANDARD OF THE WORLD"* is built on merit. Is the best too good for you?

ERICSSON TELEPHONE CO. *296 BROADWAY NEW YORK.*



POINTS OF EXCELLENCE OF OUR NEW JACK-HEAD PLUNGER PUMP.

Pumps sand and grit without injury to cylinder.

Seldom requires packing and is easily repacked.

Forces water on the down stroke so does not require balanced bob.

Water column and pump rod can be made to perfectly balance.

Each pump is provided with an automatic air valve which relieves pump of air taken in when suction gets out of water.

Combines strength with lightness.

We make a specialty of pumps and would be pleased to forward to you our catalogue.
Send us your inquiries.

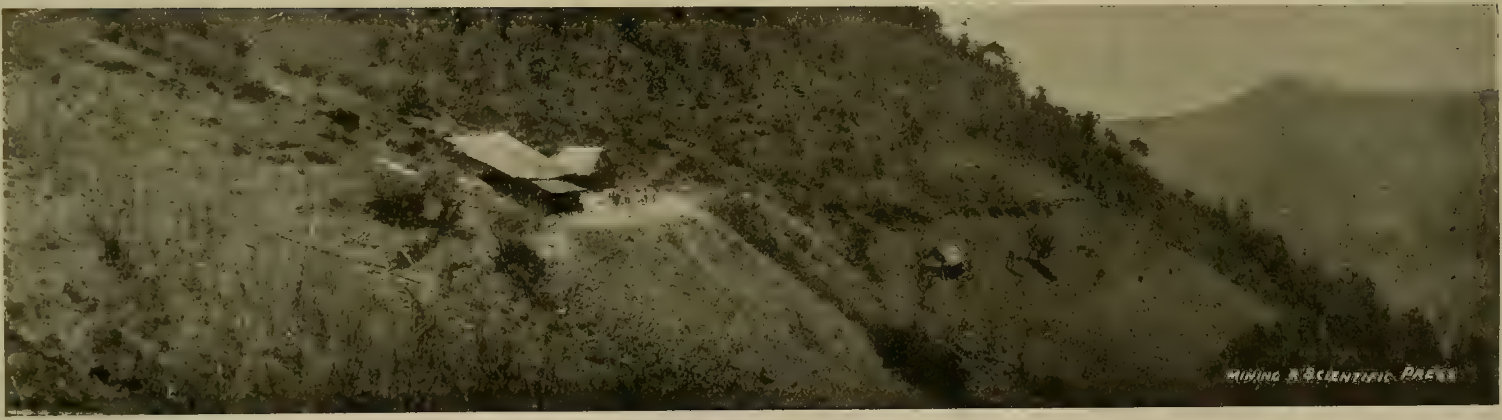
W. T. GARRATT & CO.,
Cor. Fremont and Natoma Sts.,
SAN FRANCISCO, CAL.

This Paper not
to be taken from
the Library. ✦✦✦✦

MINING AND SCIENTIFIC PRESS.
AND PACIFIC ELECTRICAL REVIEW.

Whole No. 2105.—VOLUME LXXXI. Number 21. SAN FRANCISCO, SATURDAY, NOVEMBER 24, 1900. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

Mouth of Mine, Los Paras Group.



Mouth of Mine, Los Paras Group.

Pile of Tailings (20,000 Tons) and Arrástra at Los Paras Mines, District of Taviche, Oaxaca, Mexico.

Mining Scenes in District of Taviche, Ocotlan, Oaxaca, Mexico. (See Page 544.)

From Brazil comes a statement illustrating in a variety of ways the value of technical education, and also illustrating incidentally what personal push will do. A young man had drifted there from an Eastern city, and, though desirous of employment, found little encouragement in the town where he had determined to stay. The situation was discouraging, when the municipal authorities there concluded that they would install an electric light plant and utilize an adjacent water power. They wanted an electrical expert to examine plans, make estimates, come to this country and get the needed machinery, and the fact having been mentioned to the young man, whom we will call Smith, he at once announced himself as a first-class electrical engineer, though, as a matter of fact, he knew no more about electricity than electricity did about him. However, on the strength of his own recommendation and self-assurance, the Brazilian authorities engaged him, and with a New York draft for needed expenses he sailed for the North on the next steamer. Immediately upon his arrival, he began a special course of study in electrical engineering, besides attending a night school for the same line of instruction. Besides his assurance he was also endowed with considerable physical strength and staying power, and stood the double strain for a month, by which time he had sufficient working knowledge of the matter to enable him to attend to his errand. He bought and brought back the machinery to the Brazilian town and is at present installing it to the satisfaction of all concerned. This is the story as given, and it sounds as if it might be true. The incident is in no wise commended nor commendable; but, without prescribing or proscribing such action, it is cited as characteristic of the qualities that often push men to the front.

MINING AND SCIENTIFIC PRESS.

ESTABLISHED 1860.

Published Every Saturday at 330 Market St., San Francisco, Cal.

ANNUAL SUBSCRIPTION:
United States, Mexico and Canada....................$3 00
All Other Countries in the Postal Union.................... 4 00

Entered at the S. F. Postoffice as second-class mail matter.

J. F. HALLORAN....................Publisher

Special Representatives:
EASTERN.
E. H. HAVEN....................150 Nassau St., New York City.
MIDDLE WEST.
CHAS. D. SPALDING....................153 La Salle St., Chicago, Ill.
INTER-MOUNTAIN.
W. A. SCOTT....................43 Jacobson Building, Denver, Colo.
SOUTHERN CALIFORNIA.
W. D. CURTIS....................223 W. Second St., Los Angeles, Cal.

San Francisco, November 24, 1900.

TABLE OF CONTENTS.

ILLUSTRATIONS.—Mining Scenes in District of Taviche, Ocotlan, Oaxaca, Mexico—Mouth of Mine, Los Paras Group; Pile of Tailings (20,000 Tons) and Arrastra at Los Paras Mines, District of Taviche, Oaxaca, Mexico, 541. E. C. Voorhies, President California State Miners' Association; Mouth of Entrance to Six-Mile Tunnel, Taviche District (Blind Boy Miners in Right Foreground); General View of Mill and House, Zeboletta Mine, Oaxaca, Mexico; General View of Taviche District, Oaxaca, Mexico, 544. Mining and Metallurgical Patents, 547.

EDITORIAL.—The Value of Technical Education, 541. California Miners' Convention, 542-543.

MINING SUMMARY.—549-550-551-552.

LATEST MARKET REPORTS.—553

MISCELLANEOUS.—Taviche, Ocotlan District, Oaxaca, Mexico, 544. Oil Fields of Fresno County, Cal.; Experimental Burning of Oil; How Fires Are Started, 545 Oil and Gas Yielding Formations of California; The German Meinecke; Steam and Gas Engines; Referendum Dollars; New Device for Heating Compressed Air; Aluminum Cables, 546. Mining and Metallurgical Patents; Jacob Bamberger and the Guggenheims; Driving an Electric Motor 153 Miles from Generator, 547. Pyritic Smelting in the Black Hills; Mining Conditions in Rhodesia, S. A., 548. List of U. S. Patents for Pacific Coast Inventors; Notices of Recent Patents; Personal; Commercial Paragraphs; Recently Declared Mining Dividends, 552-553.

California Miners' Convention.

The ninth annual convention of the California State Miners' Association assembled at Golden Gate Hall, San Francisco, on the morning of the 19th inst. The delegates were welcomed in an address by the Mayor of the city. The Credentials Committee reported delegate representation from the several counties as follows:

San Francisco 57, Butte 26, Calaveras 24, Alameda 20, Santa Clara 7, Nevada 60, Placer 58, Los Angeles 6, San Diego 2, San Bernardino 1, Kern 19, Inyo 1, Plumas 11, Sierra 22, El Dorado 15, Amador 37, Tuolumne 10, Yuba 10, Fresno 5, Marin 5, Solano 5, Shasta 35, Mariposa 2, San Luis Obispo 5, Santa Barbara 5, Napa 1, Sonoma 4, Trinity 1, Siskiyou 1, Madera 1; also, from the Sacramento Chamber of Commerce 5, University of California 1, California Petroleum Miners' Association 14, Southwest Miners' Association 5, San Francisco Chamber of Commerce 5, Stanford University 1, Fresno Chamber of Commerce 5, Los Angeles Chamber of Commerce 5, honorary delegates, Senators and Congressmen 9; a total of 505.

The president read his annual address, dealing with all the questions that have been before the consideration of the Association during the preceding year, welcomed the delegates from the California Petroleum Miners' Association, who were for the first time represented in the State Miners' Association, and went into the history of debris legislation concerning the hydraulic miner at considerable length. He expressed belief that the mineral lands bill would pass at the next session of Congress, recommended the building up of county branch associations through the State, and suggested that the Association's secretary be paid a salary. He showed that the California State Mining Bureau should be maintained under the regular appropriation bill instead of depending for the necessary funds for its existence on the biennial caprice of legislators. President Ralston made a fine address, which was received with applause by all present.

Secy. Benjamin and Treas. Hendy reported, showing an increase in membership and $3,208.65 in the treasury, with all bills paid. The receipts during the year were $11,215.41; disbursements, $8,006.76.

Two of California's newly elected Congressmen—Coombs and Woods—made addresses.

The first committee report was from the committee on legislation and was read by Chairman Jno. F. Davis of Amador county. It said in part that the committee adheres to the proposition laid down by it at the convention in 1899 and that the remedial legislation with reference to the law of mining, in almost all its phases, should be amendatory of existing Federal law, rather than independent statutory enactment at the hands of the Legislature. The law will lose nothing of directness and efficacy thereby and the uniformity so much desired will be promoted. The present mining law of California is, roughly speaking, the Federal Lode law of May 10, 1872, and the Act amendatory thereof, the whole being codified in Sections 2318 to 2346, inclusive, of the Revised Statutes of the United States.

The salient features of the sections referring to quartz mining are contained in Sections 2319, 2320, 2322 and 2324, and the legislation recommended to Congress by the committee refers to amendments of three of those four sections. The committee recommended that these sections be amended in three particulars: In the provisions concerning the marking of the exterior boundaries on the ground; in the provisions concerning the local rules, regulations and customs of miners and State and Territorial statutes on location of claims; and in the provisions concerning annual assessment work.

In the requirements for the marking of exterior boundaries upon the ground, under the present provisions of the law, the rights of the discoverer of a vein are not fully protected. Unless he be given a reasonable time to mark his boundaries upon the ground, either under a State statute or a local rule or the decision of the Supreme Court of the United States, he may make many mistakes vital to his interests. As a matter of fact, the trend of the California decisions on this point is against him, though at the same time against the trend of the decisions of almost all the other States and Territories except Oregon. The committee recommended to Congress an amendment to Section 2324 in this respect, drafted upon lines analogous to those in the late State statute repealed in 1899.

Concerning the second point referred to by the committee, the recognition in Federal statutes of local rules, regulations and customs of miners and State and Territorial laws concerning location of claims, Chairman Davis cited Judge Beatty to the effect that the whole subject of mining locations is an extremely simple one, which may easily and therefore ought to be regulated by one general law, the terms and existence of which shall be established by public and authentic records and not left to be proved in every case by the oral testimony of witnesses or by writing contained in loose papers or memorandum books, such as are often dignified by the name of mining records. The tainting of every mining title in the land at its very inception with the uncertainty which results from the actual or possible existence of rules affecting its validity, perfectly authentic evidence of which is nowhere to be found, is a stupendous evil. Experience has demonstrated that such an uncertian state of the law is a prolific source of litigation and no experience is required to convince any man of ordinary intelligence that it must have the effect of depreciating the value of all unpatented claims by deterring the more prudent class of capitalists from investing in them. That the subject is simple enough to be embraced in one general law is proved by the fact that the laws of the various districts, although differing in details, are in substance identical, and are substantially contained in the existing acts of Congress. "The magnitude of the evil resulting from the uncertainty of mining titles will perhaps be appreciated when I say that after a residence of seventeen years with the best opportunity of observing, I cannot at this moment recall a single instance in which the owners of really valuable mining ground have escaped expensive litigation, except by paying a heavy blackmail. This defect in the law, like the one concerning a want of reasonable time to mark boundaries in making a location, can be cured by an amendment of the law itself." In this instance the committee made the same recommendation made to Congress by the Public Land Commission in 1880, namely, the amending of the present law so that all future occupation, location or purchase of mineral lands shall be governed by laws of Congress to the exclusion of all local customs, rules and regulations and all State and Territorial law.

"The third provision in the law in need of amendment is the provision in Section 2324 concerning annual assessment work necessary to hold the possessory right to a claim as against the Government of the United States. The abuse of the present provision is so persistent, so flagrant and so well known that it is needless to describe it. Probably every man in this convention has, at some time in his own personal experience, been guilty of straining the present provision of the law upon this subject. We all recognize the statute concerning annual assessment work as insufficient, however, and most earnestly urge upon Congress such amendatory legislation in this regard that while it will provide a liberal system for the bona fide locator who holds and works his claim in good faith, will still most effectually and incontinently work for the undoing of every blackmailer and every dog in the manger."

The report discussed at length the present Federal statute concerning hydraulic mining in the Sacramento and San Joaquin valleys. Concerning the constitutionality of the Caminetti Act, the report said:

"Let the question be presented squarely, so that there can be no evasion in the decision. Is, or is not, the Act contrary to the provisions of the fifth amendment to the Constitution of the United States? Does, or does not, the Act, directly or indirectly, deprive any person of property without due process of law? Is the State deprived by the Act of any right guaranteed it in the constitution of the United States to protect the navigability of its streams? If the Act is held to be constitutional, as the miners are satisfied to take their chances under it, they will have to submit to the jurisdiction of the commission, for otherwise their hydraulic mining, no matter how little injurious, will be unlawful. They would then at least have this much security in expending the moneys necessary to take advantage of its provisions—that they would run no danger of having the Act declared unconstitutional over their heads after they had spent their money. If the Act shall be held unconstitutional, then those who have already submitted themselves to its jurisdiction would cease expending further money under it, and can apply for the cancellation of their surrenders on the ground that they were given without consideration."

The report of the committee on mineral lands was read by Chairman Jno. M. Wright, recounting the history of this well known measure, and giving the experience of those who were seeking the passage of a bill through Congress providing for a commission to classify the lands of the State, so that no more mineral lands would be absorbed by corporations as agricultural land. He said that, no matter which way the supporters of the bill turned, they found some technicality or some objection that put off its passage until too late. The report recommended that "the Association should continue its support of the Mineral Lands bill now before Congress, and to this end a strong mineral lands committee should be appointed, headed by some gentleman able to give a large proportion of his time to the accomplishment of the Association's purposes."

The report went into details of the conflict between "scrippers" and locators. The difficulty of the oil locator was that it is sometimes several weeks, and even months, before he can tell whether or not he is on an oil-producing claim, and in the meantime the scripper can come in and "select" the land under his scrip, which entitles him to agricultural land only. If the scrippers would select unappropriated lands where the presence of mineral was not apparent, said Mr. Wright, no one would question his right to a patent, nor would his right to mineral afterward discovered be questioned. But in very many instances the scripper has selected land within the well known limits of oil fields, lands known to him to contain vast quantities of oil; and he has even gone further and selected land upon which derricks had been erected and upon which wells were being sunk.

It was the purpose of the committee to prepare a bill that would protect the oil locator until he had either discovered oil or had demonstrated that there was no oil in his claim. The bill provides that locators should have three months after the marking of their claim within which to begin work for the purpose of completing discovery—the discovery, if made, to date back to the time of the location, in order to secure a continuous title. It provides further that so long as work is carried on with reasonable diligence the locator shall be protected, but if he fail to prosecute the work diligently, or if he fail to commence it within the three months allowed, he shall forfeit his claim.

Upon assembling on the morning of the second day, the 20th inst., the president appointed a committee on resolutions. The chairman of the committee on mines and mining reported that material progress had been made. In the current press is greater and more favorable mention. The last meeting of the International Mining Congress at Milwaukee, Wis., in June, 1900, unanimously endorsed and recommended the passage of a law by Congress creating a department of mines and mining. A bill providing for the creating of a cabinet office as so designed was favorably reported on by the House committee on mines and mining at the last session of Congress. When the extent of territory affected, the diverse interests, and the natural public inertia is taken into consideration, the committee felt encouraged in the evidence of progress, and expressed its belief that the measure, by reason of its manifest justice, will receive the favorable consideration by our national legislators to which its importance entitles it. The committee recommended that every member further the movement by personally addressing his Senators and Congressmen, and suggested to miners everywhere that if similar concerted action be taken by them that such united request would greatly hasten the ultimate fulfilling of the effort. The committee did not deem it needful to recount or repeat the reasons making necessary the creation of such a department, nor requisite that further argument should be adduced in support. Such reasons and argument have been presented and their truth and justice have been acceded to by thousands of mining men all over the country, who know that such legislation as that asked for is a present necessity.

Chairman Thos. J. Barbour, of the committee on dredging and jetties, presented a detailed report of the operation of gold dredgers in California, giving considerable information of a commercial and technical nature. The report stated that at the present time twenty dredgers are operating in California, producing in the neighborhood of $1,000,000 per year, and no doubt the coming year will show a large advance in the production.

An invitation from the Union Iron Works to visit that establishment and placing a tug at the disposal of the delegates was accepted.

L. C. Crane, prest. Petroleum Miners' Association, addressed the convention and said:

"Our industry is a large integral part of the mining industry. The value of the petroleum industry to the State of California cannot be estimated by any one living man. Petroleum is the basis of our coming industries. As an experiment, recently in England, a steamer was propelled 10,000 miles with petroleum. Petroleum costs more in England than coal, but it costs 70% less to handle it. California faces a new era and that new era depends upon the miner. It will not be very many years before the smokestacks of our industries will rear their heads all along the Pacific coast.

"When petroleum was discovered here a few years ago there were many Californians who doubted the utility of the crude oil, but now they are all alive to the situation.

"Fully $34,000,000 has been invested in lands, machinery and all that goes to make up the outfit for the production of oil. That capital has come largely from the East. The California oil industry represents to-day a capital of $116,000,000. We have inquiries from all over Europe. There are 2000 oil companies in California. The capital is bound to flow in. We want the co-operation of our gold miners. We are one brotherhood—a fraternity for the common good of California."

W. L. Watts made a report regarding the oil industry: The records show that the production of petroleum in California has increased from about 12,000 barrels in 1876 to nearly 2,500,000 barrels in 1899, and the production for 1900 will be larger.

When he made his report on petroleum in 1896, there were about 550 producing wells, and about 100 prospect wells had been drilled. At the date at which he closed his report, August, 1900, there were about 1500 producing wells and 470 prospect wells, and there is every reason to expect that the petroleum industry in California will go on increasing in extent and importance.

L. E. Aubrey discussed freight rates. Under existing circumstances, ore is charged for under a rate schedule dated September 15, 1899, at the rate of $100 per ton, a rebate to be made on the showing by the report of the smelting works that it was lower than the $100 rate called for, an exemplification of the theory of "all the traffic will bear." Under the schedule, a man might ship ore he valued at $50 a ton on a supposed rate of $5 a ton, but when the assay at the smelter showed a value of $75 a ton he would find he had to pay $2.50 per ton more. There would be some reason if the rate was made contingent upon the valuation of the ore by the owner, for then in case of loss the shipper could only regain the value he had placed upon it. There is a theory that a shipper can recover full value regardless of what his first valuation might be, but there had never been known a case where a man might recover more than the valuation he placed upon his own shipment even if he recovered that.

A resolution asking that the fixing of the rates on ore be brought to the attention of the Interstate Commerce Commission was referred to the committee on resolution, as were other resolutions proffered.

Chairman Caminetti of the committee on dams and debris, read the report, which went into the subject at great length. He discussed the preliminary barrier plan of the California Debris Commission illustrated and described in the issue of June 23, 1900.

The River and Harbor Act of 1900 contained authority to proceed at once with the construction of the works, thus giving Congressional sanction to the scheme.

The commission went to work at once with all preliminaries, and has continued energetically to press them to an early conclusion in order to proceed with the actual construction of restraining barriers and settling basins.

Owners of land covered by the proposed site have been brought together and all rights and lands required, with a few exceptions, have been secured. The commission is now in a fair way of obtaining about 3400 acres for site purposes within the limits of the appropriation.

The estimates of the commission fix the aggregate of cost of the completed works at $800,000, $500,000 of which has been appropriated in equal amounts by the Federal and our State governments. Plans for the works have been prepared by that commission, submitted to and approved by the Secretary of War, and now in turn transferred to the jurisdiction of the State in order to secure approval thereof, so that the appropriation made in that behalf by California may become available.

In order to fully provide for the completion of the system contemplated it will be necessary to secure an additional appropriation of $300,000, one-half from the National Government and the other from the State. The report recommends that the Association use its utmost endeavors toward securing the quota required from the State of California at the ensuing session of the Legislature, and that a special committee be appointed by the president to wait upon the Legislature and present the wishes of the Association in that respect, and report further recommends that the Association also request favorable action by Congress, and that Senators and Representatives in Congress be requested to use all honorable means to secure the appropriation of the sum of $150,000 for this purpose.

The report and supplemental remarks by Chairman Caminetti elicited considerable vigorous discussion of the whole subject from the standpoint of the miner, in which was outlined a plan to further test the constitutionality of the Act and to curb the course of the Anti-Debris Association.

O. S. Breese of Los Angeles read a paper on "Mining in Southern California."

When the convention reassembled on the third day, the 21st, the first business was the report of the committee on resolutions; but the committee not being in immediate readiness, President Ralston took occasion to refer briefly to the action of the anti-debris meeting at Sacramento the day previous as corroborative of his assertions concerning that matter in his address wherein he charged that Association with evasion and want of faith.

At the opening of the afternoon session E. C. Voorheis, chairman of the committee on resolutions, made the following report:

WHEREAS, The California Miners' Association was organized, primarily, for the purpose of devising a method whereby the great industry of hydraulic mining could be resumed without injury to the agricultural and other interests; and

Whereas, Since that time the mining interest has broadened by the development of the copper and petroleum mining industries to such an extent that it covers practically the whole State; and

Whereas, We recognize in the Petroleum Miners' Association an ally of great importance in the development of the mineral resources of the State; therefore, be it

Resolved, That we welcome into the fullest fellowship our fellow miners who are doing so much to develop the petroleum mining industry of the State, and pledge to them our heartiest co-operation and support in every measure in which we may be of service to them.

Resolved, That we highly appreciate the efforts made by the National Congress and the Legislature of the State to secure the passage by each of those bodies of that measure known as the California Mineral Lands bill; that we urgently urge upon the Congress of the United States that such efforts may be continued at its coming session, to the end that the California Mineral Lands bill may become the law of the land, and be the means of preventing further absorption by corporate interests of of land of great value to the prospector and the miner.

WHEREAS, Opposition to the efforts of certain of our fellow miners to operate their hydraulic mines under the Caminetti law has been made in the courts of the State, and more suits of a further character are threatened; and

Whereas, Where the injunctions obtained in the cases already brought were under a ruling by the court that the licenses in these particular cases were not regularly issued, the constitutionality of the law has been challenged; now, therefore, be it

Resolved, That the executive committee of the California Miners' Association shall determine the constitutionality of said law in the courts of last resort by defending a test case brought against a miner holding a regularly issued license by the California Debris Commission.

Resolved, That we heartily favor the amendment of Sections 2319, 2320 and 2324 of the Revised Statutes of the United States, concerning the location of mining claims, so that the locator shall be accorded a reasonable time within which to finally mark his surface boundaries on the ground, so that all local rules, regulations and customs of miners and all State and Territorial laws on the location of mining claims shall be abolished, and so that, while liberal provision shall be made for the protection of the locator who holds and works his claim in good faith, the law concerning annual assessment shall most effectually check the present injurious practice of holding mining claims year after year without development.

E. C. Voorhies, President California State Miners' Association.

Resolved, That in the problem of remedying the criminal abuses of the land and mining laws of the nation by the wholesale attempts to secure as agricultural lands, by the use of so-called scrip and otherwise, great tracts of the public domain that are unquestionably mineral in character, and which are recognized as mineral by the the people who seek to secure them as such by subterfuge, legal technicalities and outright perjury, the petroleum industry faces the matter of most serious present concern to it in its relation to the Federal laws and their administration. We believe that this problem is peculiarly one in which the whole mining industry of the State is interested, together with the petroleum miners, and we solemnly pledge our highest endeavors to protect the heritage of the miner in the public domain in accordance with the letter and spirit of the beneficent laws which were intended by Congress to sacredly preserve the vast mineral resources of the public domain to the mining industry, that their development might be encouraged and fostered. We distinctly favor the proposition that where a contest takes place between a scripper and a miner in any department of the United States Land Office the burden of proof shall be placed upon the scripper and not on the miner.

Resolved, That one of the most important and feasible remedies for the said abuses of the rights of the oil miner on the public domain would be found in the law unsuccessfully proposed to Congress during its last session, by which the location of petroleum placer claims was sought to be so regulated as to secure to the miner an opportunity to make technical "discovery" of mineral substances as a precedent to location, in accordance with law. A measure of this nature is demanded by the peculiar conditions of the petroleum industry; would be but a measure of simple justice necessary to give effect to the spirit and intent of the mining law; would be but a wise adaptation to the oil industry of the tunnel-site law, and would work no injury or inconvenience to any legitimate interest. And that we heartily recommend the passage of the proposed Act of Congress recommended by the executive committee of the California Miners' Association, and by the Petroleum Miners' Co-operative Association, being Senate bill 3326, now pending before Congress, and earnestly urge our Senators and Representatives in Congress to use all honorable means to secure the passage thereof.

Resolved, That in the opinion of this body the geological conditions attending oil mining and the multiplication of wells which penetrate water-yielding strata and release their stores of water, make wise and timely investigation of the alleged injuries done to the oil wells and oil fields by the flooding of porous oil-yielding strata from such induced flows of water. We note the fact that the laws of certain Eastern States recognize the injury to oil interests caused in this way and require the casing of water-yielding wells in oil regions and the effective plugging of abandoned wells.

Resolved, That we heartily favor State legislation relative to the needs of the petroleum industry, and it is suggested that one important matter is that of the regulation of mining rights on lands controlled by the State, including tide lands, the bed of the ocean to the 3-mile limit, and the beds of the streams, all mining operations in such ground being now conducted by the simple sufferance of the State and the only mining rights obtainable being those based on possession.

Resolved, That in the judgment of this Association the mining industry of this country, with its output of raw material exceeding a billion dollars in annual value, its tremendous significance to the industrial prosperity of the Nation and its still more splendid promise for the future, warrants and demands the governmental protection and assistance that can be adequately extended only through a Cabinet department of the executive branch of the Government. We therefore heartily endorse the now national demand for a Cabinet department of mines and mining, and invite other organizations to join with this Association in the effort to secure the creation of such a department.

Resolved, We deem it the duty of this convention to place itself on record in favor of liberal encouragement and protection to all legitimate mining interests and pledge ourselves to assist in every reasonable manner any and all legislation, State or national, which is calculated to remedy existing wrongs. We recognize the gross injustice of permitting that class of land pirates, which by claiming land to be suited for agricultural purposes that is manifestly and essentially unfit for any uses except mining, to attempt to wrest from purchasers of State lands their recognized equitable rights, and through perjury and distorted interpretation of the land laws of the State, to place serious obstacles in the way of large investments of money and important oil developments.

Resolved, We look forward with pardonable pride to the early construction, already assured, of the restraining barriers for which $500,000 have been appropriated by our State and National Governments. We heartily approve the plans and recommendations of the California Debris Commission for the construction of such restraining barriers, as outlined in their official report of 1899 to the Secretary of War, and we hereby instruct our committee upon legislation to use all honorable means to secure such added legislation and appropriation as may be necessary on the part of the State and National Governments to carry such work to a final and successful completion.

WHEREAS, The great mineral wealth of the State is increasing from year to year, and greater demands are made upon the State Mining Bureau; therefore be it

Resolved, That we recognize the fact that the future development of the State depends in a large measure upon the future development of its water resources and the preservation of its forests; therefore, we favor the immediate and thorough investigation of, and report on our water resources and the best methods of improving and developing the same; the collaboration of the Federal and State Governments in such investigations; and the proper appropriations therefor by our State Legislature. We desire, and urge upon the Federal Government, that all public forests be reserved from sale, and the establishment of a forest patrol, and we favor the enactment by the State Legislature of such penal laws as will lessen the danger from forest fires.

Resolved, That this Association again express its deep satisfaction at the justice of the policy and action of the Commissioner of the General Land Office, Binger Hermann, in his suspension from agricultural entry of a large area of probable oil lands in this State pending an impartial investigation of their mineral or non-mineral character, thereby preserving to the oil miners the mining rights which are theirs by both the letter and the spirit of the laws.

Resolved, That this Association holds itself greatly indebted to the public press of San Francisco and the mining counties for the assistance it has given not only to the Association, but to the mining industry of California during the past year.

Resolved, That this Association is under deep obligations to the merchants, manufacturers and business men of San Francisco for their generous financial aid during the past and previous years, and recognizes the fact that without this special assistance it would have been unable to accomplish one-half of what has been done. The Association is free to acknowledge this, since the largest proportion of the funds received has come from these gentlemen, who are only indirectly interested in the mining industry.

The report was taken up, seriatim, and adopted section by section as above.

The committee on revision of the constitution and by-laws reported as follows:

Your committee on revision of constitution and by-laws of the California Miners' Association recommend the following amendments to said constitution and by-laws: Amend Section 2 of Article 1 of the constitution to read as follows: Section 2. The objects of this Association shall be to protect, develop and foster the mining and mineral industries of the State of California in all its branches.

Amend Section 1 of Article 2 of the constitution to read as follows:

Section 1. The officers of this organization shall be a president, two vice-presidents, secretary, assistant secretary and treasurer, and an executive committee consisting of not less than fifteen members selected at large, and two additional members from each county represented in the Association, to be selected by the president of this Association.

Amend Section 2 of Article 3 of the constitution to read as follows in the last paragraph:

In the absence of the president, one of the vice-presidents shall perform the duties of that office.

Amend Section 6 of Article 3 of the constitution as follows: Section 6. All checks and drafts of this Association must be drawn by the secretary and signed by the president and secretary.

Amend Section 2 of Article 4 of the constitution to read as follows:

Section 2. It shall be the duty of the executive committee of this Association to promote the formation of branch organizations in all counties where mines or minerals constitute one of the important industries. Such organizations shall be recognized as branches of this Association.

Amend Section 4 of Article 4 of the constitution by eliminating the clause: "All individual members of the Association in counties abutting on San Francisco bay, $5 per annum."

All other sections of the constitution and all sections of the by-laws to remain unchanged.

The report was adopted as read.

Col. W. H. H. Heuer, U. S. Corps of Engineers, and senior member of the Cal. Debris Commission, in response to invitation, took the platform and said:

"The question most frequently on the lips of the miners is, 'Where is that $500,000 appropriated for the dams?' I'll tell you. There has not been one cent drawn from it. The State has spent nothing for the preliminary work. You'll get your dams and they'll impound debris; and while I don't say they will allow the resumption of hydraulic mining, I do believe that they will prove so effective that in time you can turn your mines loose."

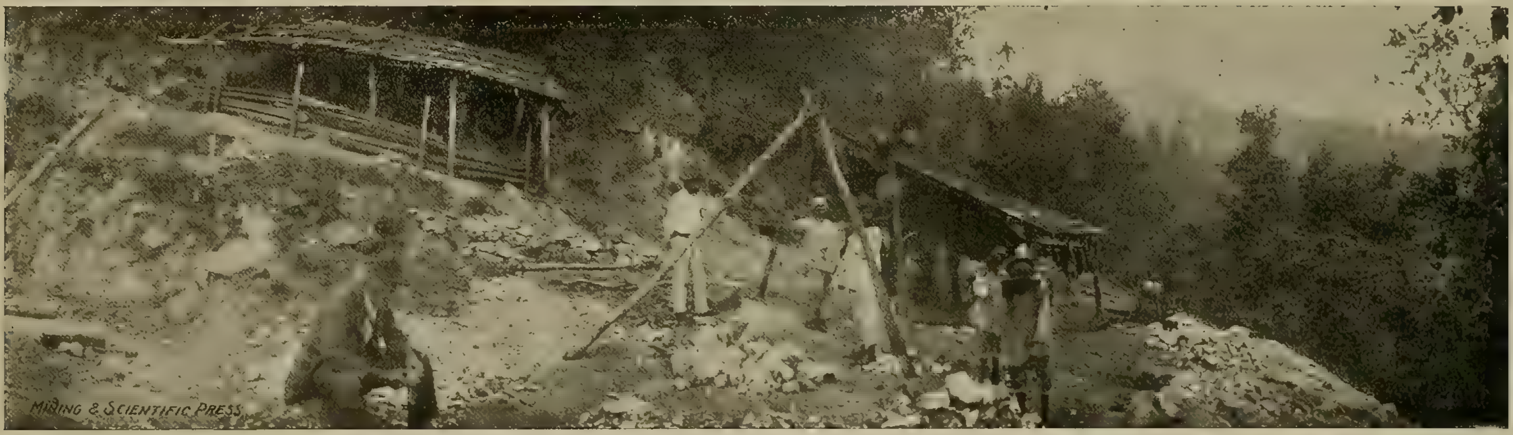
The election of officers for the ensuing year was next in order. E. C. Voorhies of Amador county was unanimously elected president, Fred Zeitler of Nevada county and Lew E. Aubrey of Los Angeles county were, by acclamation, elected first and second vice-presidents, respectively, and, in an equally unanimous way, E. H. Benjamin of Alameda county was re-elected secretary and Sam'l J. Hendy of San Francisco was re-elected treasurer. As all the officers are serving without salary or emolument of any kind, and as the position of secretaryship involves considerable expense, a motion unanimously prevailed that the Executive Committee of the Association hereafter provide "a liberal salary" for the secretary.

After the customary votes of thanks, the convention adjourned sine die.

Taviche, Ocotlan District, Oaxaca, Mexico.

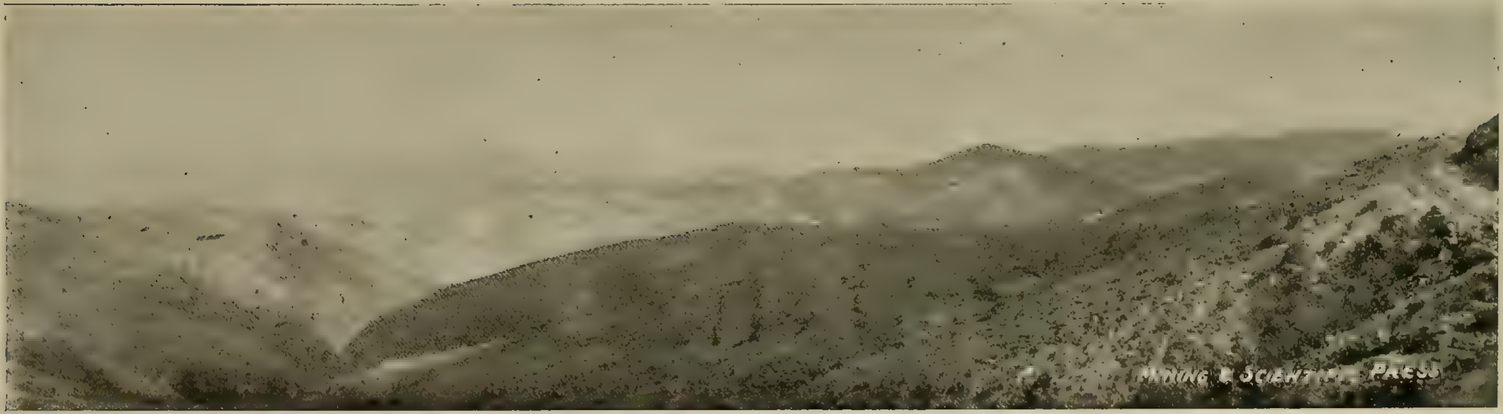
Written for the MINING AND SCIENTIFIC PRESS.

Mexico is a land of mystery and romance, with creeds and civilizations more ancient, with ruins more wonderful, with manners and customs more strange, with soil and climate more rich and varied, than any portion of these United States, and yet there is less known about our next door neighbor than of foreign lands we must cross the broad Atlantic to see. This is true of the vast majority of people. Tourists and sight-seers will traverse half the globe in search of something new or strange in the old world, while sights more wonderful lie right at their door and can be reached in a Pullman car.



Mouth of Entrance to Six-Mile Tunnel, Taviche District; (Blind Boy Miners in Right Foreground.)

General View of Mill and House, Zeboletta Mine, Oaxaca, Mexico.



General View of Taviche District, Oaxaca, Mexico.

To the tourist everything is new and strange—the people, their manners, customs, social life, business habits, religion and superstitions. In all of these Mexico differs from every other country in the world. The first view of the City of Mexico surpasses any other city on the continent of America. Nestled in a valley of exceeding beauty, it gleams like a jewel in its setting of silvery lakes and dark-green hills. The belfries and towers of its hundred churches and palaces are mirrored against a sky that baffles all description. It was this sight that inspired the feelings of awe and admiration in the bosom of Cortez as he stood with his little band of adventurers upon the crest of one of the surrounding hills and looked down upon the capital of the Montezumas for the first time. The sight is truly inspiring, and all tourists are profuse in their exclamations of its grandeur. Mexico City, with all its relics of a past civilization, never fails to fascinate the student of history and fill the mind of the casual observer with wonder.

Mexico is a rich mineral country, and has yielded nearly two-thirds of the silver that forms the stock of the white metal of the world.

For years a syndicate has held a concession on a tract of rich mineral land 35 miles square in the district of Taviche, Ocotlan, Oaxaca, and not having complied with the requirements of the concession the Government took possession and threw the same open to the world for denouncement—that is, for settlement, as was Oklahoma, or the Colville reservation last month. No rush was made, as was the case at Oklahoma or Washington; but few went in.

Some of the properties are reported valuable. Of the Benjamine, owned and operated by the Teressa Co., J. B. Powell of Toronto, Canada, says: "I found at the bottom of its lowest workings, about 470 feet deep, a body of ore between two walls 14 feet wide, 16 inches of this vein being a rich hilo. A choice sample gave an assay of 13,077 ounces silver and 11¾ ounces gold per ton. The whole of this hilo of 16 inches wide would assay 1500 ounces silver and 6 ounces gold per ton. This, of course, was an extraordinary result, but the average sample of this 14-foot vein gave 176 ounces silver and 2⅞ ounces gold per ton."

The La Squadra adjoins the Benjamine and is owned and operated by Senor Don Von Baights.

The Zapote mine, owned and operated by Mr. Wallace, has proven a good property. He has taken out ore ranging from 300 to 800 ounces silver per ton and the usual pro rata of gold.

The El Conejo, the El Mojura, the San Antonio, owned and operated by a company of which A. Fous is manager, are yielding handsome returns.

The camp is well situated. To-day it is 35 miles from a railroad, but by January, 1901, the extension of the Mexican Southern Railroad to Ocotlan will bring it within 12 miles of railroad facilities. From Ocotlan the main road will be extended to Ejutla.

The Los Paras mines, owned and operated by Senor Garcia, lie west of the Taviche camp about 30 miles. This is one of the famous mines of Oaxaca. Some illustrations are given herewith of this region, on this page and the front page.

There are fourteen veins now opened, connected by tunnels and incline shafts, over 6 miles in length. The ore from these mines yields from 2 to 8 ounces gold per ton.

The affairs of this company are conducted on purely Mexican methods. The ore is carried out of the mine on the backs of boys. One of the wonders is that some of these boys are stone blind, but with unerring instinct they will find the drifts, secure the ore, carry it out on their backs and deposit it in its proper place, then return and repeat the process all day without a mistake. They can pilot one to any part of the mine he wishes to find. Eight miles from Taviche is the St. Martine district, where Boss & Armstrong have a mine, in which at a depth of 50 feet was found ore running 1700 ounces silver per ton, besides considerable gold.

Some of the old properties have yielded considerable amounts to their owners. There are about twenty-five other mines being worked in the district mentioned, all of which, a greater or less extent, are paying their owners.

Oil Fields of Fresno County, Cal.

Written for the MINING AND SCIENTIFIC PRESS by H. G. PARSONS.

COALINGA DISTRICT.—The oil-bearing territory in the neighborhood of Coalinga, Fresno county, has been partially defined for many years. In a monograph written by Prof. W. L. Watts, assistant State Mineralogist, and published in 1894, the topography and geology of the entire district were described with some minuteness. At that time several shallow wells had been previously sunk, and a few of these wells were producing limited quantities of petroleum. Recent developments prove that this oil production was merely a seepage from the oil-bearing strata lying far beneath the bottom of the deepest of these wells. In 1898 the attention of C. A. Canfield, who had previously been instrumental in oil development at Los Angeles and elsewhere, was centered on the district 9 miles north of Coalinga. The experience of others at this point had been disappointing, rather than encouraging. But Mr. Canfield seemed imbued with the idea that this could be made a productive district. Enlisting the financial aid of Mr. Chanslor of Los Angeles, he proceeded to sink a well. He went down deeper than any of his predecessors, and on the third trial he struck a "spouter." This was the basis of Messrs. Canfield & Chanslor's wealth, as it was the beginning of the oil excitement and activity in the San Joaquin valley, which has increased from that day to this. The gentlemen named continued to sink wells in close proximity to their successful venture, and in nearly every case they secured another producing well. Other companies came in and they, too, obtained oil in profitable quantities. The Coalinga district became famed over the entire country. It is still one of the most productive fields for its size in the State, and its shipments are undiminished.

The S. P. Railroad Co. built a branch line west from Goshen to Alcalde several years ago. This was done to reach certain coal measures in the same range of hills that are now producing oil. The coal was bituminous in character, and was found upon practical test to be too soft for profitable use. There is no doubt that the genesis of this coal is closely allied to the petroleum deposits which have since been tapped. The railroad from Huron westward was fast becoming a piece of unproductive property. It would probably have been abandoned and the track pulled up if petroleum had not been discovered at about the time it was. The railroad has proven a great boon to the oil industry at Coalinga. It afforded an instant market by transporting the oil to the center of manufacturing industry. The Coalinga oil, like that which has since been discovered in other parts of the San Joaquin valley, is a fuel product, with an asphaltum base. It is decidedly popular as a substitute for coal in steam production. There is also a growing demand for this oil from manufacturers of illuminating gas. There is almost no waste when it is used for this purpose.

Soon after oil was discovered in paying quantities at Oil City, which was the name given to the cluster of buildings which sprang up around Messrs. Canfield & Chanslor's wells, the Union Oil Co. of San Francisco provided tankage facilities in the field and laid a pipe line 9 miles in length to the railroad track. Their charge for storing the oil and piping it to the tank cars is 10 cents per barrel. It is needless to say that the line has proven a profitable bit of property. It has probably paid for itself several times over. The Coalinga Oil Co. (stock in which is largely owned by Canfield & Chanslor) constructed a 30,000-barrel tank some distance from the oil field about one year ago, and connected the tank by a pipe line with their wells, but they have never yet connected the tank with the Union Oil Co.'s pipe line, nor have they laid an independent line to the railroad track. Thus the only purpose served by the Coalinga Co.'s tank is that of a reservoir for any surplus oil which could not be handled by the Union Oil Co. There has been no occasion to use it for this purpose as yet. At the time of the writer's visit to Coalinga, however, the Home Oil Co. had not been shipping for nearly a month, and the Union Oil Co.'s tanks were nearly full. Had the Home Co. not made arrangements to ship soon thereafter, the Coalinga Co.'s tank would have proven a great utility. The Union Oil Co. has also laid a pipe line to a new portion of the Coalinga field, on Section 28, where several wells have recently added to the production of the district.

The water question is usually a serious question in the central California oil fields. Artesian water—often struck in these regions instead of oil—usually carries in solution so much salt, sulphur or other minerals as to make it unpalatable for drinking purposes, as well as undesirable for use in boilers for the generation of steam. At Oil City the water question has been met in a tolerably satisfactory manner by the Coalinga Water Co. This corporation has a pumping station on the plains, 3 miles from Coalinga and 6 miles from Oil City. Water is pumped from two wells, each 300 feet deep, and it is thence forced into tanks on the top of a high range of hills, 5 miles distant and 1180 feet above the pumping station. From here it flows by gravity to the boilers of the oil companies at Oil City and to Section 28. This water is not the best for domestic purposes, and many families own small stills, with which they procure distilled water. Stock drink the water freely, and it is used unchanged in the boilers, where it incrusts the flues in a short period. Another company has developed a purer, but more limited, water supply in one of the canyons west of Oil City.

The Coalinga Oil Co., largely the property of Canfield & Chanslor, as before stated, is the largest producer in the Coalinga field. This company has at least a dozen productive wells, one of which is a copious flower at this date, considerably more than a year since it was sunk. The Canfield & Chanslor Co. is closely allied to the Coalinga Co. Each of these companies is now drilling a new well, showing that development has not ceased on Section 20, where the original discovery was made. The pumps at several wells are run from one jack, centrally located. The fuel used on Section 20 is gas that is obtained in conjunction with the oil. As oil is drawn out of the wells, a considerable amount of gas is liberated. This is conducted by pipe lines to retorts in various parts of the field, and is thence drawn to the boilers as needed. Thus the pumping arrangements are almost entirely automatic. An engineer, to attend to the water supply in boilers or to overlook the gas engines stationed here and there, is the only employe needed for this part of the work. The arrangement is decidedly economical.

The Home Oil Co., in which Canfield & Chanslor were once largely interested, but from which they retired by sale of their stock more than a year ago, is the second largest producer in the Coalinga district. They have five producing wells, from only one of which the oil is pumped; the others are flowing wells. One of these is the famous Blue Goose, or Well No. 3, which started to flow over a year ago at the rate of 1100 barrels per day. It finally settled down to 200 barrels per day, which is its present production. The other wells started to flow at the rate of 400 barrels per day, and they, too, settled down to a much lower rate of production. The total production of the Home Oil Co. is said to be about 15,000 barrels per month. The company is now drilling wells Nos. 6 and 7. They have just completed a steel tank of 30,000 barrels capacity.

The Blue Goose Oil Co., which has a well on Section 20, not far from its celebrated namesake, is still drifting and is down over 2000 feet without striking oil. They are greatly embrrassed with water, as it comes in almost as fast as it can be pumped out. They have one of the finest holes in the camp, with 7⅝-inch casing from top to bottom. Oil is the one thing needful to make a fine well.

The experience of this company is no more unfortunate than that of several other concerns which began operations quite close to the Chanslor & Canfield and the Home gushers. They put down holes to a depth of 1000 to 2000 feet, but found no oil. Apparently under part of Section 20, 19–15, there is a pool of petroleum. If the field extends continuously to the northwest or west, as was thought at first, this fact must yet be demonstrated. The field seems certainly to extend to the southeast, or, at any rate, another pool exists under Section 28, where the greatest activity in development work is now apparent.

The Hanford Oil Co. own all of Section 28, but they are themselves drilling only one well. They have three-fourths of the section leased to other companies. The Independence Oil Co., lessee of the S.W. ¼ of the N.E. ¼ of Section 28, has three producing wells, while Well No. 4 is in oil sand. This was struck at 730 feet and is 50 to 60 feet thick. The Twenty-eight Oil Co., lessee of three-fourths of the N.E. ¼ of Section 28 has two finished wells, which will be producing as soon as a pumping jack can be rigged; a third well is being drilled. The oil sand in these wells is 100 feet thick. The Oil City Petroleum Co., lessee of 240 acres on Section 28, has three producing wells, averaging sixty to seventy barrels per day each. Well No. 4 is about finished. The oil sand is struck at 730 feet; well is finished in clay at 900 feet. The Rock Oil Co., lessee of the W. ½ of the S.W. ¼ of Section 28, is just finishing its first well. It will thus be seen that Section 28 is proving promising and productive territory. These wells are sunk on the sides of a spur of hills, running southwest from the main range, and they are nearer the valley than the wells on Section 28.

The Confidence Oil Co., which owns Section 25, 19–14, where they have a well in the oil sand at 775 feet, are about to insert a pump. The Wisconsin Oil Co. is drilling on Section 32. The Minnesota Oil Co., on Section 33, spoiled their first hole, and they are now drilling a second hole, with good indications of oil. This is still nearer the foothills than Section 28. The Investment Oil Co., on Section 16, 19–15, is now down 1900 feet, but have found no oil sand as yet.

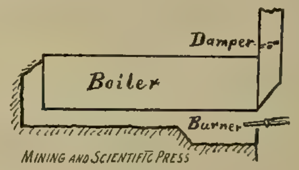
Considerable activity is expected in the newer part of the Coalinga district, on Sections 28, 33, etc., the coming winter.

GREGOR BLANCK, a Hungarian, has invented a loud-speaking telephone, and by the aid of a powerful inductive coil has succeeded in telephoning over a distance of 1000 miles. The crux of the invention is that, by means of the coil, articulation of the speaker is intensified as the words pass along the wire. Besides connecting the instrument with the telephone, the inventor will attach it to the electrophone, and by this means one will be able to sit in a room and listen to what is happening in a theater without having to insert the tubes into the ear, as is now necessary. The sounds would proceed from the electrophone in much the same manner as they are recited by the phonograph.

Experimental Burning of Oil.

TO THE EDITOR:—Following is an account and some figures in regard to an attempt to burn oil, which may be of interest to anyone interested in obtaining cheap fuel—for, although our effort failed, we often learn as much through our mistakes and failures as we do through our successes. We are located in a place where wood costs $5 per cord, and, wishing to reduce the expense of working an old dump, which involves but the question of cheap fuel to make it profitable, we concluded to try burning oil.

Our attempt to burn oil proved more expensive than burning wood, oil being laid down at the mill at a total expense of $3 per barrel. We burned 1⅓ cords of wood per twenty-four hours, and calculations based on information collected before attempting to burn oil led to the belief that oil was cheaper. We are all green in regard to burning oil, and perhaps the conditions under which we burned it are not calculated to give the best results. We installed the oil battery under the direction of a man from Los Angeles, which consists of an oil tank 6 feet in diameter by 30 inches high, from which runs a pipe conveying the oil through a heater, heated by exhaust steam, to the burner. The oil burned well with steady flame and no smoke when using a certain amount of oil, and a certain amount of steam to blow with; but, if more steam was used, it would burn unsteadily, with occasional small explosions, something like a sudden back draft. The arrangement of the furnace is like the enclosed sketch:



We managed to keep steam between seventy and eighty pounds, but found it no easy matter to do so without constant attention to the burner, and the consumption of oil was such as to make it much more expensive than wood. Notwithstanding our failure to economically burn oil, we are in hopes to reduce the amount of oil consumed, and would be glad to hear of any improvements that we could make to reduce the consumption of oil.

Following are the figures, conditions, etc., noted during a run of 11¾ hours. We used three different burners during the run and measured the oil every hour as it lowered in the tank:

First burner—Run, 5 hours; burned, 2½ inches oil. Second burner—Run, 5 hours 45 minutes; burned, 2¼ inches oil. Third burner—Run, 1 hour; burned, ⅜ inch oil. Total run, 11¾ hours; total burned, 5⅛ inches oil.

5⅛ inches = 20,866.50 cubic inches in 11¾ hours.
At 231 cubic inches to gallon, makes 90.32 gallons.
Oil per hour for four stamps, 7.686 gallons.
Oil per hour for one stamp, 1.921 gallons.
Boiler, 30 inches by 8 feet.
Engine cylinder, 5″ x 8″.
Four stamps, 850 pounds.
Speed of engine, 350 revolutions per minute.
Number of drops per minute, 100; 5-inch drop.
Feed water for boiler, injector.
Flame shot direct; no larger.

We would be glad to learn if conditions could be in any way improved.

H. T. SEDGLEY.

Weldon, Kern county, Cal.

How Fires Are Started.

The Railway Review has collected some curious examples of the way in which fires may be caused. In one instance, where some waste, which had been used with mineral oil, had been thrown into a safe place, an insect crawled through it, and then, carrying some pieces of the oily fiber sticking to his body, made his way to a gas jet. The cotton fibers which adhered to him caught fire, and he dropped, blazing, to the floor, setting the building on fire. In another case a quantity of waste was supposed to have been ignited by an electric spark which passed from a belt running close to it to some conducting substance through the cotton, which it ignited on its way, as sparks of frictional electricity can very easily do. In two cases destructive fires are said to have been caused by water. In one of these a flood caused the water to rise high enough in a factory to reach a pile of iron filings. The filings, on contact with the water, oxidized so rapidly that they became intensely heated, and then set fire to the neighboring woodwork, and the building was destroyed. In the other case the water from the engines, during a fire, found its way into a shed containing quicklime, and the heat generated by the slacking of the lime set fire to the shed, and this to other buildings.

Oil and Gas Yielding Formations of California.

W. L. Watts has completed his bulletin on the above subject, and in a short time it will be issued by the California State Printing Office under the auspices of the Mining Bureau. The scientific standing of Mr. Watts gives value to his views from an impartial and expert standpoint. Through his courtesy we are enabled to publish some of the salient points, that the information contained therein may have wide and immediate circulation among those most interested.

In the bulletin he will cite the geological formations in the San Joaquin valley, in the course of his observations saying that "the Neocene formations on the eastern side of the valley are much less disturbed than those on the western side. On the eastern side they are usually inclined at a very slight angle, generally less than 15°, while on the western side the inclination is seldom less than 20°, and sometimes as high as 70°. The reason of this is that the earth movement which so greatly disturbed the rocks of the coast ranges at the close of the Neocene period affected but slightly the Neocene formations in the foothills of the Sierras. The development of the remunerative oil field at Kern river, on the eastern side of the San Joaquin valley, where the formations are so slightly disturbed, warrants the assumption that other localities may be found where oil-yielding rocks which have been subjected to but very little disturbance form a wide and extensive oil line. The place to look for such conditions is on the east side of the San Joaquin valley. A great drawback to prospecting in the lowermost foothills of the San Joaquin valley is alluvium, which to a great extent covers the Neocene formations. It is also possible that comparatively undisturbed Neocene formations may be found in the foothills of the Sierras to the south of the Tehachapi pass."

Discussing the Kern river oil field Mr. Watts says: "The Kern river oil field, as far as it has been developed, comprises an area of about 12 square miles, and is situated in T. 28 S., R. 27 and 28 E., and partly in T. 29 S., R. 28 E., M. D. M. Within this area in August, 1900, about 130 wells had been drilled and many others had been commenced. These wells are drilled in groups and some of the groups are nearly a mile apart. The depth of these wells varies from 450 feet to more than 1000 feet. The formation penetrated is, first, alluvium or drift, which in few places exceeds 50 feet in thickness; then a stratum of blue clay from 25 feet to 350 feet thick; beneath the blue clay is a water sand from 10 feet to 100 feet in thickness; beneath the water sand the formation consists of alternate strata of clay and sand. The well records show that most of these sands contain oil, and that in some instances they aggregate a thickness of more than 300 feet.

"It is a difficult matter to estimate the thickness of oil-sand strata in a well which is yielding oil, especially when the formation is caving; but some of the operators in the Kern river field state that they have estimated the thickness of the oil-sand in their wells by carefully casing off all the strata as they went down, and that they found the oil-sand to be more than 300 feet in thickness. It is unlikely that the oil sands in the Kern river oil field will prove of uniform thickness or uniformly saturated with petroleum; but the development at this date indicates that the Kern river oil field is the largest developed oil field in California.

"The owners of the wells in the Kern river fields state that their wells will produce from 40 barrels to more than 100 barrels of oil a day. Owing to lack of transportation, there has not been a sufficiently continuous production to warrant a definite statement by the writer as to the yield of the wells in this field. The oil is a black oil, and it is said to have a gravity of from 14° to 17° B. Much running sand accompanies the oil. Some companies separate the sand from the oil by running both into a slump-hole, where the sand settles; the oil is then pumped from the surface. Other operators pump the oil and sand into flumes furnished with riffles, which are from 4 to 8 inches in height. The flumes are from 80 to 300 feet in length, and the riffles are from 8 to 14 feet apart, according to the grade of the flume. In some instances the oil is of such gravity that it has to be steamed in the well before it can be pumped. In a general way, it may be said that there is very little gas in the Kern river oil field, although, in some instances, it is claimed that enough gas could be collected to supply fuel for steam purposes. The gas appears to be held in solution in the oil and separates from it when brought to the surface.

"There are very few rock exposures in the Kern river oil field. These show strata of clay and soft sandstone. The sandstone is light-colored and formed principally of granitic material. These rocks resemble the formations which may be seen resting on the granite a few miles northeast of the oil field.

"Between the oil field and the granite, the sandstone contains fossils which identify the formation as the Middle Neocene. The best rock exposures seen in the oil fields are on the bank of Kern river in Sec. 2, T. 29 S., R. 28 E., M. D. M. At this point, strata of sandstone, somewhat impregnated with petroleum, dip to the west of north at an angle of less than 10°. It is difficult to estimate the precise direction of the dip of the oil sand, even when the depth at which the oil sand was struck has been given. The reasons of this difficulty are: First, it is impossible to tell whether or not the first oil-yielding stratum is the same stratum; second, it is evident that the strata vary in thickness within a short distance; third, the angle of the dip is so slight that it is necessary to use the records of wells which are far apart for the purposes of calculation; fourth, there is every reason to believe that the strata penetrated in the Kern river oil field undulate.

"Notwithstanding the difficulties referred to, the writer collated the well records kindly furnished him by the well owners in this oil field. From these records it appears that in the northern portion of the field the strike of the oil sand is about N. 30° W., the dip being S. 60° W. at an angle of less than 10°; and in the southern portions of the field the strike is about N. 70° W., the dip being S. 20° W. at an angle of less than 10°. It is probable that N. 60° to 70° W. is the prevailing strike of the Neocene formations in the Kern River district.

"In August, 1900, when the Kern River district was visited by the writer, the Kern river might be said to bound the developed portion of the Kern river oil field on the south and east. The rock exposures on the banks of the river show no evidence of any fault or line of geological disturbance to which the course of the Kern river might be attributed; and the terraced banks of the river indicate a long period of gradual erosion. There is a reasonable probability, therefore, that remunerative oil-yielding formations will be discovered on the south side of Kern river."

(TO BE CONTINUED.)

The German Meinecke.

TO THE EDITOR:—In these days of economical mining, when engineers are searching, not for ores running thousands of dollars or hundreds of dollars to the ton, but seem to be rather devoting their time and attention to securing the last ten cents per ton from a large tonnage, a brief description and plans of a machine that has been in practical use for many years is in order, especially as this machine has been so thoroughly tried that it is no longer a theory but an actual condition, and is, in fact, a satisfactory, practicable, easily handled and correct piece of machinery. The machines in the Smuggler mill were imported from Germany, and have been in use by me for many years, and have been in use for a much longer period than this in the old country. Classification for size of the sands of any mill, it is generally conceded, is one of the most important branches of concentration, and one that requires more study and care than at first glance would seem that it would warrant. The importance of separating ore into sizes, however, before attempting to concentrate, either on jigs or tables, is so self evident that it hardly requires any special argument. The mere fact that a chunk of lead the size of a marble will not fall more quickly than a chunk of some kind of rocks as large as a crabapple, but that a piece of lead as large as a marble will fall more quickly than a piece of rock the same size, is about the only argument that this is needed. When rock gets so fine that it is practically impossible to size it by means of screens, owing to the fact that the smaller the hole in a screen the thinner the metal has to be in which these holes are punched or drilled, makes it necessary to size this ore in some other way. Of course we all understand that the hydraulic sizing cannot be as acceptable as screen sizing, and it is simply because it is impossible to screen size the ore that we try to get some other means of accomplishing the same object. This, as a rule, is done hydraulically on the German plan, for making this classification. It is easily adjustable, simple, and almost impossible to get out of order. It should immediately precede the spitztkasten or settling box. Of course, in all hydraulic sizing the great trouble is that the factor of weight, as well as size, enters very largely into the law of bodies falling through an upward current of water, and naturally any hydraulic classifier will, to a certain extent, effect a partial concentration in itself. A perfect sizer for the finest of slimes is yet to be invented or discovered. The most of the classifiers for size are based upon the principle of dropping the slimes through an upward current of water and drawing it off by a siphon as this one does. But the most of them, unfortunately, introduce water from an upward current each time that any one size is desired to be drawn off. For example, in drawing off one size, they introduce water at the bottom under pressure, and they go through the same process, adding more water in a different receptacle for getting another size. The objection to this is two-fold; first, it is extravagant in the use of water, and sometimes water is scarce, and secondly, such a flood of water is introduced into these slimes as to be a very great detriment. As a matter of fact, for the successful concentration of slimes, the less water above that absolutely necessary indroduced the better. The German meinecke has to a certain extent obviated this difficulty, by means of a pressure tank of clear water located at from 4 to 10 feet above it, thus introducing an upward current of water, at the pipe flange, and drawing off four different sizes of sands and meals, so that only one-fourth of the amount of water ordinarily used is necessary. Of course this machine could be built with as many siphons as would be required, but in practical use it would probably be more advisable to have more of them in use rather than to make each larger.

Aspen, Colo., Nov. 10. S. I. HALLETT.

Steam and Gas Engines.

A correct answer to the question, What is the comparative cost of operating a gas engine and a steam engine equal of power? involves a special solution for each individual problem. Considered solely as a machine for converting the total energy of the fuel into mechanical work, the gas engine is far more efficient. There are gas engines in operation which transform over 25% of the heat in the fuel into useful work, while in the best recorded performance of the steam engine barely 14% of the energy in the coal burned has been thus accounted for, and in the average steam plant, not to exceed 5%. There are many small plants, consisting of common slide engines, with uneconomical types of boilers, in which less than 2% of the energy of the coal burned is converted into mechanical work. At the same time it must be remembered that a given number of heat units in the form of fuel suitable for use in a gas engine costs more than an equal number in the shape of coal or other ordinary fuel suitable for burning in a common boiler furnace. As a general proposition it may be assumed that in a plant which operates continuously the item of fuel alone will be somewhat greater for the gas engine than for an improved type of modern steam engine, except possibly in the case of an engine running on producer gas. When the service is of an intermittent nature, or the power is required only for a comparatively short time each day, this difference in favor of the steam engine becomes less, and may become a balance in favor of the gas engine, for the reason that in the gas engine plant there are no stand-by losses, no radiation nor leakage when standing idle under full steam pressure, and coal being burned in banking fires and raising steam. With the gas engine the fuel expense starts and stops with the engine. But the fuel cost is only one item in the cost of producing power. One must consider the value of the additional space and buildings required for a boiler plant; the cost of a stack; depreciation, repairs and insurance on a boiler plant. The gas engine has a field of its own which cannot be occupied by the steam engine, and there is no immediate prospect of the gas engine encroaching on the legitimate field of the steam engine.

Referendum Dollars.

Joseph Lesher, a Victor, Colo., silver mine owner, has procured a die, laid in a supply of silver bullion, and has manufactured several silver coins, each containing one ounce of pure silver. He calls his coins "referendum dollars," because they are referred to the people for acceptance or rejection. His silver at the present quotation costs him 65 cents an ounce, and the expense of coining is 15 cents—80 cents in all. He values his dollars at $1.25 and expects to issue them as such and keep them at par. He promises to pay $1.25 in United States money on demand for each referendum dollar. To avoid interference by the Federal authorities for imitating the lawful money of the United States, Mr. Lesher makes his dollars six-sided.

THE Niagara Falls Power Co. is stringing aluminum cables on the power transmission line between Niagara Falls and the Tonawandas. This is the second transmission line built by that company in which aluminum replaces copper. Aluminum being so much lighter than copper, the new aluminum cables are larger in diameter than the copper cables in use on the original transmission line and will have thirty-seven strands, while the new copper cables have nineteen strands. The conductivity of the aluminum cables, however, will equal that of the copper cables; while the weight of material on the pole line will be very much lighter. It is significant that all of the aluminum transmission lines now in operation are successful. In this new Niagara line aluminum will be given a severe test, as the voltage at present is 11,000 and it is soon to be raised to 22,000.

WATER SUPPLY AND IRRIGATION PAPER No. 40, on the Austin dam, by Thomas U. Taylor, professor of civil engineering at the University of Texas, has been issued. The paper reviews briefly the history of the events which led up to the construction of the dam, and gives the specifications and describes the methods of building, as well as the more important engineering details. The flow of Colorado river is also discussed, and data are given of the accumulation of silt behind the dam. The final destruction by the flood of April 7, 1900, is described and causes of the failure are noted. Application for the paper should be made to members of Congress, by whom 4000 copies of the 5000 printed are distributed, or to the Director, United States Geological Survey, Washington, D. C.

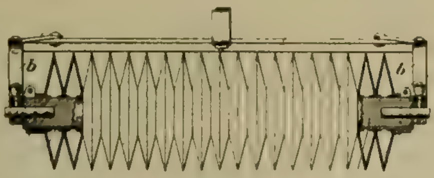
THOMAS A. EDISON has perfected a device for heating compressed air which, he asserts, utilizes all the store energy of coal and obtains fully 95% of it.

Mining and Metallurgical Patents.

Patents Issued November 13, 1900.

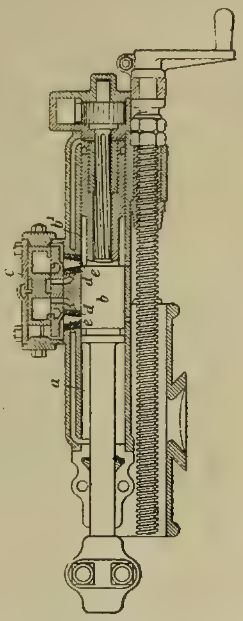
Specially Reported for the MINING AND SCIENTIFIC PRESS.

PULVERIZER.—No. 661,814; A. F. Peterson, Kent, Ohio.



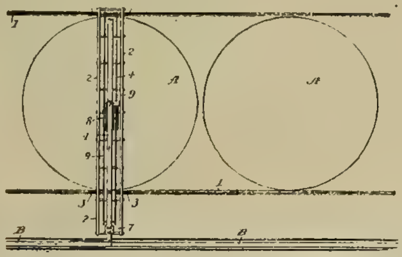
In a pulverizer, combination of frame, rotary shaft, series of closely arranged hollow metal disks rotatable independently on said shaft and together with shaft, means holding disks together on shaft, each disk having side walls widely separated at center and having flanged openings and narrow flat faces, walls converging oppositely from said flat faces and rigidly united at edge of disk, and circular cutting blade rigid with both walls and projecting beyond meeting line thereof.

ROCK DRILLING ENGINE.—No. 661,825; W. C. Stephens, Carn Brea, England.



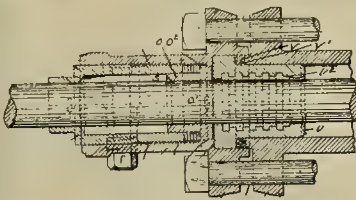
In a rock drill, employment in exhaust passage of elastic and compressible bushing having central passage provided with lining of suitable rigid material such as metal.

CONVEYER.—No. 661,842; H. W. Blaisdell, Yuma, Ariz.



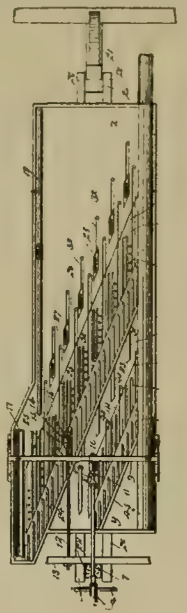
Combination of conveyer, stationary support therefor, movable bridge disposed at an angle to conveyer stationary support, conveyer on movable bridge, discharging device adjustable on fixed support and co-operating with conveyer thereon, discharging device on movable bridge adjustable from end to end thereof and co-operating with conveyer on bridge to discharge material at any point throughout length of latter.

ROCK DRILL CYLINDER HEAD.—No. 661,684; A. Ball and T. Officer, Claremont, N. H., assignors to Sullivan Machinery Co., same place and Chicago, Ill.



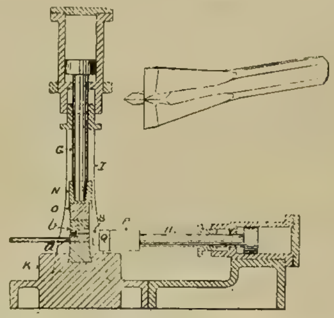
In a cylinder head for rock drills, comprising shell provided with interior screw threads and shoulder, bushing contained within shell and having shoulder engaging shoulder of shell, a partible gland extending into shell and over bushing, gland having exterior screw threads for engaging interior screw threads of shell and internal shoulder between which and end of bushing packing is interposed.

CONCENTRATING TABLE.—No. 661,886; I. F. Monell, Boulder, Colo.



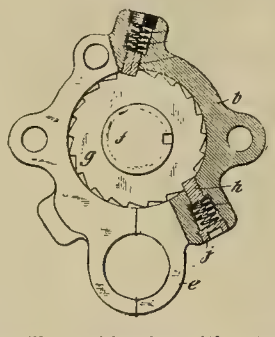
Concentrating table mounted to swing and arranged in an inclined position, having series of channels formed in it, arranged diagonally, certain channels being deeper than others and having communication with outlets, series of fixed riffles at one side of series of channels and also arranged diagonally, and series of adjustable riffles arranged diagonally at opposite side of series of channels.

APPARATUS FOR MAKING AND SHARPENING ROCK DRILLS.—No. 661,798; G. Glossop, Leeds, England.



In machinery or apparatus for mending and sharpening blunted and worn rock drills, combination of vertical hammer, horizontal hammer, anvil, hammer head N of vertical hammer having wing drawing and pointing die or tool d and holding die i, hammer head p of horizontal hammer having wing sharpening tool or die k, and anvil block being provided with wing pointing, forming and drawing die c and holding die h, and of double gripping device consisting of two hollow split taper gripping blocks n, tapered guides or slides connecting lugs q, rocking levers s, shaft r and foot lever p.

ROCK DRILL.—No. 661,927; R. L. Ambrose, North Tarrytown, N. Y., assignor to Rand Drill Co., New York, N. Y.

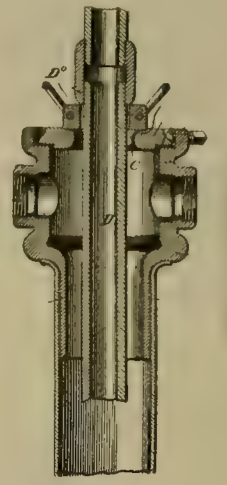


In a rock drill, combination with rotating bar and ratchet wheel secured to rotate therewith, of pawl mounted in drill cylinder head and having rectangular movement therein toward and away from face of ratchet wheel, helical spring mounted in drill cylinder head and adapted to press said pawl inwardly against face of said ratchet wheel, and means interposed between said pawl and said spring whereby spring is retained from accidental displacement through pawlways after pawl has been removed.

ELECTRIC FUSE.—No. 661,498; J. L. Cohen, New York, N. Y.

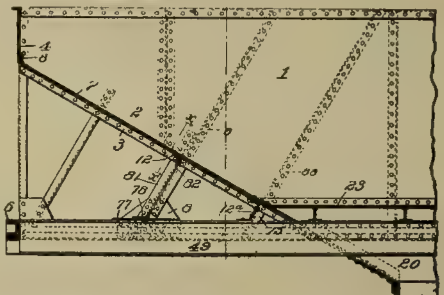
An electric igniting device consisting of non-conducting combustible material, compound affixed thereto, and conducting wire adapted for igniting and flashing compound and producing flame in connection with combustible non-conducting material when an excessive current of electricity is applied thereto.

CASING HEAD FOR OIL WELLS.—No. 661,913; C. Hayes, Franklin, Pa.



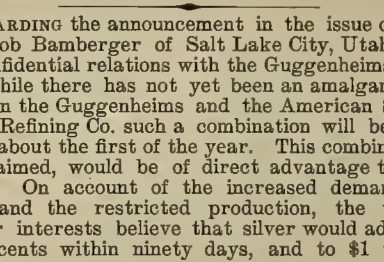
In an oil well apparatus, combination with drillers' casing nipple having its belled-over upper end; of casing head having tubular extension thereon fitted within belled-over end of drillers' casing nipple and having exterior concave curved shoulder resting upon said belled-over end of drillers' casing nipple.

HOPPER BOTTOM CAR.—No. 661,698; G. I. King, Detroit, Mich.



The combination with side and end plates of car body, of inclined floor plates arranged longitudinally, cover plate arranged centrally of floor plates, downturned flanges 3, at side edges of floor plates which extend to lower edges of side plates substantially throughout length of their inclined portions, and co-operate with side plates at this point, devices for securing flanges to side plates and means for securing outer end of floor plates to end plate.

DREDGING MACHINE.—No. 661,609; F. K. Hoover and A. J. Mason, Kansas City, Mo.



In a dredging apparatus, combination with suction pipe of debris trap arranged therein to intercept and trap debris and water-sealed valve for exit of debris from said trap.

REGARDING the announcement in the issue of Oct. 20, Jacob Bamberger of Salt Lake City, Utah, having confidential relations with the Guggenheims, says that while there has not yet been an amalgamation between the Guggenheims and the American Smelting & Refining Co. such a combination will be perfected about the first of the year. This combination, it is claimed, would be of direct advantage to producers. On account of the increased demand for silver and the restricted production, the united smelter interests believe that silver would advance to 75 cents within ninety days, and to $1 within a year.

THE Snoqualmie Falls Power Co. of Seattle, Wash., has succeeded in driving an electric motor 153 miles distant from the generator. All the lines of the company were connected up to one continuous circuit, commencing at Snoqualmie Falls, running to Seattle, back to the Falls, thence to Tacoma and back again to the Falls. The regular transmission is 153 miles to Seattle and 44 miles to Tacoma. The tests were conducted for experimental purposes, to show that electric transmission of power can be made commercially practicable at such distance.

Pyritic Smelting in the Black Hills.*

NUMBER II.

In Table II analyses of the Mansfield slags are given for the purpose of comparison. I have figured the alumina as a base, as we always did in our work at Deadwood. With the Mansfield slags before me, and the knowledge that, in iron smelting, slags (cinder) are made in which there are not—intentionally, at least—any iron, I was not discouraged over the slags. I had before me the work of Percy and Smith upon silicates, and their methods of experimenting with crucible charges. As I was restricted to a siliceous ore of even composition, barren pyrite and magnesian limestone, I set myself to work to see what slags I could make most easily and profitably of these materials. I mention the method of experimenting, as it may, some day, be useful to others.

TABLE II.—ANALYSES OF MANSFIELD SLAGS.

	Cu.......	SiO₂......	FeO......	Al_2O_3....	CaO......	MgO.....	Oxygen in acid..	Oxygen in base..	Silicate degree.	
									RO.	SiO_2.
1...	0.6	50.0	8.7	15.6	20.3	4.4	1.59	1	1.25	2
2...	0.3	47.6	4.7	14.8	18.4	6.7	1.65	1	1.21	2
3...	0.25	53.8	4.4	4.4	33.1	1.70	2.18	1	0.92	2
	0.3	48.47	4.64	17.0	23.2	2.2	1.56	1	1.28	2
	0.3	46.4	2.77	16.52	21.51	0.85	1.66	1	1.20	2
	0.75	48.2	10.75	16.35	19.3	3.2	1.52	1	1.32	2
	0.2	48.4	5.89	18.17	19.5	8.02	1.38	1	1.43	2
	0.3	46.8	7.21	17.64	19.15	3.68	1.48	1	1.35	2
	0.3	54.7	7.47	7.83	23.4	0.87	2.47	1	0.81	2

NOTE.—At Mansfield Al_2O_3 is figured as acid. I have here figured it as a base in order to compare these slags with mine.

At this time there were associated with me, at the Dakota School of Mines, Dr. H. O. Hofman, now of the Massachusetts Institute of Technology, and Dr. W. P. Headden, both of whom made valuable suggestions. The actual experimental work, which was long and tedious, was done under my direction by Theodor Knutzen, then a laboratory assistant at the School of Mines, and for years connected with the smelting works afterwards erected at Deadwood.

My idea was to take certain quantities of ore and limestone, and of pyrite, raw and roasted, and melt them together in a crucible, after the manner of Percy and Smith, until I had determined the most fusible and desirable charge, as well as the most profitable, that could be made from these constituents. We used Hessian crucibles, about 6 inches high, and an ordinary crucible furnace. The material was finely ground, and many charges in varying proportions were tried, the endeavor being always to use as much ore and as little limestone and pyrite as possible. We added carbonaceous material to the crucible charges, usually in the form of wheat flour, so as to imitate as nearly as possible the action of a blast furnace. After some experimental work, it was found that a charge composed of 40% siliceous ore, 45% of magnesian limestone and 15% of raw pyrite gave a clean fluid slag, and a matte button at the bottom of the crucible carrying practically all the gold and silver, thus getting the results which, according to Bloxam, are obtained from the smelting together of lime, quartz and pyrite at Zalathna, Hungary. These slags were analyzed and attempts were made to deduce formulæ for them. The only noticeable feature was that the slags were high in silica and (though made without the use of copper) were free from gold and silver, or nearly so.

Dr. Richard Pearce has shown that pure iron sulphide does not dissolve gold, while the experiments of E. G. Spilsbury at the Massachusetts Institute of Technology, in matting the auriferous sulphides of North Carolina, showed that gold could not be concentrated in an iron matte satisfactorily. I will refer to this later.

Having done so much with crucibles, the next point was to do the work in a large way. Six thousand dollars was subscribed, with which I bought a 36-inch round water jacket furnace, a blower and engine and boiler, and seven carloads of West Virginia coke, and erected an experimental plant, the so-called "baby smelter."

The charges which had worked best in the crucible experiments were tried, I confess, with much anxiety, for my lead smelting friends, with scarcely an exception, predicted failure and dire disaster. The first slags were duplicates of the experimental ones, and the furnace ran as smoothly as at any subsequent run. I made a carload of iron matte, carrying about twelve ounces of gold, sixty ounces of silver and no copper, took it to Omaha, sold it to the smelter there, and returned to the Hills with the argumentum ad hominem, the check in hand.

The work in the crucibles was never much modified. The slags from the blast furnace, however, while fairly clean, were not so notably so as in the crucible experiments; and this led me to believe that a reverberatory furnace would possibly have done better work, as it would more nearly have imitated the crucible experiments. It is said that when this raw smelting was practiced at Freiberg the reverberatory was preferred. We found it advisable to use somewhat more pyrite in our blast furnace work than had been found necessary in the crucibles.

The "baby" or experimental plant was operated for several months, when it was decided to build a larger plant upon the same lines. Our first Raschette furnace was but 84 inches long; the next ones were 120 inches, and the last furnaces erected were 144 inches long. Different degrees of bosh and of width were experimented upon. We found 36 inches about the best width.

For many months the charge remained siliceous ore, barren pyrite and limestone. The first charge was the substitution of Homestake stamp mill concentrates for a part of the barren pyrite, and after several years the barren pyrite was replaced by copper sulphide ores from Butte, Montana. The Homestake concentrates gave rise to large quantities of flue dust, which in time became very annoying. All attempts at briquetting the concentrates, even with costly presses, failed. The problem was finally solved by resmelting the flue dust in large reverberatory furnaces, and adding the resulting low-grade iron matte to the ore charge of the blast furnaces.

During our experimental work I made one experiment in briquetting the concentrates that promised success. I bought a tank of the so-called "sugar waste" of the sugar refineries. It is a coarse molasses. I mixed up the concentrates with it and water, as a mason mixes mortar. When it was allowed to dry it gave good results, but the plant smelled like a candy factory, and apparently all the flies in South Dakota came down to investigate. The sugar waste was not only cheap and did the work, but it also added carbonaceous fuel to the furnace as well. I believe the idea is well worth following out.

Our practice, as at Mansfield, where the ores also consist of earthy minerals low in iron, gave rise to "sows" or bodies of metallic iron. At Mansfield these sows were formerly sold in England at the price of pig iron. The ores at Mansfield carry no gold, and these iron sows do not take up the silver. Had we been smelting only silver or copper ores, we might have disregarded them, but owing to the gold in our charge, and the affinity of metallic iron for it, these sows were our richest product. In time they came to replace the brick in the furnace hearths and foundations. They were virtually blocks of solid metallic iron, weighing from twenty to forty tons, and carrying sometimes twenty ounces of gold per ton. It was extremely difficult, as well as very expensive, to break them up, but we formerly accomplished this by boring holes with a ratchet drill and repeatedly "shooting" them with dynamite, as many as fifty shots being sometimes required to break open the larger masses.

This was repeated until pieces of 100 or 200 pounds weight were thus obtained. Sampling them was out of the question, but I made arrangements to have them smelted by the Omaha & Grant Co., which treated them with a lead sulphide carrying no gold. As our sows carry little or no silver, the bullion obtained by this process was kept separate, and sampled alone, to the satisfaction of all concerned.

One day I found an account of the method formerly employed by the Detroit Copper Co. in treating large masses of native copper, which was to place them upon the hearth of a reverberatory furnace and smelt them down with pyrites. I set about arranging one of our reverberatories with a removable top and large traveling crane, intending to do the same with my iron sows, when the foreman suggested the passing of them beneath the roof of the furnaces at such times as it became necessary to rebuild the flues, which would save altering the roof. The first time a flue came down we placed forty tons of "sow" or metallic iron upon the hearth, charged the furnace with raw pyrites and copper ores, and fired the furnace. At the end of three days there was no sow in the furnace, nor was the hearth in the least injured, and several hundred ounces of gold had been recovered at mere nominal cost.

(TO BE CONTINUED.)

THE telephone has new uses every day; and, with each addition to its field, the simplicity makes people wonder why it was not tried before and what the limit of its use really is. One of the latest applications is a device which enables the conductor of a trolley car to talk to the officers of the company, and is applied on the St. Louis, St. Charles & Western Railroad in Missouri. In each car is placed a telephone box of the usual type, containing receiver and transmitter, but without the regular bottom box for the battery. In place of this the ground wire, which is concealed, is connected with the ground wire of the propelling motor; and the other wires, which are also hidden, are led through the car into the vestibule, where they are socketed to connect with the plugs on the device for making contact with overhead wires on the poles.

Mining Conditions in Rhodesia, S. A.

To THE EDITOR:—Rhodesia, a country of many promises and few fulfilments. Such, up to the present, must be the verdict. It is also the land of "excuses." If one is rash enough to ask why the gold output of the country does not come up to expectations, two reasons are always given: the rebellion and the rinderpest. Both are now some years old, and still the output is but little over 6500 ounces per month, and is practically stationary, one mine producing very nearly half of that. The want of native labor is also one of the reasons given, but, in many people's opinions, a very poor one. The native labor in the country is without doubt poor and ignorant, but since the shut-down of the Johannesburg mines that labor, which was on the whole fairly well trained, ought to have been available. The great drawback to the country hasn't been so much the "native" labor as it has the very poor "white" labor that is and has been in the country. Every white man who could talk the language, Kitchen Kaffir, and who could "boss" boys immediately after he had sunk a few regulation 30-foot holes, considered himself a miner, and, unfortunately for most of the companies, their highly-paid managers and managing directors knew no different, and so long as they were not required to go out into the country and look after the work they didn't bother how the "miner" got on.

Their salaries went on just the same, and so long as the "footage" was satisfactory and specimens came in, to be sent on to London, everything was allowed to go on just as it liked.

The country being nothing but a "fissure" country, in contradistinction to the Rand, which is a "bedded" country, has to be worked with as much care and attention as any other "fissure" country. The average of the gold contents of the veins does not, as first heralded to the world, run up into ounces. One can more nearly count the average in pennyweights on the fingers of one's two hands, and when one gets down to those sort of figures one has to have a careful and thoroughly capable manager to make both ends meet.

The thoroughly capable mine manager in Rhodesia is almost like the needle in the bundle of hay. Perhaps one reason for his absence is that the Rand offers better inducements, not only in salary, but also in salubrity of climate and the pleasures of life. Rhodesia has a bad name for fever, which to a certain extent is unjust. In the pioneer days no doubt fever had many victims, but since people have begun to live more rationally its victims have greatly decreased in numbers, and, although it may never disappear in toto, as civilization increases so fever will decrease.

One of the great drawbacks to the mining future of the country is that large blocks of claims are held by "developing companies," who expect to pay their shareholders dividends on "prospect" holes they float off on the gullible English public. They don't float off a mine. If they did, that would be all right; but most of them sink a few shafts, seldom over 100 feet deep, and do a few feet of drifting, and, of course, always on the best part of the vein, and then go in for "flotation." Shares are taken in part payment and then "boomed," and after a year's precarious existence the "flotation company" has to be reconstructed. And so the wheel goes round. Out of the enormous number of claims pegged in Rhodesia there certainly will be a few that will eventually turn out good, and if such companies as (shall we say?) the Exploration Co. of London or the De Beers of Kimberley would come in and turn some of these numerous prospects into mines, then the future of gold mining in Rhodesia would be assured. But until then the probabilities are that failure and disappointment will be the lot of most of the existing companies; and their failure will be principally due to themselves for not having got the proper men to look after their interests. Of the enormous sums of money that have been spent in Rhodesia, had only one-half of it been spent under capable and honest management, the gold future of the country would not be as bad as it is now, an unknown quantity. The country would either have a future before it or else it would be given up as a mining country and have to depend for its future on agriculture and stock raising.

Of the success of the two latter industries in the country there cannot be the slightest doubt, but with the same proviso as in the mining industry—capable and honest men, and not younger sons and ne'er-do-wells, sent out to make their fortunes, generally with the old Scotchman's advice to his son, "Sandy, make money—honestly if you can; but make money."

Salisbury, S. A., Oct. 17.

MINING SUMMARY.

ALASKA.

Nome reports that, as on the north California coast, nature through wind and wave has renewed the deposit of ruby sand on the beach, and stranded miners are out again washing the sand with profit.

F. D. Nowell, receiver of the Nowell properties, Seward City, is putting in a $2000 building to cover blanket sluices. Forty stamps are dropping.

At the Apollo, Unga, T. C. Mayon Supt., the tunnel is in 1800 feet, and forty stamps are dropping.

Good placers are reported found near Cape Dyer, between Point Hope and Cape Lisburn, 300 miles north of Nome.

ARIZONA.

GRAHAM COUNTY.

The October output of the Arizona Copper Co., Clifton, was 890 tons copper. New storage tailings bins are going in.

A. Rosecrans has added seven men at the Medler, near Clifton.

GRANT COUNTY.

The Summit group (lead) at Cook's Peak is reported sold to A. F. Fuller of Chicago for $150,000. Electric drills and other machinery will be put in.

MOJAVE COUNTY.

The new 50-ton Huntington mill recently put in on Burro gulch, near Kingman, is running satisfactorily. Maj. Mensch owner.

W. Weston, general manager of the White Hills mines, Mojave City, will sink the main shaft to the 1000-foot level.

PINAL COUNTY.

The London Globe Exploration Co. may buy the Glissan and Lawrence (gold) near Dripping Springs.

The Mammoth-Collins Co., Florence, will put in a pumping plant within next ninety days. Extensive development has been done on 760-foot level with good results.

Work on the Henry & Ritch Bonanza is being pushed.

Holman & Perkins are working copper property near Silver King.

Work has begun on the new steam plant to be put in at the Ray mine. Supt. Turman is expected back Jan. 1.

SANTA CRUZ COUNTY.

The Bradford (copper), near Bloxton, will put in a steam hoist and pump.

The Wetherill process of separation is in successful operation in Washington Camp.

YAVAPAI COUNTY.

The Whim shaft at the Copper Bottom, supplied with 22 H. P. gasoline hoist, is down over 100 feet.

Nellis, Shelton & Fisher, operating the Picnic group, have opened up a 5-foot vein running 15% copper, 7 ounces silver and a little gold per ton.

A body of copper sulphide was recently opened up on the 200-foot level of the Blue Bell, 5 miles southeast of Mayer.

Ten men are working at the Iron King, crosscutting, etc.

Ore carrying $50 gold, $20 silver and $10 lead per ton is reported opened up on the 130-foot level in the First Home, near Big Bug.

CALIFORNIA.

Secretary Benjamin of the California State Miners' Association reports that since the last annual convention there have been six meetings of the executive committee of the Association—the first, on Jan. 26, 1900, called by President Ralston for the purpose of obtaining a consensus of opinion and to decide upon a course to be pursued in regard to the mineral lands bill; to discuss the question of the preservation of forests and the conservation of water, and to take action toward urging the establishment of a department of mines and mining in the national Government. The second meeting, Feb. 20, 1900, was called to consider a letter received from Congressman De Vries, in reference to the elimination of certain lands in the southern part of California from the mineral lands bill; to endorse the bill prepared by the mineral lands committee in reference to oil locations, and to discuss the matter of scrip location in Shasta county. The third meeting, on March 17, 1900, was called, at the request of the committee on dams, to consider the advisability of sending a representative to Washington in the interest of legislation regarding debris dams. As there were but a few present, the matter was laid over until the fourth meeting, on March 23rd, when the report of the committee on debris dams was received and adopted, and A. Caminetti was authorized to proceed to Washington in the interest of the debris, mineral lands and petroleum bills. At this meeting action was also taken on Congressman De Vries' letter, and it was resolved that the Association refuse its consent to any amendments to the mineral lands bill that would eliminate any portion of the State. The fifth meeting, on August 13th, 1900, was called for the purpose of taking action regarding the suit of Sutter County vs. The Polar Star M. Co., to receive the report of the Association's special attorney in the Red Dog lawsuit, also the report of A. Caminetti, who had been sent to Washington in the interest of the Association, and to set the time for the annual convention. The sixth and last meeting was held on November 13th, and was called for the transaction of general business prior to the convention.

During the year, Secy. Benjamin states, many new members have joined the Association, and a great many inquiries have been received for literature and information regarding the Association and its aims and objects. The remaining volumes of "California Mines and Minerals," reported at the last convention, have been distributed among libraries and educational institutions in many parts of the world and to the different exchanges, excepting such copies as were sold. The edition is now exhausted, but the Association owns all the plates and half-tones, and it has been suggested that a second edition, with the addition of later statistics, would find a large sale and prove remunerative to the Association. The entire cost of that publication was $5858.33, all of which was raised by private subscription and from the sale of advertising space. All amounts pledged were collected, except one $50 subscription.

During the year the receipts of the Association have been $11,215.41, as follows: Cash on hand last statement, $4,211.33; souvenir book, $4,494.

San Francisco subscriptions: Dunham, Carrigan & Hayden Co., $100; San Francisco Miners' Association, $115; Giant Powder Co., $50; California Powder Co., $50; Parke & Lacy, $50; Selby S. & L. Co., $50; Pelton Water Wheel Co., $50; W. T. Garratt & Co., $50; Geo. E. Dow Pumping Eng. Co., $50; Risdon Iron Works, $50; N. Y. Belting & Packing Co., $50; Arctic Oil Works, $50; W. W. Montague, $50; Union Iron Works, $50; John A. Roebling Sons Co., $50; Paraffine Paint Co., $50; Abner Doble Co., $50; American Steel & Wire Co., $50; Joshua Hendy Machine Works, $50; Miller, Sloss & Scott, $50; Ames & Harris, $50; Tubbs Cordage Co., $50; Geo. H. Tay Co., $50; Crane & Co., $50; Carbon Hill Coal M. Co., $25; Schaw, Ingram & Batcher, $25; John Taylor & Co., $25; Meese & Gottfried, $25; General Electric Co., $25; C. C. Moore & Co., $25; H. N. Cook Co., $25; L. P. Degen, $25; North Bloomfield Co., $25; John Rosenfeld's Sons, $25; Mayflower M. Co., $25; Gutta Percha Rubber Co., $25. Total, $1615.

Advertising in proceedings, $360; Red Dog lawsuit, $120; banquet tickets, $95; badges, $86.30; El Dorado county, $75; Tuolumne county, $81; Yuba county, $50; membership certificates, $18; telegrams, $9.58. Total, $11,215.41.

The disbursements were as follows: Souvenir book, $4735.03; Commissioner to Washington, $773.50; convention account, $624.85; Red Dog lawsuit, $587.10; clerks and stenographer, $603; printing and stationery, $411.15; postage and telegrams, $293.47; office rent, $260; badges, $283.50; Native Sons donation, $150; Remington typewriter, $75; mineral lands committee, $64.67; Polar Star suit, $25; sundry expense, $19.01; press clippings, $19.50; engineer fund, $14.48; cash on hand in treasury, $2321.15. Total, $11,215.41.

This was made up on the 17th. On the 19th inst. the secretary further reported receipts as follows: Nevada county, $400; Placer county, $225; Butte county, $150; El Dorado county, $60; Santa Clara county, $52.50, leaving a balance on hand on that date of $3,208.65.

AMADOR COUNTY.

The three-compartment south shaft of the Mutual Baliol M. Co., Sutter Creek, is down over 700 feet.

The Baliol, Supt. W. H. Storms, has started a new shaft 2000 feet south of the Porter shaft. Good ore is opened up.

The Moon M. Co. of Valley Springs will work property 2 miles from Jackson.

BUTTE COUNTY.

At Bloomer hill the new mill is being driven as rapidly as twenty men can do the work. It will begin crushing quartz Dec. 1st.

The Buzzard mine, near Inskip, is to be operated under the management of W. H. Baker.

CALAVERAS COUNTY.

It is said that sinking on the property of J. Baldwin, Jr., near Copperopolis, costs $20 per foot.

At Angel's Camp, on the 20th, a slide at the Gold Cliff mine demolished the gallows-frame and engine house.

At a meeting of the stockholders of the Greek M. Co. at San Andreas the old indebtedness of the company was settled upon a basis of 75 cents on the dollar, and the mortgage was canceled.

Mr. Purdy of Valley Springs will begin development on the Comet, near there.

Work at the Hexter, in Jackass gulch, is resumed under Supt. Jones.

COLUSA COUNTY.

Last week the Empire Quicksilver M. Co. made shipments of quicksilver from the Abbott, on Sulphur creek.

DEL NORTE COUNTY.

H. Nicholas is opening up mining ground belonging to the old French Hill Hydraulic M. Co.

EL DORADO COUNTY.

(Special Correspondence).—Continuation of the ore bodies stoped in the upper levels of the Mount Pleasant has been found on the 850-foot level, giving this mine new lease of life. Its mill is kept crushing ore. A canvas plant is being constructed.

The Mount Hope, Baltic and Bullard quartz mines have improved in depth, inciting the owners to push work vigorously.

The Grizzly Flat drift gravel mine is doing well under the superintendence of W. Voss.

Grizzly Flat, Nov. 21.

O. S. Ford has men working on his copper property, 3 miles from Placerville.

The Michigan Bluff M. Co. is in 1000 feet on its tunnel.

Good cement gravel is being run through the mill at the Kimble.

C. C. Clark, Supt. Church Union, near Placerville, is unwatering the mine.

Twenty men are employed at the Ralston Divide, near Georgetown. A giant monitor will be put in in the spring.

Two men will work during the winter at the Wilton, near Volcanoville.

A mill test of five tons ore from north extension of the old Argonaut, near Greenwood, averaged $18.05 per ton. The test was made at the LaGrave mill, near Greenwood; the gold was 841½ fine.

Supt. F. Thomas of the Old Western, near Newtown, will resume operations early next spring.

S. McCleave and others will drive a tunnel at the Badger Hill.

HUMBOLDT COUNTY.

The Big Bear M. Co., operating on Klamath river, near Orleans, has spent $10,000 in equipping property. The flume from Slate creek to mine is 4 miles long. A No. 3 giant is used. Ten men are employed.

At the Trophy, near China Flat, the Campbell creek ditch is being put in shape for winter.

INYO COUNTY.

G. L. Albright of Bishop is putting in machinery in the new mill at Rhode's Marsh.

The Ratcliff, Ballarat, recently closed down owing to scarcity of water, will resume, and twenty stamps will be dropping shortly.

The Mineral Hill M. Co. has twenty men employed. They have a 6-stamp mill.

Mr. Stebbins is putting in a 6-stamp mill near Ballarat.

Salt Lake men are working fifteen men on property adjoining the Mineral Hill.

A German company is working the old silver tailings in old Panamint, with such good results that they will erect a smelter. They have let a contract for 500 tons of charcoal.

The Reward, Ballarat, is down 825 feet in ore. The 10-stamp mill is running. Ten more stamps will be put in.

After lying idle for years the old Montezuma has been sold to Chicago men for $15,000. This mine carries gold, silver and lead.

KERN COUNTY.

The Prosperity Oil Co. of Nevada City is organized. It has bought 320 acres land in McKittrick district, and will bore.

The Gray Gander Oil Co., Bakersfield, is drilling on 7-28-28.

In a recent test at the Lion's well, Bakersfield, 117 barrels of oil were taken out by the baler in two hours.

The Kern Oil Co. produces nearly 400 barrels of oil per day. A 3600-barrel oil tank will be put in.

The McKittrick Oil Co.'s well on 18-30-29, McKittrick, has 200 feet of oil sand at a depth of 900 feet.

The Sunset Standard Oil Co. has a rig up, ready for drilling.

The Pittsburg Oil Co. has resumed drilling.

The Sunset Czar No. 1 is producing forty barrels of oil per day.

The Dean, in the Slate range, has a 20-stamp mill running. The cyanide plant comprises one 260-ton tank and four 150-ton tanks. It is estimated that there are $60,000 worth of tailings on hand.

A good strike was recently made at the Kinyon, Randsburg. The ore is said to mill $200 to the ton. They have a stamp mill and a cyanide plant.

There are twelve shafts on the Butte, Randsburg, the deepest being 325 feet. P. H. McMahon Supt. A new gasoline hoist will be put in soon.

The Rademacher, Randsburg, shaft is down 200 feet.

Work on the Sidney group, under A. C. White, is progressing.

A gasoline hoist will go in on the Napoleon.

The Merton M. & M. Co, capital $250,000, will push work on the Merton claims, near the Yellow Aster, Randsburg.

T. W. Atkinson is down 70 feet on the Fraction, Randsburg. The ore mills from $10 to $40 per ton.

LASSEN COUNTY.

The output of Hayden Hill mines to date is as follows: Providence $100,000, Blue Belle $150,000, Brush Hill $750,000, Evening Star $250,000, Golden Eagle $1,500,000, Juniper $1,000,000, Hayseed $100,000, North Star $15,000; total, $3,865,000.

Supt. C. Crane of the Daisy Dean has twenty-five men working in mine and mill. A steam hoist, 40-ton mill and pumping plant are in.

LOS ANGELES COUNTY.

The San Jacinto well, Los Angeles, is down 600 feet.

The Scheffelin well, on North Main street, Los Angeles, has struck oil at a depth of 175 feet.

Oil is found at 1000 feet at the North Whittier, Whittier.

The East Whittier well is 1600 feet deep.

The Union Oil Co. has a 100-barrel per day producer.

MONO COUNTY.

At the Boston Con., Bodie, a 3-foot ledge of $25 ore is opened up.

NEVADA COUNTY.

The Deadwood and Colbert mines, in Willow Valley, are reported bonded to Eastern men, and it is said that machinery will be put in and work pushed.

The new machinery at the Nevada County, Grass Valley, is running.

A new compressor is in at the Mayflower, Supt. W. H. Martin.

The Franklin, at Willow valley, has resumed, and sinking will be continued.

The Federal Loan, near Nevada City, is pumped out from the 400-foot level, and good ore is being mined.

The new Huntington mill on the 16 to 1, near Grass Valley, on Poorman's creek, is crushing ore from the mine. W. M. Taylor, Supt.

Supt. Campbell of the Stiles, near Nevada City, reports a strike of a 2-foot ledge of ore. A water-pipe line is being put in; the mine is to be worked on a more extensive scale.

The Providence M. Co. of Nevada City is shipping sulphurets to the Selby Smelting & Lead Works of San Francisco.

The Board of Supervisors appropriated $250 to the County Miners' Association.

PLACER COUNTY.

The main tunnel at the Red Point, 12 miles above Forest Hill, is in over 3 miles.

The Herman M. Co. are putting in a pipe line from the Breece & Wheeler ditch to the mill.

PLUMAS COUNTY.

The Blue Bell G. M. Co. of San Francisco is incorporated to work property near Genesee; J. J. Sullivan Supt. Six men are working.

RIVERSIDE COUNTY.

M. J. Andrews, Supt. Indian Queen, Pinacate district, is placing new machinery at the mine preparatory to starting work. A 10-inch vein is opened up.

The Rincon Crude Oil Co., Riverside-Fullerton district, will begin drilling near the Montezuma property.

SAN BERNARDINO COUNTY.

At Gold Mountain, Supt. Spargo is quoted for the statement that sixty extra stamps are to be put in. A 4-inch pipe line, by which water is forced to the camp, comes from the highest artesian well in the State.

SAN DIEGO COUNTY.

Drilling is resumed on the La Jolla at La Jolla.

The San Diego County well is down over 600 feet.

SAN LUIS OBISPO COUNTY.

The San Luis Obispo Breeze reports a big pick-up on Spruce creek, P. Gillis having found a nugget weighing 4 pounds 10 ounces "solid gold." Gillis returned from Spruce creek with about $2500 gold. In the lot was the nugget.

SHASTA COUNTY.

The South Fork Development Co., 3 miles from Igo, will put on more men and start sinking a shaft.

Sheehan & Cannon have an 8-inch ledge on the Scorpion, near French Gulch.

W. & J. Blagrave have a lease on the Washington, to carry off and mill all surface dirt on the mountain. They are running through about twenty tons of dirt per day, running $4 to 6 a ton.

At the Gladstone, under new management, there are fifteen men employed. The Ohio tunnel is being driven.

At the American they are driving a tunnel to connect Tunnel No. 3 with No. 4.

G. Simmons has a lease on the Niagara.

A 12-inch vein was opened up recently on the Shafter, 5 miles from French Gulch.

The Redding Oil M. Co. will bore in Stinking Creek district, 7 miles from Redding.

Woodrow & Bush of Redding have bonded the Texas, near Whitehouse, and are working twenty men.

Thompson & Barber have leased the Mammoth and are shipping ore therefrom to Keswick.

On the Garfield, an extension of the Mammoth, three tunnels, aggregating 600 feet, have been run, and a 60-foot shaft sunk.

F. H. Beurich, Supt. Evening Star, is shipping ore to Keswick.

The California G. M. Co. will begin erection of new plant on the Bowery Bell, near Redding.

The Hiatt G. M. Co. is pushing work on the Cleveland, near Whitehouse. A steam hoisting plant is in on the 120-foot shaft. Drifting is in progress on the 120-foot level. Ore shipped to the Keswick smelter has returned $20 per ton. D. B. Hunt and others may buy the mine and push development on a larger scale.

W. Clark of Buckeye is operating the Keystone, near there. Ore has assayed $99.50 per ton. Returns from a 2½-ton shipment to the Keswick smelter gave $45.20 per ton.

SIERRA COUNTY.

Mountain Messenger: Another large nugget worth about $1500 was taken from the gravel in Ladies canyon a few days ago. It was found by one of the workmen, who was digging a trench. This is the second large nugget taken from that mine since they began fitting it up this season.

At the Comet the new track from the lower tunnel to the mill is in; air pipe is about laid and will soon run.

W. Wolf is putting in a 3-stamp mill and a gasoline engine to run the mill at the Ruby, near Downieville.

D. G. White of the Frost, in Hungry Mouth, has bought the old mill of the North Star mines in Strawberry valley and will put the same up on the Frost.

The new Middle Fork ditch, with capacity of 2000 inches, is completed.

SISKIYOU COUNTY.

J. O. Rusby, Supt. hydraulic mine, South Fork, near Etna, will put on men. New flume is under way; a dynamo for electric lighting will be put in.

J. Derry of Hornbrook is operating a group of mines on Printer gulch. Reports from San Francisco mint show gold from there to be .883 fine.

It is reported that the Sterling and Blue Jay mines, Fore & Co., near Coles, are closed down temporarily, owing to a disagreement about wages.

TRINITY COUNTY.

Payne & Clary, who recently bought the Boyce & Ellery ranch, near Trinity Center, have fifteen men working. Construction of a new dredger is being pushed.

Farris Bros. are putting in a 5-stamp mill on the Katy Foley, 3 miles from Carrville.

F. Fletcher has fifteen men working at the Headlight.

W. H. Hill, manager Last Chance, will begin prospecting with a Keystone driller on the Cush Given Ranch properties, near Junction City, recently bought from W. C. Given of that place. Should developments prove satisfactory, a dredger will be put in.

F. Hall has bonded the Sweepstake, near Weaverville, and is pushing work thereon.

The new mill of the Brown Bear Co., Deadwood, is running.

The Altoona Quicksilver M. Co. at Cinnabar is putting in hydraulic pipe.

Reports from the Las Perlas, near Abrams, are encouraging. Four feet of the vein gives assays of from $32 to $150 per ton.

TUOLUMNE COUNTY.

The Arrow, near Soulsbyville, is temporarily closed down during the erection of a new steam hoisting plant.

One hundred and fifty men are working at the Shawmut, near Jamestown.

Supt. Gorrie of the Santa Ysabel Co. expects to resume underground work. The new air compressor is in; eighteen men are working.

C. H. Knox, Supt. Riverside mine, Columbia, reports mill running on good ore.

Sinking is stopped for the present at the Tri-Color, Tuttletown, and drifting will be done on the 200-foot level.

The new Hope mill, Carters, is ready to run.

The McKinley Con. shaft is down 100 feet. At 93 feet ore was opened up.

The Triumph and Spartan may consolidate. In this event men will be put on and an auxiliary mill erected.

Sinking at the Poison Oak will resume Dec. 1st. The shaft, now down 200 feet, will be sunk to 450-foot level.

Supt. Moorhead of the Dreisam is in 50 feet on the drift on 400-foot level.

Timbers for the new foundation of the 10-stamp mill at the Hope, near Sonora, are going in. S. Ralston owner.

The boring machine of the Columbia Tunnel Co. is sold to Butte county men.

The Golden West M. Co., operating on the Comstock ranch, is putting in two boilers, engines, pipes, etc., and the new 10-stamp mill will soon be up.

YUBA COUNTY.

J. C. West of Strawberry Valley has received a permit to mine by hydraulic process his claim in Eagle gulch, near there. A restraining dam is built.

COLORADO.

BOULDER COUNTY.

The Alaska tunnel, starting at Brainerd Camp, near Ward, is in over 1500 feet.

The Village Belle will probably be reopened.

The Great Western Exploration Co. is sinking a shaft, now down 360 feet, to 660-foot level, on property on Big Horn mountain, near Boulder.

The new 30-ton concentrating mill at the Success, Ward, W. B. Rundle manager, is running.

Ouray wires that the sale of the Camp Bird mine at Ouray to an English syndicate is off. "The property will not be sold," says the owner, T. F. Walsh. "Had the prospective buyers been ready to pay over $7,000,000 cash when the deal was first talked of, it is probable the mine would have passed into their possession. Now I have decided to retain possession of the mine."

CHAFFEE COUNTY.

The Lone Star M. Co., St. Elmo, C. Holt manager, will sink a double-compartment shaft, put in new machinery, etc. Work will continue through the winter. A new compressor will go in on the Mary Murphy, Supt. Taylor. Work on the big tunnel will begin soon and seventy-five men will be employed.

CLEAR CREEK COUNTY.

On the Mendota group, recently sold for $350,000, the shaft will be sunk to the 500-foot level. Men will be put on. S. S. Badger manager, J. Old Supt.

The air pipe from the compressor to the mine, at the Pelican, Georgetown, is in.

The Anchor group, Freeland, is sold to G. E. McClelland, representing Colorado Springs men, for $50,000.

The Monarch M., M., T., T. & P. Co. of Colorado Springs, capital $3,000,000, is incorporated to work the Lake County, St. Patrick, Signorita, El Capitan and Toledo Side mines.

The Mixsell, Idaho Springs, has a 30-stamp mill with capacity of thirty tons ore per day.

The Mendota Co., Silver Plume, is driving a 250-foot raise to connect with the Grostburg. A new engine and boiler will go in on the latter about Dec. 1st.

The Bismarck ships ten tons ore daily.

The shaft on the Fraction, Idaho Springs, now down 450 feet, will be sunk an additional 100 feet.

The tunnel cutting the Big Soft, Mammoth, Billee and Ben Harrison is in 800 feet and is equipped with air compressor and drills.

FREMONT COUNTY.

The Colorado Portland Cement Co. at Florence turns out 500 barrels of cement daily. Fifty men are employed.

The zinc smelter to be erected in Canyon City will be general Western headquarters for the Mineral Point Zinc Co. of New Jersey.

GILPIN COUNTY.

The 94 M. & M. Co., Yankee, will lay a 10-inch pipe line to furnish water for the new concentrator.

The Rio Grande has opened up good ore in the 350-foot tunnel.

GUNNISON COUNTY.

The Reynolds Co., at Pitkin, has the air compressor, etc., in place, ready for work.

The Big Seven M. Co., J. Powell manager, will continue operations with the diamond drill.

The Citizen is shipping ore.

Lejune & Hartman are pushing work on the Euterpe group. A new hoisting plant is in.

The Ruby (coal), Crested Butte, is closed down for the winter.

HUERFANO COUNTY.

At the Bassick, near Walsenburg, sinking of shaft is progressing. The company is putting in a concentrator at Grape Creek.

Men are working at the Bull Domingo.

The Geyser will resume in sixty days.

The Huerfano Valley R. & M. Co. of Pennsylvania will put in machinery on oil property at Badito, near Walsenburg.

LAKE COUNTY.

Follett, Leppel and others, operating the Vivian, Leadville, have ore assaying 30% lead and twenty ounces silver to the ton.

The Gold M. & M. Co. is sinking a new shaft in Big Evans gulch, Leadville.

The Josie shaft has resumed.

Resurrection No. 2 shaft is down 800 feet. Stations have been cut and drifting will begin.

The daily output of the Home M. Co., operating the Penrose, Bon Air, Starr and other mines, is 250 tons. This will be increased.

The Rose-Emmet shaft, down 530 feet, is being sunk to the 605-foot level.

At the Coronado, Leadville, the diamond drill shows a body of high-grade iron ore below the 600-foot level.

Ore bins have been put in at the Seeley shaft, Leadville.

The Revenue Leasing Co. will use a diamond drill on the ground of the Royalty Co.

At Leadville, at the Arkansas Valley smelter, three new 150-ton furnaces are being constructed; one will be blown in this month, the others next month.

SAN JUAN COUNTY.

D. Umbel, Supt. Henrietta group, near Silverton, is hiring men.

The 24x67-foot two-story ore house of the Minnie Gulch M. & T. Co. is finished. An air compressor, engine and other machinery will soon be in. Work on the 3000-foot tunnel will start soon.

SAN MIGUEL COUNTY.

C. H. Nazro, Supt. Bessie mill, Telluride, is adding improvements to same.

E. G. Stoiber, owner of the Silver Lake, has 100 men working day and night on the new 150-stamp combination mill.

The Gold King Con. Mines Co., on Bonito mountain, have added forty stamps, making a total of eighty stamps, at their mill on Cement creek.

F. Trumble expects to resume work on the La Berta group, Ophir.

Work on the Deadwood 2000-foot tunnel is being pushed. Three shifts are working.

The report of Manager Herron of the Tomboy G. M. Co. from Sept. 1, 1899, to June 30, 1900, shows for the ten months a product of $446,665—a net profit of $160,000. Reports show development work accomplished for the ten months as follows: Drifts on the vein, 2401 feet; raises, 1103 feet; crosscuts, 152 feet. shaft sinking, 109 feet. Total, 3765 feet. The greater part of this work has been done on the 300, 700 and 800 foot levels. The ore above the 200-foot level is exhausted. Over the 300-foot level is in sight about 50,000 tons. Between the 300 and 600 foot levels a large tonnage, probably 200,000 tons, has been opened up of low-grade ore. On the 700-foot level two ore bodies have been opened up which appear to have their apexes near the 600-foot level. In both of these the vein appears as in the upper mine, and there is still more resemblance to the productive ores of past years in recent developments on the 800-foot level, where the vein is stronger and more oxidized than it has been on any level below the 300-foot. The company has a bond on four claims controlling the apex of the Elephant-Cincinnati-Argentine vein—the strongest vein in the district, so far as surface indications are concerned.

The report shows that during the ten months 46,716 tons of ore were milled in the company's mill and 72 tons of crude ore shipped. The milling expenses were $1.87 per ton and the cost of mining $3.77 per ton.

SUMMIT COUNTY.

The Excelsior mill, Frisco, run by electricity, recently made a run on a 100-ton lot of ore from the Excelsior mine.

Supt. J. A. Bush is pushing work on the Glen-Mohawk and Mount Gilead properties.

The Maximus, near Kokomo, is shipping again. This property was making regular shipments during the summer of high-grade gold and silver ore, and employing quite a force of men. Owing to the high altitude of the mine, 13,600 feet, it is a hard proposition to work and requires considerable money to operate. The lessees have to pay $10 per ton to haul the ore.

TELLER COUNTY.

(Special Correspondence).—McCormack, Connor & Clevender, who organized the Minna S. Mining & Leasing Co., are sinking on the Minna S. claim, on Squaw mountain; they have a depth of 300 feet; will sink to 500 feet.

Victor, Nov. 18.

(Special Correspondence).—The La Bella M., W. & Power Co. recently made some additions to its Goldfield plant. They now operate three 1000 H. P. engines for the generation of electric power. The plant also includes a 35 and a 12-drill air compressor. The 35-drill compressor operates to full capacity to supply air for drills in various mines in the district. The 12-drill compressor will be operated by an electric motor. There are fifty to sixty electric hoists operating within the district, and, as a general thing, they give good satisfaction. Their capacities range from 5 H. P. to 30 H. P., the 15 H. P. hoist being the size most in use. The deepest shaft over which an electric hoist is now working is 500 feet. In many cases these hoists are under lease to the mine operators by the company that furnishes the power. As an example: a 15 H. P. electric hoist is leased to a mine lessee at $55 per month, including power, the lessee contracting to use it six months.

The Cameron electric power plant, which belongs to the Colorado Springs & Cripple Creek Short Line Co., comprises two 250 K. W. rotary converters; one 250 K. W. direct-current generator, driven by an Allis Corliss engine. The power by which the rotaries are operated is generated at the Lake Morain plant, near Pike's Peak. Thus, the Cameron station is auxiliary to that of Lake Morain.

The Eagle ore sampler is getting well started and expects to be handling 6000 to 7000 tons per month after Dec. 1.

Goldfield, Nov. 18. WASCOTT.

(Special Corresdondence).—F. T. Osgood has a lease on the mine of the old Victor G. M. Co., and since the sale of the property under a judgment to D. H. Moffat, it is claimed some important ore bodies have been opened, and public attention is again directed to the Victor.

Altman, Nov. 12.

(Special Correspondence).—The Standard Leasing Co. have a lease on the Mountain Beauty, on Blue hill, which runs to July 1, 1901. Present work is directed to development, with J. D. Murphy in charge.

Independence, Nov. 15.

(Special Correspondence).—The Cripple Creek Ore Sampling Co.'s sampling mill is nearly completed. Its location is on the Midland and Short Line tracks, south of Bull Cliff, and it is called the largest sampler in the district. In the main, its work will be to sample and crush the ore that goes to the chlorination mills at Colorado City. It belongs to the same parties who control the Colorado-Philadelphia reduction works.

Altman, Nov. 20.

(Special Correspondence). — The Anaconda M. Co. is shipping about 1000 tons of ore per month as the product of various lessees. Recently the company installed a hoist at a point in the tunnel 1100 feet from entrance, where a shaft has been sunk.

Anaconda, Nov. 15.

(Special Correspondence). — The chlorination mill of the Economic Extraction Co., which was closed down two weeks while a bedding floor was being put in over the drier, has just resumed work again and expects soon to be running on about 200 tons of ore per day. Waste heat from the roaster is utilized by the drier.

Victor, Nov. 15.

(Special Correspondence).—The Ophelia tunnel, which has progressed to a point over 4000 feet from the entrance, is being pushed with three air drills, the work being under the management of J. M. Parfet. The work is being done with a compound, 6 H. P. compressor, having 16x16-inch cylinders. A second compressor, 12x12, has been used to charge a small tunnel locomotive, which operates by compressed air, instead of steam. At the tunnel entrance is also a high-speed engine which operates a suction blower that draws air from the breast of the tunnel through a 10-inch hydraulic steel pipe, the latter being painted inside and outside with an asphaltum preparation. As has been noted before, the Ophelia tunnel starts under the town of Cripple Creek, cuts through one section of Gold hill, through the ground of the Anaconda M. Co. and that of the Mary McKinney, pursuing a course toward Bull hill.

Cripple Creek, Nov. 18.

(Special Correspondence).—The Philadelphia & Pittsburg G. M. Co., who have expended about $90,000 in developing and equipping their Golconda mine, have been hoisting ore since Sept. 23. The shaft here is 660 feet deep, from which extensive drifting has been done. On the 660 level a 300-foot winze is being sunk, a gasoline hoist having been installed at the collar of the winze. At the surface is a gasoline hoist of larger size; also, a belt-driven compressor, run by a gasoline engine.

Victor, Nov. 16.

(Special Correspondence).—The Alamo shaft is 200 feet deep, with considerable amount of drifting at the 200 level. All this work is in the way of prospecting for ore.

The Irish Mollie shaft is 150 feet deep and sinking goes on. This property is well equipped with hoisting facilities. It belongs to the Mint M. & M. Co.

(Special Correspondence).—That section of the Mary McKinney vein which was crosscut by the Ophelia tunnel at 400 feet below the surface is 25 feet in width. At that point there is no water, though the Mary McKinney pumps 900 to 1000 gallons of water per minute, but this volume is now decreasing considerably.

Anaconda, Nov. 19.

W. S. Stratton, questioned regarding the present condition of the Independence mine, which he sold in London, says: "It is my opinion that the property has been worked too hard. The management has simply made a mistake in what it thought the property could do. I am satisfied that the Venture Corporation is absolutely honest in the handling of the stock company." The opinion of Cripple Creek mining men is that the London company has neglected to do the necessary development work and has drawn too heavily upon the ore reserves for the purpose of paying large dividends. J. H. Hammond, after an examination of the Independence mine, has cabled to London advising a reduction of dividends and extensive development. He is having assays made and will make a full report. He is confident that the mine has a great future.

The company has just issued from the London office a report covering the period of fourteen months, from May 1, 1899, to June 30, 1900. The balance sheet shows liabilities as follows: Shares issued (authorized, £1,100,000), £1,000,007; accounts and balances payable, £35,114; profit and loss, balance, £80,086; total, £1,115,207. The assets were: Cost of property—mine and land, £973,001; buildings and plant, £26,999—£1,000,000; ore and supplies on hand, £11,359; balances due, £28,663; cash, £75,185; total, £1,115,207. The revenue account shows:

Sales of ore		£705,762
Less freight and treatment		122,117
Net sales		£583,645
Royalties and rents		1,499
Ore on hand		10,104
Total		£595,248
Mine expenses	£63,089	
Repairs and improvements	11,363	
Shipping and selling	3,601	
General charges	14,331	
Development	12,867	
		105,251
Net balance		£489,997

The profit and loss account shows: Net balance as above, £489,997, less exchange—£2152—leaving, net, £487,845; interest and transfer fees, £2224; total, £490,069. The charges were: London office expenses, £9274: dividends, 40%, £400,003; income tax, £706; total, £409,983; balance, £80,086.

The Chicago-International M. & D. Co. has put in a new steam hoist on the Draper, Victor.

The drift on 400-foot level of the Whisper is in 25 feet south of the shaft.

The Gold Dollar is shipping ore from the first, third and fourth levels.

A strike was recently made at the Anaconda, on Gold hill, Cripple Creek; J. W. Cummings Supt.

The Atlantis Mines Corporation will sink to 600-foot level.

In the Gurley tunnel of the Rose Nicol two veins, 12 feet apart, have been opened up. Main shaft, now down 330 feet, will be sunk to 400-foot level.

Trussel & McHenry have leased property of Lipton G. M. Co., on Copper mountain.

Lessee Smith, operating the old World's Fair, on Gold Bond Co.'s property, Cripple Creek, has opened up ore on 60-foot level running 7½ ounces to the ton.

Preston & Co. are putting in new hoisting plant over the old 130-foot shaft at the Draper and will sink to 230-foot level.

Drifting on the 200-foot level of the Robert Burns, Guyot hill, Cripple Creek, is in progress.

E. H. Phillips has leased the Constantine and will sink a 400-foot three-compartment shaft.

The Camilla Leasing Co. are crosscutting on the 130-foot level of the Maud Helena.

The Mayflower Co., near Gillett, have men sinking a new 300-foot three-compartment shaft.

For the first fifteen days of November the Rio Grande sampler has handled 3500 tons of ore, averaging $45 per ton in gold.

The shaft on the Sitting Bull, now down 100 feet, will be sunk an additional 100 feet.

Work on the Pinto, Cripple Creek, is resumed. One shift is working and another will be put on within a month.

The shaft on the Rubie, Supt. Fitting, now down 950 feet, will be sunk an additional 200 feet.

The Elkton Con. M. Co. projects purchase of the Arequa plant of the Colorado Ore Reduction Works, Cripple Creek.

IDAHO.

ADA COUNTY.

The shaft of the South Peacock (copper), in Seven Devils district, near Boise, is down 320 feet. The Blue Jacket may resume.

E. T. Staples is putting things in shape on the Mountain Dot, in Black Hornet district, near Boise, for winter operations.

Two bars of gold were cast at the Boise assay office recently, valued at $36,322.42.

BLAINE COUNTY.

Work at the Golden Star, Hailey, will continue during the winter under Supt. Allen.

BOISE COUNTY.

The Middleman, Pearl, has resumed, and sinking will be done to 150-foot level.

Mr. Mitten, representing Boston men, is pushing work on the El Paso. Work will be continued through the winter, and a new mill will probably be put up next spring.

CANYON COUNTY.

The new forty-ton roller mill going in at the I. X. L., on Willow creek, near Caldwell, will be running by Jan. 1. Building will be 30x40 feet, engine 30 H. P., boiler 40 H. P.

CARBON COUNTY.

The Pleasant Valley Coal Co., will increase output of mines at Price by 2000 tons per day, which will give employment to about fifty additional men, making a total of 750 employes. It is said that there is work for 200 men at the company's new camp at Sunnyside.

IDAHO COUNTY.

The Mount Clemens & Idaho M. Co., Warren, will continue operations during the winter. The Silver King M. Co. is pushing work on the Silver King.

KOOTENAI COUNTY.

On the Conjecture, near Lakeview, sinking and drifting are in progress. Ore is chiefly silver bearing and shipments have netted about $60 per ton.

OWYHEE COUNTY.

Work at the Flint mines has been suspended. The property is owned by M. Holdredge of Nebraska.

SALT LAKE COUNTY.

Supt. McRea, Bingham Cop. & G. M. Co., Bingham, is hoisting ore.

SHOSHONE COUNTY.

The mill at the Crescent, near Pierce, is running.

The tunnel on the Leslie group, near Wallace, is in 500 feet. Nine men are working.

Outside work of the Morning M. Co., Mullan, is suspended for the winter.

Work on the Tamarack and Chesapeake, one mile from Burke, is progressing.

WASHINGTON COUNTY.

More men will be put on at the Iron Dyke, near Weiser, this winter. The new matting plant will probably be put in next spring.

MICHIGAN.

HOUGHTON COUNTY.

A new stamp mill will be put in on the Trimountain, of the Fay group, near Redridge, Supt. Chynoweth.

MONTANA.

FERGUS COUNTY.

The Yogo sapphire mines of the New Sapphire Mines Co., S. S. Hobson manager, will be worked during the winter.

H. Kendall has completed a 100-ton per day cyanide plant on North Moccasin mountain.

In Whisky gulch A. S. Wright is building a 300-ton cyanide plant.

The New Year cyanide mill treats from 150 to 200 tons ore per day.

Twenty stamps will soon be dropping on the Spotted Horse.

The Gilt Edge cyanide plant treats 100 tons ore per day.

GRANITE COUNTY.

C. Weingren has bonded two claims (manganese), near Phillipsburg. He will ship three carloads of ore daily to the Federal Steel Co., Chicago, with whom he has a contract to supply 5000 tons of the ore, which is said to run from 40% to 50% manganese.

The Hope stamp mill, Phillipsburg, has resumed.

LEWIS AND CLARKE COUNTY.

The Drumlummon Co., operating the Frankie, near Marysville, is sinking a 300-foot shaft near the property of the Montana Standard Co.

On the Ida the Montana Standard Co. has a 600-foot tunnel.

C. W. Whitley, manager Huffaker (copper), West Helena, has men sinking.

MADISON COUNTY.

At the Watseka, Rochester, the old Goodale shaft, now down 300 feet, will be sunk to the 400-foot level. A new hoisting plant is going in.

A new 1000-foot shaft will be sunk on the Climax. The mill is running steadily.

Glass Bros. have erected a 20-stamp mill at Silver Star.

About 250 tons tailings from the Glendale Works, Sheridan, are treated daily, being run through high pressure rolls and three-decked Bartlett tables.

J. F. Cowan has twelve men working on the Keystone and Strawberry mines at Pony. Operations will continue during the winter.

A body of copper ore is opened on the August Flower at Brandon.

MEAGHER COUNTY.

One hundred and twenty-five men are employed in the copper mines at Copperopolis.

A railroad will probably be built from Dorsey to Copperopolis next spring.

MISSOULA COUNTY.

At the Hidden Treasure, near Clinton, work is progressing.

NEVADA.

ELKO COUNTY.

The Dexter & Tuscarora M. Companies, Tuscarora, consolidated on the 15th inst.

Three and one-half feet of ore, assaying $100 gold per ton, is opened up in the Dexter, at Tuscarora.

The Slip mill, at Olinghouse gulch, lately repaired, has resumed.

The new water wheel at the Dexter, Tuscarora, is in and power is thereby doubled. Output is 140 tons ore daily.

EUREKA COUNTY.

A 100-foot tunnel will be driven on the Bay State, near Newark, recently bonded to W. D. Thompson and others.

Ore from the Ice King, at Bald mountain, near Eureka, was recently shipped to Denver, Colo., for treatment.

HUMBOLDT COUNTY.

J. E. Wilson, of Jackson Creek, reports 20 feet ore in the Tiger tunnel, near there.

Manager White of the Nevada Copper Co. expects to have the fifty-ton matte smelter in operation next month. A mixture of coke and charcoal, in equal proportions, will be used as fuel.

LINCOLN COUNTY.

At Stateline the Ophir M. Co. will build a 50-ton mill.

The Johnnie M. Co. will put in a steam hoist.

LYON COUNTY.

The Overland and Silver Hill mines, Silver City, report good cleanups recently.

ORMSBY COUNTY.

Williams & Adams are turning out ground gypsum from their Empire mill. The raw product comes from near Mound House.

STOREY COUNTY.

The Con. Cal. & Va. recently shipped to the Selby Smelting & Lead Co., San Francisco, one car of concentrates—896 sacks, or 62,655 pounds (railroad weight).

The Hale & Norcross tunnel is in 1874 feet.

WASHOE COUNTY.

On account of scarcity of water, no placering is being done near Wadsworth.

At the Bluestone (copper), in Mason Valley, two shafts have been sunk and crosscuts run. The ore runs 4% copper. A reduction plant will be built.

The shaft at the Ora, near Wadsworth, is down over 200 feet, the deepest in the camp.

The average value of ores reduced at the Ora mill since its construction is $27.95.

The Reno M. Co. and the Reno Reduction Works, Reno, will resume operations.

WHITE PINE COUNTY.

The Ida (lead), near Ely, is bonded to S. T. Thompson, representing Salt Lake, Utah, men.

NEW MEXICO.

BERNALILLO COUNTY.

The new mill for the Cochiti Reduction & Improvement Co., at Woodbury, is going in and it is expected to be ready for the treatment of ore within six months.

COLFAX COUNTY.

The Senate and Bobtail mines, near Elizabethtown, are sold to the Smithfield Co. for $10,000. F. Spurr is manager.

DONA ANA COUNTY.

Men are working on the Excelsior and on the Memphis (both copper), near Organ.

The Copper Bar M. & M. Co. has suspended development.

The machinery on the Torpedo is working satisfactorily.

The Copper Co. will put in new machinery on the Copper Bar.

LINCOLN COUNTY.

It is reported that the Kansas City Co., which recently bought the Compromise, White Oaks, for $20,000, has refused an offer of $100,000 for the mine.

It is reported that the Bethlehem Steel Co. of Bethlehem, Pa., has bought 4000 acres of coal lands and 4000 acres of iron lands near Capitan.

RIO ARRIBA COUNTY.

The Admiral G. & C. M. Co., owning the Dewey, the Sampson and the Schley, is working day and night shifts, sinking the main shaft on the Sampson, now down over 50 feet.

The Mexican King G. & C. Co. of Milwaukee, Wis., has bought the War Eagle group, in Headstone district.

The New Mexico G. & C. Co. of Milwaukee, Wis., is sinking a shaft on the Strawberry.

The Burnt Mountain G. & C. M. Co. of Milwaukee, Wis., has bought the Rusty Bucket & Sardine group, and is sinking a shaft at the junction of the two claims.

OREGON.

BAKER COUNTY.

The Tammany G. M. Co. of Sumpter is driving a 500-foot tunnel on the Tammany, near there.

During the past three weeks fifty carloads of machinery have arrived in Sumpter for use in mines near there.

The Baby McKee, Baker City, is putting in machinery.

The Bald Mountain ditch is under way. Ten-inch steel pipe will be used.

The Golconda, near Sumpter, is reported sold to Illinois men.

A 500-foot tunnel will be driven on the Gypsy; Supt. Hamilton.

The new mill at the Richmond of the Empire M. Co. is running.

Unwatering the 270-foot shaft Gold Ridge, Baker City. The 10-stamp mill at the Gold Ridge is running on ore recently opened up in No. 4 tunnel.

A 6-foot body of ore, running $10 to the ton, is opened up in 700-foot tunnel on the Golden Star group.

A recent clean up at the Phœnix, Baker City, returned eighty-five ounces gold.

The Golden Gate group, Quartz gulch, near Geiser, is being operated by California men. H. S. Sherard manager. A new track is in and crosscutting will be pushed.

Pending the placing of new machinery the Blue Jacket mine has suspended operations. The number of men employed before it closed was seventy-three.

GRANT COUNTY.

The Rialto group, near Granite, is sold to California men for $25,000.

The Red Boy is putting in a deep sinking plant.

The crosscut tunnel on the Strasburg is in 280 feet.

Work at the Alamo is resumed and two shifts are working.

Susanville reports a strike of free gold assaying $100 per ton on the Mayflower near there.

The Cougar, near Granite, is reported sold to Seattle men for $30,000. A 10-stamp mill is on the property. Work will be pushed.

JACKSON COUNTY.

Ore from the Bill Nye, in Gall's creek district, Jacksonville, is being crushed at the Humason mill with good results.

A. W. Sturgis of Forest Creek has his mines rigged up ready for a good run.

The Champion group is bonded by P. J. Jennings. The intention is to consolidate the Helena No. 2 with this group.

The Montreal & Oregon M. Co., operating the Ashland, near Ashland, will add five stamps to their 5-stamp mill, G. E. Ingersoll Supt. Thirty men are working in mine and mill. Good ore is found on 500-foot and 600-foot levels.

JOSEPHINE COUNTY.

The Columbia mines, at Placer, now have long distance telephone connection with outside points.

SOUTH DAKOTA.

CUSTER COUNTY.

Towner & Nelson of Custer are developing copper property on Spring creek, near there.

LAWRENCE COUNTY.

The twenty-ton cyanide plant, near Whitewood, operated by McLaughlin and others, will be run during the winter.

PENNINGTON COUNTY.

Ore from the Lena, near Hill City, recently ran $100 to the ton.

The Detroit, 8 miles east of Deadwood, is bonded to Ohio men for $30,000; owners, F. Lockhart & W. W. Challis.

UTAH.

BEAVER COUNTY.

The Cactus group, near Frisco, consisting of 700 acres land, is sold to A. B. Lewis and others.

JUAB COUNTY.

At the Utah, near Fish Springs, at a depth of 600 feet, connection is made with vein. Ore runs 300 ounces silver per ton. The main shaft is down 700 feet.

Work on the tunnel at the Yankee Con., Eureka, is being pushed.

Manager Wilson of the R. G. W., Eureka, has reached the foot wall of the vein 128 feet from the hanging wall.

Manager Kopp has closed down the Maple, Eureka, for the winter.

KANE COUNTY.

Barton Sewell of New York and S. Newhouse of Utah have joined Salt Lake men in the purchase of the Cactus group of mines.

PIUTE COUNTY.

M. C. Packard, manager Star Con. Co., Tintic, is pushing work on the Bully Boy and Webster at Marysvale.

SALT LAKE COUNTY.

A new compound condensing two-stage air compressor is going in at the mouth of No. 7 tunnel, on the Highland Boy, near Bingham. It will drive twelve heavy drills and is arranged so that electric power can be used upon its inception into the camp. The smelter enlargements are progressing, and Supt. of Construction G. K. Fischer thinks trial run will be made by Dec. 31st. Capacity of smelter will then have been increased to 450 tons. During week ending Nov. 17th Supt. R. White of the smelter forwarded to refineries of the East 120,254 pounds of copper, gold and silver bullion, with total of over 300,000 pounds for month to above date.

The American Smelting & Refining Co., Murray, are letting contracts for the new plant there.

The Bingham Copper & Gold M. Co., Bingham, will erect a large ore bin at the main tunnel in Copper Center gulch, near there.

The St. Joe shaft, Bingham, is down 200 feet. Ore shows 52% lead, twenty ounces silver and $1.60 gold per ton.

SUMMIT COUNTY.

The old Homestake, near Park City, is to be reopened.

Ore from the Naildriver, Park City, recently assayed 159 ounces silver, 17% lead, $4.13 gold to the ton.

The main tunnel at the Wasatch is now in 300 feet.

Kearns Bros. are pushing work on the Lucy.

On the Glencoe, in Glencoe gulch, sinking is in progress at the 1600-foot mark in the tunnel. A small battery may be put in next spring.

The tunnel at the Silver Bell, O. Rydvall Supt., is in 380 feet.

The aerial tramway for the Silver King is expected to be ready early in January. Two 70-ton track scales, each 54 feet long, are going in. The sampler building is about ready for the machinery.

Supt. Boyle of the Valeo has put in a pump to hoist water from tunnel to smelter site 150 feet above.

TOOELE COUNTY.

The Ingot M. Co., Mercur, has levied an assessment of 1 cent per share for development purposes.

Manager Weir of the Ajax, Tintic, expects to open up the ore body on 1000-foot level next month.

The Ophir Hill of Ophir will enlarge its mill.

WASHINGTON.

FERRY COUNTY.

The Republic mill, Republic, is crushing 150 tons ore daily.

On 200-foot level of the Quilp, Republic, a 15x10-foot station is cut and timbered with 16-inch stulls; the latter are covered with 3-inch planks. From this station a raise to 100-foot level will be cut.

The Tom Thumb, Republic, will probably resume next March, when the Republic mill will be able to handle twenty-five tons of its ore daily.

A new plant is going in on the Silver King, near Nelson, including a 500-foot smokestack, boiler and pump. The pump will lift 600 gallons water 500 feet per minute.

The annual meeting of the Clackamas G. M. Co. will be held in Republic on Dec. 1st at 1 P. M. The Republic Con., Republic, will hold its annual meeting on Dec. 20th.

Manager Fell of Athabasca, Nelson, furnishes the following results of mill run for October: Period of run, 29 days, 1 hour; tons milled, 445; approximate value of bullion recovered, $7000; approximate value of concentrates recovered, $2200; total, $9200. Total value recovered per ton of ore milled, $22.67.

Republic reports the cleanup of the first vat of ore leached at the Republic mill was 91.24% of the assay value. The vat was charged with 100 tons of ore, which was in the leaching bath nine days.

OKANOGAN COUNTY.

The Palmer mountain tunnel, near Loomis, is in 3835 feet, 137½ feet having been driven during October.

At the Puritan mines Manager Jackson has everything in shape for winter work. The flume is about completed and the new compressor is going in, R. Baggaly Supt.

Ore recently opened up in the 615-foot tunnel of the Review, Chesaw, assayed from $84 to $300 per ton.

SNOHOMISH COUNTY.

The ledge at the Nonpareil is said to be 80 feet wide and that it has been traced for 800 feet.

In crosscutting on 118-foot level at the Blue Bell, near Index, an 11-foot ledge of gray copper and red oxide of copper was opened up. Hunter & Lotstrom of Edmonds, owners.

SPOKANE COUNTY.

The Gertie G. M. Co., capital $100,000, is incorporated at Spokane.

The Chelan Transportation & Smelting Co. of Spokane is incorporated; capital $1,000,000.

WYOMING.

CARBON COUNTY.

The Boston–Wyoming Co. is building a 100-ton smelter at Encampment.

The Headlight Copper M. Co., Encampment, now sinking a 50-foot shaft on the Headlight, will sink an additional 100 feet.

The Doane at Ramber, near Grand Encampment, is reported sold for $250,000. A plant will probably be put in, E. S. Tice manager.

FOREIGN.

BRITISH COLUMBIA.

Ore from the Lavina group, near Argenta, in Lardeau district, nets $40 to the ton. The company will, in conjunction with the Government, build a wagon road. Work will continue during the winter.

G. W. Hughes has men working on the Sunset, near Sandon.

The Nip & Tuck placer property, East Kootenay, is sold to D. Griffith, who will operate next year.

The Paradise, near Windermere, R. R. Bruce manager, will probably ship 2000 tons ore this winter.

The new 18-drill compressor for the Velvet, Rossland, will soon be in.

The diamond drill is in operation at the White Bear.

The sampling mill and other machinery are going in at the Le Roi.

The winze at the Evening Star, down 253 feet, will be continued an additional 67 feet.

The West Kootenay Power & Light Co. will add to the plant at Bonnington to the extent of 10,000 H. P. This plant now has a capacity of 5000 H. P. It will involve the expenditure of $1,000,000, and the work will take a year to finish.

At the Ymir, Ymir, S. S. Fowler Supt., eighty stamps are dropping, crushing about 200 tons of ore per day. Either steam or water power can be used.

The Imperial Development Syndicate will put on men on property on Lexington mountain, near Revelstoke.

The True Blue of Kaslo is bonded to J. C. Drewry of Rossland.

Manager W. H. Sandiford of the Bosun Slocan has driven tunnel 400 feet.

The output for October of the St. Eugene, East Kootenay, was 3007 tons.

At the Hall mines smelter work on the new roaster is progressing.

It is said that the Puget Sound iron mine on Texada island may be bought by an American company.

Eighteen men are working at the Nettie L., near Lardeau.

The Cooper group, in Burnt basin, near Gladstone, is sold to W. H. Jackson of Rossland, representing an Eastern company. Work will begin next spring.

The St. Eugene M. Co., East Kootenay, will put in a new 15 H. P. hoist at the St. Eugene.

Following were ore shipments received at Trail smelter from different shipping mines for week ending Nov. 10th:

	Tons.
Centre Star	2.098
Le Roi	621
Iron Mask	136
B. C.	136
Snowshoe	31
Athelston	25
Enterprise	17
Payne	118
Bosun	20
Ymir	50
Sullivan	138
Vancouver group	20
Hampton	4
Valparaiso	2
Total	3,416

For the same week the matte shipped from the smelter was 171 tons and the bullion 91 tons.

The Lenora (copper), in Mount Sicker district, Vancouver Island, is reported bonded to New York and Chicago men for $3,000,000.

MEXICO.

P. Gerhart of Cripple Creek, Colo., will put up a mill on his property near Dios Te Guia, State of Chihuahua.

Mine owners of Zacatecas, Chihuahua and Durango will import 10,000 Chinese direct from China for employment in the mines.

At La Colorado, Sonora, the Creston-Colorado Co. are putting in machine shops and ore bins at the Wyman shaft, preparatory to starting up. The old roaster from Minas Prietas is also going in.

Ore from the Conforme, in Moctezuma district, Sonora, carries silver and gold.

A. B. Adams, owner of the Palmerito, near Playo Colorade, Sinaloa, on Gulf of Lower California, is putting in a 200-stamp mill on the property.

RUSSIA.

An English syndicate, capital £1,000,000, has a concession to exploit the Perhena gold fields, which are 370,000 acres in extent, in the Amur region, and will dredge the streams.

Personal.

R. CORY is in Salt Lake City, Utah.

J. A. CORAM has returned from Europe.

H. MOWRY of Salt Lake, Utah, is in Fay, Nev.

A. C. LUCK of Austin, Nev., is in Nevada City, Cal.

S. MURCHIE of Grass Valley, Cal., is in San Francisco.

OTTO GRAMM of Laramie, Wyo., is at Coarse Gold, Cal.

T. W. SPRAGUE of Boston, Mass., is in Los Angeles, Cal.

F. G. HARTMAN of Los Angeles, Cal., is in Sonora, Mexico.

A. M. WELLES of Denver, Colo., goes to Durango, Mexico.

P. GERHART, Cripple Creek, Colo., is in Dios Te Guia, Mexico.

T. A. RICKARD AND F. W. BAKER of London are in New York.

F. HALL, of Salt Lake, Utah, is in Madison county, Montana.

CHAS. D. LANE has returned to California from Nome, Alaska.

S. R. GUGGENHEIM AND L. FEUSTMAN of New York are in Mexico.

J. H. HAMMOND has returned to Denver, Colo., from California.

J. DERN, V. P. Con. Mercur, Mercur, Utah, is in Canyon City, Colo.

MANAGER HILL, of the Little Giant, Warren, Idaho, has gone East.

N. P. DOOLEY, of De Lamar, Nev., is now located in Salt Lake, Utah.

P. J. DONAHUE, of Salt Lake, Utah, is in Beaverhead county, Montana.

R. WALKER, Supt. Gold Hill, Grass Valley, Cal., is in San Francisco.

SUPT. E. A. DAVIS of the Ribbon Rock Placerville, Cal., is ill at that point.

W. G. BENHAM AND A. H. TARBET, of Salt Lake, Utah, are in Butte, Mont.

A. H. WARD of Alameda and Plumas counties, Cal., has returned from the East.

W. S. MORROW of San Jose de Pimas, Sonora, Mexico, has returned from the East.

C. A. ROSS of New York and Mr. Heckshor of London, England, are in Clifton, Ariz.

O. P. POSEY of the Bingham Copper & Gold M. Co., Bingham, Utah, is in New York.

P. GEO. GOW has returned to the Jumper mine, Tuolumne Co., Cal., from Europe.

C. E. LOOSE, Manager Grand Central, has returned to Salt Lake, Utah, from California.

W. L. HOGG, of the Montreal-Boundary Creek M. Co., Greenwood, B. C., is in California.

H. REAMER of Pittsburg, Pa., and W. D. Wrighter of Spokane, Wash., are in Slocan, B. C.

J. E. BAMBERGER of the Daly–West has returned to Salt Lake, Utah, from Denver, Colo.

W. H. RADFORD, Supt. La Grange hydraulic mine, Junction City, Cal., is in San Francisco.

J. H. WOLKOTTE, owner Gladstone, Carters, Cal., has returned there from San Francisco.

J. MILNER, late Supt. John A. Logan mine, Cripple Creek, has returned there from Nome, Alaska.

C. JAMES of California goes to German West Africa in charge of a mining expedition for Cecil Rhodes.

W. H. STROUT & SON, for many years assayers at Ouray, Colo., are opening an assay office in Denver.

G. MOORE, formerly with Kansas City Con. Smelting & Refining Co., Salt Lake, Utah, goes to California.

SUPT. D. HARMON, of the Gaston Ridge, Grass Valley, Cal., has returned there from San Francisco.

C. E. POTTER of Los Angeles, Cal., and F. M. Michelson of Philadelphia, Pa., have gone to Cedros island, Mexico.

J. F. HUMPHREYS, Pres. Britannia M. Co., Howe Sound, B. C., has returned to Vancouver, B. C., from the East.

P. H. CLARK, general manager Copper Bullion Co., Arizona, has returned to Pearce, Ariz., from Los Angeles, Cal.

V. BARND of Boston, Mass., and A. G. Campbell of San Francisco are examining the Two G properties, near Tybo, Nev.

W. H. FERRIER is now general manager Gooderham–Blackstock syndicate, Rossland, B. C., vice J. B. Hastings, resigned.

CHAS. J. BUSH, assistant Western manager Canton Steel Co., at Denver, Colo., has returned there from Deadwood, S. D.

J. B. HASTINGS, former Manager War Eagle and Center Star mines, Rossland, B. C., goes to London, England, to locate permanently.

W. A. WATSON, who resigned the position of superintendent of the Economic Gold Extraction Co. mill, Victor, Colo., is making a trip to Cuba.

F. D. BAKER of Denver, Colo., is in south Chicago, Ill., superintending the erection of an automatic sampling mill for the National plant of the A. S. & R. Co.

H. W. ASBURY has resigned the vice-presidency of the Darius Green M. Co., Arizona, to assume the general managership. G. W. Sparks succeeds him in the former capacity.

Commercial Paragraphs.

THE Globe Engineering Works of San Francisco has secured a contract for furnishing two 300 H. P. Sterling boilers to the Yellow Aster M. Co., Randsburg, Cal.

MR. JOS. H. WILLIAMSON, for nearly eighteen years business manager Manufacturers' Advertising Agency, New York City, has severed his relationship with that company to connect himself with the old established Viennot Advertising Agency, No. 524 Walnut street, Philadelphia, as its business manager in the place of Mr. Thompson, resigned. Mr. Williamson also desires to express his appreciation of the uniform courtesy extended to him by his many friends in the trade paper and general advertising field in the past, and will be glad to welcome them at any time in his new address, either at the office in Philadelphia, or at the New York office of the Viennot Agency, No. 127 Duane street, Graham building.

THE I. X. L. Co. of Idaho have purchased of the Colorado Iron Works material for a high-speed roller crushing plant, including elevators, screens, Bartlett tables, engine and boiler. The Middlemarch Copper Co. of Arizona have ordered a hoisting plant of the company, who formerly furnished a 42-inch round copper furnace for the same property. The British–Globe Mines Co. of Sonora, Mex., are being furnished a 36x68-inch silver-lead smelting furnace, with the Nesmith patent water vaporizer; also includes an English cupelling furnace. The Philadelphia S. & R. Co. at Pueblo, Colo., have placed an order with the same works for six large slag trucks of special design. The Colorado Iron Works Co. are also furnishing water jackets for the furnaces of the Arkansas Valley smelter at Leadville, Colo., and are building a 10-stamp mill for the Cochiti R. Co. at Bland, N. M.

AMBITIOUS MECHANICS who desire to obtain better positions and higher wages might investigate the free scholarship offer made in another column by the American School of Correspondence, Boston, Mass. Situated in a large city which is a recognized educational and industrial center, this well-known correspondence school has many natural advantages in teaching the theory of the trades and engineering professions. Without leaving home or losing time from work, the student pursues a thorough course of study under the directions of able instructors, who are always ready and willing to assist him. Instruction papers, prepared especially for teaching by mail, are furnished free. These papers, written in clear and concise language, as free as possible from technicalities, are considered by their authors superior to the ordinary text books on the subjects of which they treat. In addition, special information regarding any difficulties in their studies is furnished students without extra charge. It should be the ambition of every man to advance in his trade or profession. A mechanic with practical experience, supplemented by theoretical education, can command a better position than a man without such an education. The results of long experience in teaching by mail indicate that this method fully meets the requirements of men who have but little time for study.

Recently Declared Mining Dividends.

	Payable.
Empire State – Idaho M. Co., Idaho, 3%—$29,554	Nov. 15
Gwin Mine Development Co., California, 15c per share, $15,000; to date $126,500	Nov. 24
Breece M. Co., Colo., 5 cents per share—$10,000	Dec. 1
Buffalo Hump M. Co., Idaho, 1%—$30,000	Dec. 1

List of U. S. Patents for Pacific Coast Inventors.

REPORTED BY DEWEY, STRONG & CO.,
PIONEER PATENT SOLICITORS
FOR PACIFIC COAST.

FOR WEEK ENDING NOV. 13, 1900.

661,483.—PROTRACTOR—J. D. Barrie, Los Angeles, Cal.
661,595.—SWIMMING APPARATUS—J. S. Bartholomew, Guerneville, Cal.
661,842.—CONVEYOR — H. W. Blaisdel, Yuma, A. T.
661,863.—ROLLER BEARING—J. S. Godfrey, Harrington, Wash.
661,724.—AIR DRAFT PROPELLER—Newmarker Bros., Reno, Nev.
661,919.—CHIMNEY TOP—J. Newmarker, Reno, Nev.
661,891.—TREE PROP — E. K. Parker, Pomona, Cal.
661,726. — WASHING MACHINE — T. J. Pickett, S. F.
661,774. — SHOVEL — Sheehy & O'Neill, S. F.
661,941. — CAR COUPLING — Sullivan & Mahoney, Los Angeles, Cal.
661,834.—TRUCK—G. M. Williams, Santa Rosa, Cal.
33,544 — DESIGN — Brewer & Burfiend, S. F.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

AIR DRAFT PROPELLING APPARATUS.—No. 661,724. Nov. 13, 1900. H. J. Newmarker, E. J. Newmarker & B. C. Newmarker, Reno, Nev. This invention relates to an apparatus designed to produce a rotary motion and power by means of a suitably journaled propeller wheel, and an apparatus connected therewith by which a current of air is caused to pass through the wheel and cause it to rotate. It consists in the combination of a horizontal chamber closed on all sides except one, and having an enlarged or recessed portion, a casing within said enlarged or recessed portion of the chamber and having a reduced extension from its upper side, a flue connecting with said extension, and a wheel journaled within the larger portion of the casing.

WASHING MACHINE. — No. 661,726. Nov. 13, 1900. T. J. Pickett, San Francisco, Cal. This invention relates to a machine for washing clothes. It consists in the combination of a tub with a convex faced plate therein having a stem. A transverse handle bar is centrally pivoted to said stem. There is a pressure platform adapted to bear the weight of the operator and connections at the ends of the handle bar, and other connections at the sides of the platform; ropes engage these connections and there are means on the handle bar for the attachment of the end of the ropes whereby the platform is adjusted with relation to the handle bar.

PROSPECTING SHOVEL.—No. 661,774. Nov. 13, 1900. P. J. Sheehy & R. E. O'Neill, San Francisco, Cal. This invention relates to a device for rapidly and conveniently prospecting sand and other gold bearing material, and separating the larger portion of the worthless material so as to determine whether there is sufficient indication of value to continue with the work. It is especially designed for use in the beds of streams or in other places where the surface is under water and not easy to reach. It consists in combination with a shovel having a handle and a concave bowl, of a perforated plate of less concavity than the bowl, and having its edges forming a close joint around the inner surface of said bowl, to form a chamber between the two. Means are provided for removably locking the plate to the shovel which consist of an elastic shank on the plate with key hole slots, and pins fixed in the shovel handle having heads which engage with the slots when the shank is pressed down upon them.

Latest Market Reports.

SAN FRANCISCO, Nov. 22, 1900.

SILVER—Per oz., Troy: London, 29⅜d (standard ounce, 925 fine); New York, bar silver, 63⅞c (1000 fine); San Francisco, 64c; Mexican dollars, 51c.

COPPER.—New York: Lake, 1 to 3 casks, $17.25 cash; carload lots, 17.00; Electrolytic, 1 to 3 casks, 16.87½; carload lots, 16.62½; Casting, 1 to 3 casks, 16.75; carload lots, 16.60. San Francisco: 18. Mill copper plates, 20c; bars, 22@23c.

The lowest bidder for furnishing 11,500 pounds of ingot copper to the Navy Department at Puget Sound, Wash., was James Clendennin, whose bid was 18.35 cents per pound.

LEAD.—New York, $4.37½; Salt Lake City, $4.00; St. Louis, $4.27½; San Francisco $5.00, carload lots; 5½c 1000 to 4000 lbs.; pipe 6¾, sheet 7½, bar 6c; pig, $4.70 @5.10. London, Soft Spanish, £17 8s per ton.

SPELTER. — New York, $4.35; St. Louis, $4.15; San Francisco, ton lots, 5¾c; 100-lb lots, 6c.

ANTIMONY.—New York, Cookson's, 10½c; Hallett's, 9½c; San Francisco, 1000-lb lots, 12c; 300 to 500 lbs., 13@14c; 100-lb lots, 15@18c.

IRON.—Pittsburg, Bessemer pig, $14.50; gray forge, $14.00; San Francisco, bar, per lb., 2½c in small quantities.

STEEL.—Bessemer billets, Pittsburg, $20.00; open hearth billets, $23.50; San Francisco, bar, 7c to 12c per lb.

TIN.—New York, pig, $28.50; San Francisco, ton lots, 30c; 1000 ℔s., 30½c; 500 ℔s., 30¾c; less, 31c; bar tin, ℘ ℔, 35c.

QUICKSILVER. — New York, $51.00; large lots: London, £9 2s 6d; San Francisco, local, $48.00 ℘ flask of 76½ ℔s.; Export, $45.

NICKEL.—New York, 50@60c ℘ ℔.

MAGNESIUM.—New York, $3.00 ℘ ℔.; San Francisco, $4.00.

ZINC.—San Francisco, 5¼c; slab, 5¾c; bar, 7c.

BABBITT METAL.— San Francisco, No. 1, 10c.

SOLDER. — Half-and-half, 100-℔. lots, 18.70c; San Francisco, Plumbers', 100-℔. lots, 15.85c.

ASSAY LITHARGE.—San Francisco, 10c ℘ ℔, small lots.

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 30c to 35c.

BISMUTH.—New York, ℘ ℔., $1.60 50-℔ lots; San Francisco, $2.50 to $2.75 ℔ lots.

PHOSPHORUS. — F. o. b. New York 50@60c ℘ ℔.

TUNGSTEN.—New York, ℘ ℔., 95c; San Francisco, $1.15.

FERRO-TUNGSTEN. — New York, 37%, 35c; San Francisco, 65c (60%).

FERRO-MANGANESE. — Pittsburg, 80%, domestic, $85, large lots.

PLATINUM.—San Francisco, crude, $17 ℘ oz.; New York, $18.20 per Troy oz

POWDER.—F. o. b. San Francisco: No 1. 70% nitro-glycerine, per ℔., in carload lots, 15¼c; less than one ton, 17¼c. No. 1*, 60%, carload lots, 13¼c; less than one ton, 15½c. No. 1** 50%, carload lots, 11¾c; less than one ton, 13¾c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9½c; less than one ton, 11½c. No. 2** 30% carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9, in lots not less than 1000.

FUSE.—Triple tape, $3.60 per 1000 feet; double tape, $3.00; single tape, $2.65; Hemp, $2.10; Cement No. 2, $3.00; Cement No. 1, $2.65, in lots of 3000 feet and up.

CANDLES.—Granite 6s, 16 oz., 40s., 11¼c ℘ set; 14 oz., 40s., 10c.

CHEMICALS.—Cyanide of potassium, 98%-99%, jobbing, 32½@33½c ℘ ℔.; carloads, 30@31c; in 10-℔. tins, 40c; sulphuric acid, 66% B, 2c ℘ ℔.; soda ash, $1.60 ℘ 100 ℔s. 58%; hyposulphite of soda, 2¾@3c ℘ ℔.; blue vitriol, 5½@6c ℘ ℔.; borax, concentrated, 7@8c ℘ ℔.; chlorate of potash, 12@13c; roll sulphur, 6c; alum, $1.90@2.00; flour sulphur, French, 2¼@2½c; California refined, 1¾@2c; nitric acid, in carboys, 8c ℘ ℔.; caustic soda, in drums, 3@4c ℘ ℔.; Cal. s. soda, bbls., $1.00; sks, 95c ℘ 100 ℔s.; chloride of lime, spot, $2.50@2.60; nitrate of potash, in kegs, 8c; caustic potash, 10c in 40-℔. tins.

COAL. — San Francisco, coast, yard prices: Wellington, $9; Seattle, $7.00; Coos Bay, $5.50; Southfield, $9.00. Cargo lots, Eastern and foreign: Wallsend, $8.00; Brymbo, $7.50; Pennsylvania, hd., $14.00; Scotch, $8; Cumberland, $12; Cannel, $9.50; Welsh Anthracite, $12.00; Rock Springs, $8.50; Colorado Anthracite, $14.50. Coke, $16 per ton in bulk; $18 in sacks.

San Francisco Stock Board Sales.

SAN FRANCISCO, Nov. 22, 1900.

200 B. & B.	21c	200 Mexican	26c
50 Caledonia	40c	100	25c
200 C. C. & V.	$1 30	200 Savage	15c
50 G. & C.	$1 10	200	16c
100	$1 15	700 Silver Hill	44c
100 H. & N.	25c	200 Union Con	14c
600 Ophir.	82c	200 Y Jacket	23c

ALPHABETICAL INDEX TO ADVERTISERS.

(—) Indicates every other week or monthly advertisements.

A PAGE.
Adams, W. J. 13
Ainsworth & Sons, Wm. 13
Aitchison Perforated Metal Co., Robert 15
Akers, Wm. A. 13
Allis Co., Edward P. 17
American Diamond Rock Drill Co. 9
American Injector Co. 1
American School of Correspondence 4
Ames. A. T. .... —
Atlas Pipe Wrench Co. 11

B
Baird & Co., Henry Carey 17
Baker, F. D. 1
Baker & Hamilton .... —
Balliet, Letson 13
Barnhart, Geo. W. 18
Bartlett & Co., C. O. 1
Bell, J. 13
Bell, Newton M. 16
Benjamin, E. H. 13
Birch & Co., W. H. 5
Boesch Lamp Co. .... —
Bowes & Co. 9
Bradley Pulverizer Co. 6
Braun & Co., F. W. 5
Breitung, E. N. 1
Bretherton Hot Blast Smelting Co. 14
Brownell, J. S. .... —
Bucyrus Company 11
Bullock Mfg. Co., M. C. 9
Burlingame & Co., E. E. 13
Burt Mfg. Co. .... —
Burton, Howard E. .... —
Butters & Co., Ltd., Chas. 13

C
California Anti-Caloric Co. 10
California Debris Commission 1
California Perforating Screen Co. 15
California Vigorit Powder Co. .... —
California Wire Works 19
Canton Steel Co. 9
Cary Spring Works 7
Colorado Iron Works Co. 2, 10
Colorado Midland Railway 15
Colorado & Southern Ry. 15
Compressed Air Machinery Co. 12
Con. Cal. & Virginia Mining Co. 17
Cook, J. H. 1
Copper King, Ltd. 5
Cory, C. L. 13
Crane & Co. 10
Crown Gold Milling Co. 19

D
Davidge & Davidge 13
Dearborn Drug & Chemical Works 14
Denniston's San Francisco Plating Works 11
Denver Engineering Works 15
Denver Fire Clay Co. 14
Denver & Rio Grande R. R. 1
Detroit Lubricator Co. 16
Dewey, Strong & Co. 2, 17
Doble Co., Abner. 9
Donaldson & Co., A. M. 1
Dow Pumping Engine Co., Geo. E. .... —

E
Eby, Jno. D. 11
Electric, Railway & Mfrs. Supply Co. 1
Elkins, John T. 13
Ericsson Telephone Co. 1

PAGE.
Eureka Co. 1
Evans & Co., C. H. 5
Excelsior Redwood Co. .... —

F
Fairbanks, Morse & Co. 6
Falkenau, Louis 13
For Sale 1
Fowler, G. C. .... —
Fraser, E. J. 1
Fraser & Chalmers 15
Frue Vanning Machine Co. .... —
Fulda's Planing Mills .... —

G
Garratt & Co., W. T. 7
Gates Iron Works 8
General Electric Co. 7
General Photo-Engraving Co. 5
Gibson, Chas. B. 13
Globe Engineering Co. 14
Globe Iron Works 7
Gold & Silver Extraction Co. of America, Ltd. 14
Goodell, Albert I. 13
Goodyear Rubber Co. 7
Gutta Percha Rubber & Mfg. Co. .... —

H
Haff, Edward L. 13
Hallidie Ropeway 19
Hamilton Mfg. Co., Wm. 18
Hanks, Abbot A. 13
Harrigan, Jno. 13
Harvey, F. H. 13
Hayden & Co., J. M. 17
Heald's Business College 1
Hendrie & Bolthoff Mfg. & Supply Co. 2
Hendy Machine Works, Joshua 12
Hercules Gas Engine Works 18
Hersey, Clarence 18
Heyl & Patterson 10
Hirsching, H. 14
Hoskins, W. 14
Hooper & Co., C. A. .... —
Hug, D. 12
Hunt, A. M. 13
Huntington, F. A. 18
Huntley, D. B. 13

I
Independent Assay Office 13

J
Jackson Drill & Mfg. Co. 9
Jackson, Geo. G. 15
Jackson Machine Works, Byron 16
Jeanesville Iron Works Co. 14
Jeffrey Mfg. Co., The 16
Jessop & Sons, Ltd., Wm. 9
Jewett, Daniel G. 13

K
Kent Mill Co. 3
Keuffel & Esser Co. 14
Keystone Driller Co. 5
Knight & Co. 12
Koppel, Arthur 18
Krogh Mfg. Co. 12
Kyle & Co., T. D. .... —

L
Lallie, J. S. J. 13
Langley & Co., S. Thornton 1

PAGE.
Larkin Mining Co. 17
Leffel & Co., James 12
Leschen & Sons Rope Co., A. 6
Lexow, Theodor 9
Leyner, J. Geo. 9
Link-Belt Machinery Co. 11
Lloyd, Benj T. 1
Luckhardt Co., C. A. 13
Ludlow-Saylor Wire Co. 12
Lunkenheimer Co. 16

M
Macdonald, Bernard 13
Madison, Bruce & Sellers 1
Main Belting Co. 11
Mammoth Garfield Gold Mining Co. 17
Mandell, Frank C. 13
Mariner & Hoskins 14
Marion Steam Shovel Co. 18
Mariposa Commercial & Mining Co. 17
Marshutz & Cantrell .... —
McFarlane & Co. 18
Meredith, Wynn 13
Mine & Smelter Supply Co. 8
Miners' Assay Office 13
Montgomery Machinery Co., J. H. 11
Moore & Co., Chas. C. 8
Morris, H. D. & H. W. 10

N
National Iron Works .... —
Nevada Metallurgical Works 13
New Process Raw Hide Co. .... —
Nicholson, Hudson H. 13
Novelty Mining & Milling Machinery Co. 6

O
Ogden Assay Co. 13
Oregon Railroad & Navigation Co. 15
Oriental Gas Engine Co. .... —

P
Pacific Coast Machinery Co. 1
Pacific Coast Smelting & Refining Works 5
Pacific Tank Co. 4
Paraffine Paint Co. 3
Parke & Lacy Co. 9, 19
Paul, Almarin B. 1, 13
Pelton Water Wheel Co. 12
Penberthy Injector Co. 16
Pennington & Sons, Geo. W. .... —
Perez, Richard A. 13
Peterson, L. 1
Phillips & Co., Alvin 14
Pneumatic Cyanide Process Co. 14
Postlethwaite, R. H. 13
Powell Co., Wm. 16
Price & Son, Thomas 13

Q
Quick, Jno. W. 15

R
Rand Drill Co. 9
Rank, Sam'l A. 13
Reckhart, D. W. 13
Richards, J. W. 13
Risdon Iron Works 3
Robins Conveying Belt Co. 11
Roebling's Sons Co., John A. .... —
Roessler & Hasslacher Chemical Co. 14
Runkle, H. E. 1

S PAGE.
San Francisco Novelty & Plating Works 15
San Francisco Pioneer Screen Works 15
Schaw, Ingram, Batcher & Co. 11
Schilling & Sons, Adam 18
School of Practical Mining 13
Selby Smelting & Lead Co. 8
Shaw, Willis 9
Shepard & Searing 15
S. H. Supply Co. 1
Simonds, Ernest H. 13
Simonds & Wainwright 13
Situations Wanted 1
Smidth & Co., F. L. 17
Smith & Co., Francis 1, 7
Smith & Thompson 14
Smooth-On Mfg. Co. 1
Snedaker, James Angus 13
S. O. 1
Star Drilling Machine Co. .... —
State Ore Sampling Co. 1
Stevens, Ralph E. 13
Stillwell-Bierce & Smith-Vaile Co. 12
St. Louis Sampling & Testing Works 14
Sturtevant Mill Co. .... —
Sullivan Machinery Co. 9

T
Tatum & Bowen 7
Taylor Iron & Steel Co. 16
Taylor & Co., John 14
Thomson & Boyle Co. 8
Trenton Iron Co. 16
Truax Mfg. Co. 7
Tyler, S. W. 13

U
Union Gas Engine Co. 4
Union Iron Works 2
Union Photo-Engraving Co. 17

V
Van Der Naillen, A. 13
Van Dieren, Hermann J. 13
Van Slooten, Wm. 13
Van Wagenen, Theo. F. 13
Volger, Wm. B. 11
Vulcan Iron Works 11

W
Wade & Wade 1
Walter, R. J. 13
Wanted 1
Weber Gas & Gasoline Engine Co. 18
Weigele Pipe Works .... —
Western Chemical Co. 16
Westinghouse Electric & Mfg. Co. 3
Wetherill Separating Co. 14
Wigmore & Sons, John 8
Wimmer, Geo. 15
Witte Iron Works Co. 18
Wohler, Bartning Suc's 1
Wolff & Zwicker Iron Works 10
Wood, Henry E. 14
Woodbury, Geo. E. .... —
Wynkoop, W. C. 18

Y
Yawger, I. C. 9

Z
Zeller, Geo. A. 1

SITUATIONS WANTED.

Assayer Desires Position —Experienced Chemist and Assayer desires position. Will go anywhere. Finest references. "Assayer," Box B, this office.

EXPERIENCED MINE FOREMAN,
who is a competent assayer and surveyor and has a good knowledge of Spanish, desires a position. Address O. R., care of Mining and Scientific Press.

Mining engineer with ten years' experience in copper and lead mining, milling and smelting, desires to secure position as superintendent or manager of developing or producing property in this country or abroad. Good assayer, surveyor and bookkeeper. Address "Montana," care of Mining and Scientific Press.

WANTED.—A position as superintendent for a mining company by a man of 16 years' practical mining experience; understands mining and milling (amalgamation, concentration and leaching); good assayer and accountant; would accept a subordinate position if good; references. Address "Advertiser," 1225 Webster St., Oakland, Cal.

A sober, industrious young man, who is a competent assayer, surveyor, draughtsman and bookkeeper, wishes a situation. Has had eighteen months' practical experience and two years' technical training. Is willing to make himself generally useful about a mine. Salary small object; opportunity to show ability considered first. References. Address "M," Mining and Scientific Press.

MINING ENGINEER (technical training), twenty years' experience as surveyor, assayer, superintendent and manager of mines and mills; business qualifications; linguist; at present general manager mining and milling proposition in Mexico; desires to make a change on account of health; best references. Address S. O., Mining and Scientific Press.

A Mechanical Engineer,
technical graduate, with four years' practical experience in steam and electrical work, is open for engagement. At present employed in the East.

Address FRANK S. TUCKER, care of J. F. Beede, 315 California St., San Francisco.

Engineers, Firemen, Machinists and Electricians: New 40-page pamphlet containing Questions asked by Examining Board of Engineers. Sent free. GEO. A. ZELLER, Publisher, ST. LOUIS, MO.

WANTED.

A Second-Hand Assay or Chemical Outfit or parts thereof. Address R. R. S., this office.

Charcoal Burner wanted. Must speak Spanish and be capable of burning 1200 cords of mesquite per month into charcoal for smelting. Healthy part of Sonora, Mexico. Salary $100 gold per month. Only sober man need apply. References and record of experience required. Address C. Coal, this office.

WANTED—A FIRST-CLASS STAMP MILL man amalgamator. Must come well recommended. No others need apply.
Address WATERLOO MINE,
Coarse Gold, California.

WANTED IMMEDIATELY.—A CHEMIST who has had practical experience lixiviating ores with the Hyposulphite of Soda.
Address REGULARS,
Care of Mining and Scientific Press.

WANTED.—MILLWRIGHT ON CONCENTRATOR work. State age, concentrators worked on, wages wanted and references.
FREDERICK T. SNYDER & CO.,
324 Dearborn St., Chicago, Illinois.

WANTED—FOR IMMEDIATE DELIVERY,

One Direct Acting, Double Drum Hoisting Engine; Cylinders about 18x40 or 20x42.

Equipment with post brakes and auxiliary engines preferred. Wire description and price. B. A. C., Rossland, B. C.

WANTED.

Experienced Promoters
—AND—
Mining Share Operators
TO SELL THE SHARES
—OF—
MERITORIOUS, DEVELOPED, SHIPPING
Gold and Copper Mines.

S. THORNTON LANGLEY & CO.,
Rossland, British Columbia.

WE BUY very rich Ores, Dental Scraps, Tellurium Ores, Mill Wastes, Jewelers' Sweeps, Gold Retorts, Old Iron Retorts, Base Amalgam, Quicksilver, Amalgamated Plates, Gold and Silver, Old Slags.

A. M. DONALDSON & CO.,
ASSAYERS AND WASTE PRODUCT SMELTERS,
1661 Larimer St., Denver, Colo.

Donaldson's Assayers' Slag Hammer { 1 lb......$1.10 / 1 lb. 3 oz. $1.25

BENJAMIN T. LLOYD,
STOCKS, BONDS AND MINES.

Have immediate customers for well-developed Gold and Copper Properties.

P. O. Box 608, SALT LAKE CITY, UTAH.

INVENTORS, Take Notice!
L. PETERSON, MODEL MAKER,
544A MISSION STREET, bet. First and Second Sts., SAN FRANCISCO. Experimental machinery and all kinds of models. Tin and brasswork. All communications *strictly confidential.*

FOR SALE.

Two Second-Hand PUNCHING MACHINES,
SUITABLE FOR PIPE MAKING.
FRANCIS SMITH & CO., 46 Fremont St., San Francisco, Cal.

FOR SALE.—A group of three high grade Gold Mines of free milling ore, situated on the mother lode in Tuolumne Co., Cal. A superior property at a very reasonable price. For full particulars, address E. J. FRASER, Parrott Building, San Francisco, Cal.

FOR SALE.
Lease and Bond, Eighteen Months, Easy Terms, Copper Property, New Mexico.

High grade ore with good gold values. Accessible. Plenty wood and water. Strong vein. Three shafts. Will pay from start. Adjoins large producing mine. **H. E. RUNKLE, El Paso, Texas.**

GUARANTEED MINING STOCK FOR SALE.

Excellent chance for profit, no chance for loss. Best of references and standing. For particulars, if you wish to purchase,

— ADDRESS —
E. N. BREITUNG,
MARQUETTE, MICH., or WASHINGTON, D. C.

FOR SALE.
FILTER PRESS.

Johnson, 24-chamber, acid proof, washing Filter Press, 24-in. square plates. Nearly new.

THE S. H. SUPPLY CO.
WRITE FOR CATALOGUE OF MINING MACHINERY AND SUPPLIES.
22nd and Larimer Sts., DENVER, COLO.

FOR SALE.

A group of manganese mines, five in number; 100 acres of mineral land on Government land. Timber and water; 22 miles from railroad depot at Ukiah or 4 miles from railroad track or depot in Redwood valley. The Cave and Franklin mines are from 5 to 12 feet wide, solid manganese ore, high grade. The Black Jack mine is over 20 feet wide on the surface. These mines can be bought very cheap, with many other mines in the same vicinity. For further information, apply to

J. H. COOK,
POTTER VALLEY, MENDOCINO CO., CAL.

The State Ore Sampling Co.
DENVER, COLO.

We buy Gold, Silver, Lead, Copper, Bismuth, Uranium, Wolframite, Cobalt, Molybdenite and Antimony Ores. We have modern sampling mills, also test ore for the new processes of ore reduction.

Our long experience in the market enables us to obtain the highest prices for all marketable ores. Write for our "Reference Book." Send analysis of your ore for prices and information.

BAILY & MONNIG, Managers.

DENVER & RIO GRANDE R.R.
SCENIC LINE OF THE WORLD

The ∴ Mining Man's Favorite Route

BETWEEN

Denver, Colorado Springs, Pueblo and Florence, Cripple Creek, Leadville, Glenwood Springs, Aspen, Gunnison, Lake City, Creede, Durango, Silverton, Telluride and Ouray,

Reaching all the Mining, Milling, Cyaniding, Chlorinating and Smelting centers in Colorado and Utah, and all mining points in California, British Columbia and the Pacific Northwest by close connections and a perfect system of through car service.

Pullman Palace and Tourist Sleeping Cars between Denver and San Francisco and Los Angeles, and Pullman Palace and Tourist Sleeping Cars and Free Reclining Chair Cars between Denver and Portland. : : A Perfect Dining Car Service on All Through Trains. : :

For Illustrated Pamphlet, address

W. J. SHOTWELL, G. A. D. & R. G. R. R., 126 California St., San Francisco, Cal.	S. K. HOOPER, G. P. & T. A., Denver, Colo.

THE CALIFORNIA DEBRIS COMMISSION, HAVING received applications to mine by the hydraulic process from F. D. Soward et als., in the Undine and May Day Placer Mines, Consolidated, near Gold Lake, Sierra Co., to deposit tailings in a worked-out pit; from Mrs. Annie E. Jones, in the Nugget Placer Mine, near Johnsville, Plumas Co., to deposit tailings in Hopkins Creek; from C. D. Hazzard, in the Plumas Imperial Mine No. 2, near Quincy, Plumas Co., to deposit tailings in Slate Creek; from David Corbett, in the Golden Gate Mine, near Gibsonville, Sierra Co., to deposit tailings in Wisconsin Ravine; and from Chas. Schneider, in the American Mine, near Spanish Ranch, Plumas Co., to deposit tailings in a ravine, gives notice that a meeting will be held at Room 59, Flood Building, San Francisco, Cal., on December 3, 1900, at 1:30 P. M.

AUTOMATIC SAMPLING
Mill Plans, Cyanide, Concentration, Smelter.
F. D. BAKER, Mech. Engr., DENVER.

THE ERICSSON SWEDISH TELEPHONES
HAVE BEEN IN USE OVER 20 YEARS.
THEY ALWAYS TALK. GIVE THEM A CHANCE TO TALK TO YOU.
CATALOGUES FREE.
ERICSSON TELEPHONE CO.
20 WARREN ST. NEW YORK, N.Y.

Electric, Railway and Manufacturers' Supply Co.
RAILWAY SUPPLIES AND ELECTRICAL SPECIALTIES.

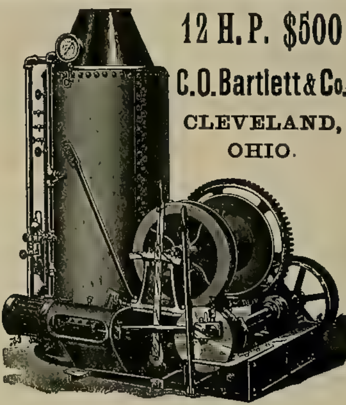
Pacific Coast Agents : : : : : : : : :
ERICSSON TELEPHONE COMPANY.

WE CARRY FULL LINE OF ABOVE GOODS.
548 MISSION ST.,
SAN FRANCISCO, CAL.

Quicksilver
—FOR SALE BY—
The Eureka Company,
OF SAN FRANCISCO.
ROOM 1, - - 320 SANSOME STREET,
SAN FRANCISCO.

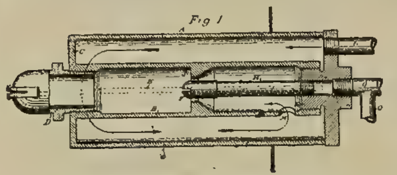
HEALD'S
BUSINESS COLLEGE
And School of Practical Sciences.
24 Post Street, - - - San Francisco.

MINING AND CIVIL ENGINEERING DEPARTMENT: Mathematics, Draughting, Strength of Material, Chemistry, Assaying, Blow-Pipe Analysis, Geology, Mineralogy, Surveying, etc.
ELECTRICAL DEPARTMENT: Theory and Practice; Construction. Mechanical Drawing.
BUSINESS: Bookkeeping, Shorthand, Typing, Modern Languages, etc.
Twenty-five teachers; individual instruction; can enter at any time; Catalogue and Journal free.



12 H. P. $500
C. O. Bartlett & Co.
CLEVELAND, OHIO.

LARKIN RETORT OIL BURNER. A SUCCESS.



Longitudinal Section Oil Burner.

PETROLEUM,
The Coming Fuel for Making Steam Economically.

Coalinga, Bakersfield, or McKittrick Oil delivered in any quantity.

COMPLETE OIL BURNING PLANTS
OUR SPECIALTY.

Manufacturers of the LARKIN OIL FILTER. Pacific Coast Agents for Stirling Water Tube Boiler, St. Louis Car Co., Missouri Car & Foundry Co., G. D. Boiler Cleaner Co. Write for Particulars.

PACIFIC COAST MACHINERY CO., 12 Fremont St., San Francisco.

WEST COAST OF MEXICO.

WÖHLER, BARTNING Suc's, Mazatlan (Sinaloa), Mex.
Bankers, Importers, Exporters and Commission Merchants.

Representatives and Agents of the principal Mining Companies in the State of Sinaloa and the dependencies of the Pacific coast in the States of Durango, Chihuahua, Sonora, Lower California and Jalisco.

ORE BUYERS AND EXPORTERS. - MINING SUPPLIES.

U

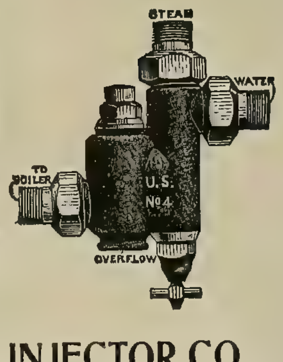
S

The Drip-Cock

is an exclusive feature with our Injector. It prevents freezing, starts with lower steam, enables you to draw hot water when Injector is working, and gives many other points of advantage to the

U. S. AUTOMATIC INJECTORS

over all others. Our little "Engineers' Red Book" covers 500 points of interest to every engineer and tells all about our Injectors. Write for one.



AMERICAN INJECTOR CO.,
Detroit, Mich., U. S. A.

SMOOTH-ON TRADE MARK **COMPOUND**
AN IRON CEMENT

For repairing leaks or fractures in steam or hydraulic work. When hard it will withstand a red heat, steam, water or oil, and expands and contracts the same as iron, insuring a tight joint at all temperatures. Difficult flanged connections can easily be made with SMOOTH-ON COMPOUND, as it adapts itself to the flanged faces, whether parallel or not. Connections are easily taken apart. Unequaled for boiler patching.

Sole proprietors and manufacturers: Smooth-On Mfg. Co., Jersey City, N. J., U. S. A.

MESSRS. MADISON, BRUCE & SELLERS,
34-36 STEUART ST., SAN FRANCISCO, CAL. .... AGENTS FOR PACIFIC COAST.

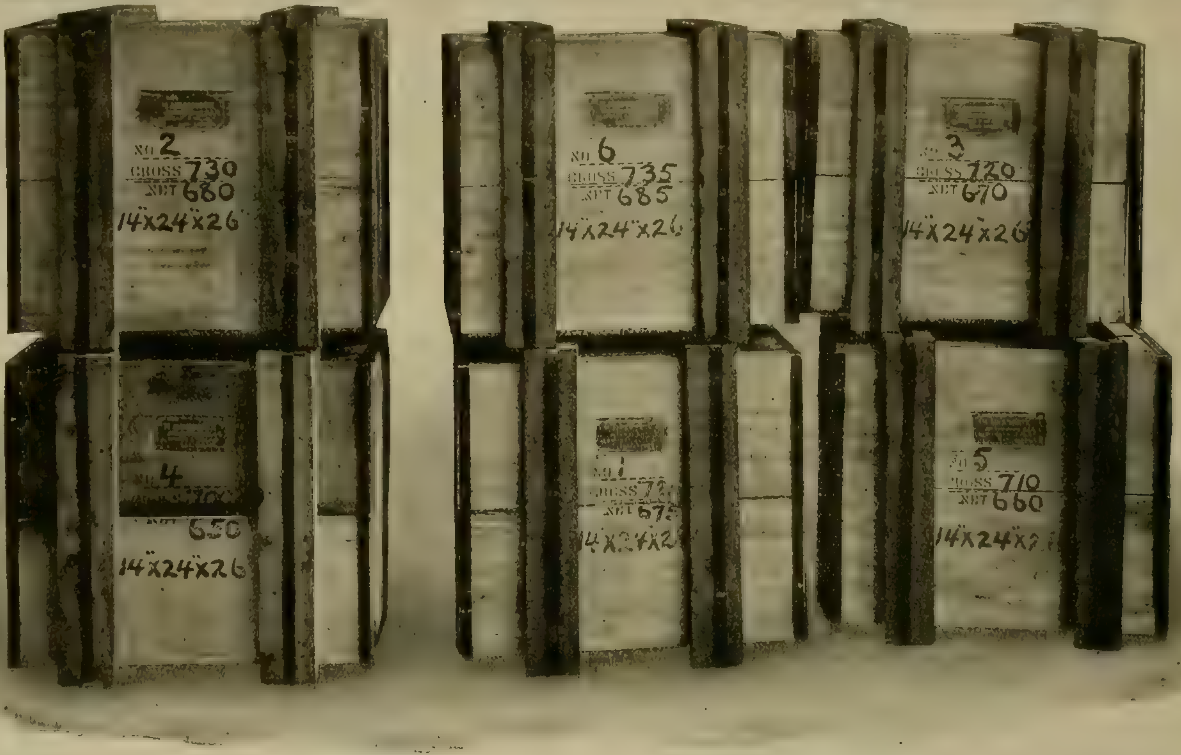
This Paper not
to be taken from
the Library. ++++

MINING AND SCIENTIFIC PRESS.
AND PACIFIC ELECTRICAL REVIEW.

Whole No. 2106.—VOLUME LXXXI. Number 22.
SAN FRANCISCO, SATURDAY, DECEMBER 1, 1900.
THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

Geologic Folios and Topographic Maps.

The U. S. Geological Survey has been engaged for eighteen years in making a topographic survey and map of the United States. The unit of map publication is an atlas sheet 16½ inches wide by 20 inches high. Three scales are used—one 1:62500, or about 1 mile to 1 inch; another 1:125000, or about 2 miles to 1 inch; the third 1:250000, or about 4 miles to 1 inch. On the mile scale an atlas sheet shows a tract 15 feet in extent each way and embraces an area of one-sixteenth of a "square degree," or about 240 square miles; on the 2-mile scale a sheet includes a tract 30 feet in extent each way, with an area of one-fourth of a "square degree," or about 920 square miles; on the 4-mile scale a sheet includes a tract 1° in extent each way, with an area of one "square degree," or about 3600 square miles, the area varying with the latitude. The maps are engraved on copper and printed from stone. The cultural features, roads, railroads, cities, towns, etc., and lettering, are in black; all water features are printed in blue; the hill features are shown by brown contour lines, the contour interval, depending on the scale of the map. An Act of Congress prescribes that the maps shall be disposed of by sale. They are sold at the rate of 5 cents a sheet.



Packing Mining Machinery for Foreign Shipment. (See page 561.)

The Joshua Hendy Machine Works, San Francisco, Cal. (See page 560.)

There is also in preparation a geologic map. Under the plan adopted for its preparation, the entire area of the United States is divided into small quadrangles, bounded by certain meridians and parallels; these quadrangles, in number several thousand, are separately surveyed and mapped. The unit of survey is also the unit of publication; the maps and description of each quadrangle are issued in the form of a folio. When all the folios are completed they will constitute a geologic atlas of the United States. Each folio is designated by the name of the principal town or of a prominent natural feature within the quadrangle. It contains topographic, geologic, economic and structural maps of the quadrangle, together with a general description. Copies of each folio are sold at 25 cents each, except such as contain an unusual amount of matter, which are priced accordingly. Prepayment is required. Remittance should be made by money order, payable to the Director of the United States Geological Survey, or by currency—the exact amount. Postage stamps, checks and drafts can not be accepted. The folios which are ready for distribution and those nearing completion are listed in a circular, which will be revised from time to time as other folios are completed, and circulars concerning the distribution of topographic maps and other publications of the Geological Survey may be had on application. Communications should be addressed to The Director, United States Geological Survey, Washington, D. C., from whom a list of sixty-five of these folios ready for distribution and twelve more approaching completion can be had. All this in answer to numerous questions.

Main Office and Works of Weber Gas & Gasoline Engine Co., Kansas City, Mo. (See page 560`.

MINING AND SCIENTIFIC PRESS.

ESTABLISHED 1860.

Published Every Saturday at 330 Market St., San Francisco, Cal.

ANNUAL SUBSCRIPTION:
United States, Mexico and Canada........$3 00
All Other Countries in the Postal Union........4 00

Entered at the S. F. Postoffice as second-class mail matter.

J. F. HALLORAN........Publisher.

Special Representatives:
EASTERN.
E. H. HAVEN........150 Nassau St., New York City.
MIDDLE WEST.
CHAS. D. SPALDING........153 La Salle St., Chicago, Ill.
INTER-MOUNTAIN.
W. A. SCOTT........43 Jacobson Building, Denver, Colo.
SOUTHERN CALIFORNIA.
W. D. CURTIS........223 W. Second St., Los Angeles, Cal.

San Francisco, December 1, 1900.

TABLE OF CONTENTS.

ILLUSTRATIONS.—Packing Mining Machinery for Foreign Shipment; The Joshua Hendy Machine Works, San Francisco, Cal.; Main Office and Works of Weber Gas & Gasoline Engine Co., Kansas City, Mo. 554. Stamp Milling of Free Gold Ores, 556-7-8-9.
EDITORIAL.—In Darkest Russia; Different Methods—and Results; Miscellaneous, 555.
MINING SUMMARY.—562-563-564-565.
LATEST MARKET REPORTS.—565.
MISCELLANEOUS.—Geologic Folios and Topographic Maps, 554. Stamp Milling of Free Gold Ores, 556-557-558-559-560. Joshua Hendy Machine Works, San Francisco; Weber Gasoline Works; "The Light of Genius," 560. Pyritic Smelting in the Black Hills; Oil and Gas Yielding Formations of California; Packing Mining Machinery for Export, 561. List of U. S. Patents for Pacific Coast Inventors; Notices of Recent Patents; Personal; Catalogues Received; Commercial Paragraphs; Recently Declared Mining Dividends, 565.

The ups and downs of mining stocks tend to injure legitimate mining as a business, as the losses occasioned by stock fluctuations deter those who would put money into mine development as an investment. Booms and speculative eras are always followed by depression in the mining business, which must rely on merit alone. It is this that makes the present period so prosperous, as in the absence of speculative excitement the value of the industry itself is made manifest to those who view it as a legitimate business in which is to be found permanence and profit for legitimate investment.

◆

Beginning the 1st of next month, the estimated cost of platting and other office work in connection with the survey of mineral claims will be computed as follows: For lode claim, $30; for placer claim, $35; for millsite, $30; for millsite included in one survey with a lode claim, $15; for each lode claim within and included in the survey of a placer claim, $15; for several lode locations included in one survey, the first location named, $30; all other locations included, each $20; for several placer locations included in one survey, the first location named, $35; all other locations included, each $25; for affidavit of $500 expenditure of improvements, after approval of survey, $5. Should an amended order issue, an additional deposit will be required.

◆

In his annual summary of the mineral production of the United States, Dr. David T. Day, Chief of the Division of Mining and Mineral Resources of the United States Geological Survey, gives eloquent reason for the creation of a governmental department of mines and mining, with a cabinet secretary. in showing that the total value of the minerals produced during the last calendar year amounted to $976,008,046, an increase in value of nearly 40% as compared with the figures for the preceding year. For the first time since 1889 the value of the metallic production exceeded that of the non-metallic products, the figures being $527,218,084, and $448,789,962, respectively. This is a great showing, and warrants the demand for the creation of such a department. To such creation there is no active opposition, the chief obstacle to the fruition of the idea being public indifference.

◆

In the tunneling of the Simplon, in Europe, now in progress for two years, Engineer Brandt in charge has made notable innovation in such boring. Ordinarily the hole has first been driven, then further excavation made, followed by the finishing masonry. In the Simplon two holes are driven, parallel within the radius of the excavations, leaving a dividing line, one hole being excavated about 56 feet in advance of the other. These holes are built for a single track, the idea being to break away the dividing wall should increasing traffic make double track necessary. At distances of 656 feet transverse connections, provided with doors, are made between the tunnels through the dividing well. For ventilation air blasts are blown into one side of the tunnel, returning through the other side of the divide, carrying out foul air and gases. The heated air of the interior is cooled by showers of cold water brought in from higher on the mountain under high pressure. In this way air at 120° F. is cooled to 60° F. The same stream furnishes 1000 H. P. for driving the drills, which are rotary. The tunnel will be 12.4 miles long, and is about half finished, as elsewhere strikes and other accidents retarding its progress.

Different Methods==and Results.

Different business firms and different localities show difference in business methods; more especially is this the case among manufacturers. Some manufacturers constantly act as though they feared some one would find out what they are making, to whom they are selling it, what they are getting for it. There is a general air of "Sh—sh" about their establishments. Others want to tell about what they are making, to whom they are selling their makes, and how much they are getting therefor; what they made this year, and how much they have on their order books. It is a difference in methods. The reticent and the open are alike supposably striving for success. Usually it is best attained by a knowledge of human nature, and human nature invariably and inevitably inclines toward the frank, open-hearted man. So true is this that even where frankness and candid exposition of plans and results are not natural, their very semblance aids in success. Many clever business men, merchants, manufacturers and vendors achieve success by the assumption that people are interested in them; that they are of sufficient importance, anyhow, to justify public interest; that if people are not interested in them it is the fault of the people, and they propose to take the public into their confidence and tell their business to them so that they may be interested. When such people have an order for a stamp mill, or air compressor, or smelter, or wire ropeway, or electrical plant, or a dozen concentrators, or anything else in their line, they straightway tell it to the public, and thus get thousands of dollars' worth of advertising free. They get ahead, too, and build bigger shops and get larger contracts, while the men who whisper "Sh—sh," and gag with grief if any one mentions them, keep struggling along in a small shop in a back street. It is one of the proudest prerogatives of an American citizen to conduct his business as best pleases his sovereign fancy, but to those who are striving for success there would seem to be an object-lesson in the fact that the successful are those who believe that success will follow on the heels of success; that not only "nothing succeeds like success," but that nothing succeeds but success, and that one great secret of commanding success is to go on the principle that people are interested in you, that you are of sufficient importance to justify such interest, and that you propose to create, maintain and constantly gratify such interest.

If you get people interested in you, you can always command a share of their trade. Of course, one may fold his arms, disdain such common, vulgar notoriety, and starve in dignified seclusion, but that isn't business. It may be lofty and grand, but it isn't business, and the man who is constantly dodging into a dark corner, lest his existence be discovered, while he may be a paragon of goodness and virtue, is not a business success. This is a mining and scientific axiom that does not admit of successful contradiction.

◆

Some encouragement to the miner is vouchsafed in the statement from Washington, D. C., that Thos. H. Carter of Montana is to be Secretary of the Interior to succeed Secretary Bliss. The Interior Department has charge of the mining industry, so far as the mining industry is afforded any governmental recognition at all, and Carter is a mining man. It is not intimated that because of this that miners will or should receive any favors, but with a miner in the President's cabinet the miner might be accorded a fairness born of some personal knowledge of the facts so often to be passed upon by that department.

In Darkest Russia.

The United States Government appears at present to be "booming" the mineral development of Siberia. During the past week three government reports from Washington, D. C., have been received in this office, telling how wonderfully rich Siberia is. Two of these state documents are written by Thos. Smith, United States consul at Moscow, Russia, whose imagination seems to have been fired by the alleged discovery, "200 miles west of the Yenesei river," of quartz outcroppings carrying gold, milling $18 per ton. Part of our zealous government agent's long reports sounds like a promoter's prospectus. The following excerpt will make the miner smile: "The quartz appears very lively in all the veins yet uncovered and exhibits the marks of decomposed sulphurets. It is, therefore, highly probable that the great majority of the free gold exists below the water level in the form combined with iron sulphide. It will, of course, after water level is reached, necessitate treatment of chloridation or potassium cyanide. Water level in this particular locality must, however, lie at considerable depth, so that the tenor of these veins may be thoroughly established by the use of small mills, of free milling capacity only, before the refractory portions of the veins are encountered."

In further appeal to his fellow countrymen, Consul Smith vouchsafes the information that the climate "in some respects is perfectly enjoyable." True, "the temperature drops as low as 30° to 40° F., below zero," but then "the fall of snow is very light." Of course, where "the fall of snow is light," life to the American miner in Siberia should be one joyous round of pleasure, even though for five months in the year the thermometers register "a temperature of from 30° to 40° F., below zero."

The Government is sending out considerable of this kind of stuff. It gives a deserving printer employment, and furnishes a little fun to the miners who read it, but does not tend to enhance popular respect for the value of American consular reports.

◆

In this issue appears in its entirety a paper on "Stamp Milling of Free Gold Ores," read by Dana Harmon of Nevada Co., Cal., before the Technical Society of the Pacific Coast, in San Francisco, Cal. It is notable in three instances: it is written by a man who has daily done for many years the things he talks about; it is the longest and most practical talk of the kind that has appeared for years on this subject, and it is from a thoroughly independent standpoint, regardless of whose theories are attacked or whose ideas are disturbed. In accordance with the policy of this paper—an open forum where ideas are admitted and the truth alone survives—the article is given place just as furnished by its author. It will probably elicit discussion, as it is not at all orthodox in its statements, and goes against some tradition and precedent. If it occasion agitation or thought on the matter, to the result of progress therein, it will have served a useful purpose. If there be anything in it susceptible of successful contradiction, our columns are equally open thereto. This journal does not editorially endorse the statements made in Mr. Harmon's paper, but prints it because of its progressive and positive discussion of subjects that are constantly interesting to miners and millmen everywhere.

◆

Great Britain sees her foreign mining machinery trade transferred to the United States, and is studying the causes of successful American competition. Such change in commercial conditions has a variety of causes; chief among them is the underlying fact that British manufacturers are crystallized around a set of standards that to the insular mind is orthodox, while American manufacturers look to the past only to select the best and disregard the obsolescent. With the American there is no limit to progress, and expense is made secondary to success.

◆

The getting together of the American Smelting & Refining Co. and the Guggenheims, as previously announced, is not a sale of the latter to the former, but a consolidation of those two smelting interests. The consolidated concern will be a big factor in the metal markets, buying ores, smelting and refining, and annually producing 75,000,000 ounces silver, 2,000,000 ounces gold, 300,000 tons lead and 100,000,000 pounds copper. The smelters on the Pacific coast continue independent.

Stamp Milling of Free Gold Ores.

[A paper read before the the Technical Society of the Pacific Coast, Sept. 7, 1900, by DANA HARMON.]

A well threshed field. From one point of view, talk is idle—your proverbial millman always catches all the gold. From another, it may be called assault and battery on good nature to say even a word more.

But one has only to travel to find all sorts of methods, much guessing and not enough assaying. Many and deep are the ruts. Somebody must be wrong. Every decent body can learn. Discussion does clarify.

Quite as important is it to catch the gold as to find the ore. In these low-grade days a fellow should be a milling man as well as a "mining man," whatever that well-worn term may mean. Mining has gotten down on all fours with any other business. To the capitalist there is no essential difference between a cotton mill and a quartz mill. The girl at the loom does not run the loom. No more should the battery boy decide how to amalgamate his ore. A superintendent should not have to run to and fro hunting for a "good millman"—he should be able to make one out of raw material.

I have had to do with many different types of mortars and on varied ores, the stamps running from 700 to 1100 lbs. Furthermore, it has been my good fortune to use side by side from the same line shaft, on identical ores, with the same screen, batteries of three different types of mortar, doing this last for over two years continuously. Certain definite conclusions have, therefore, been hammered into my head, touching mortars and weight of stamps.

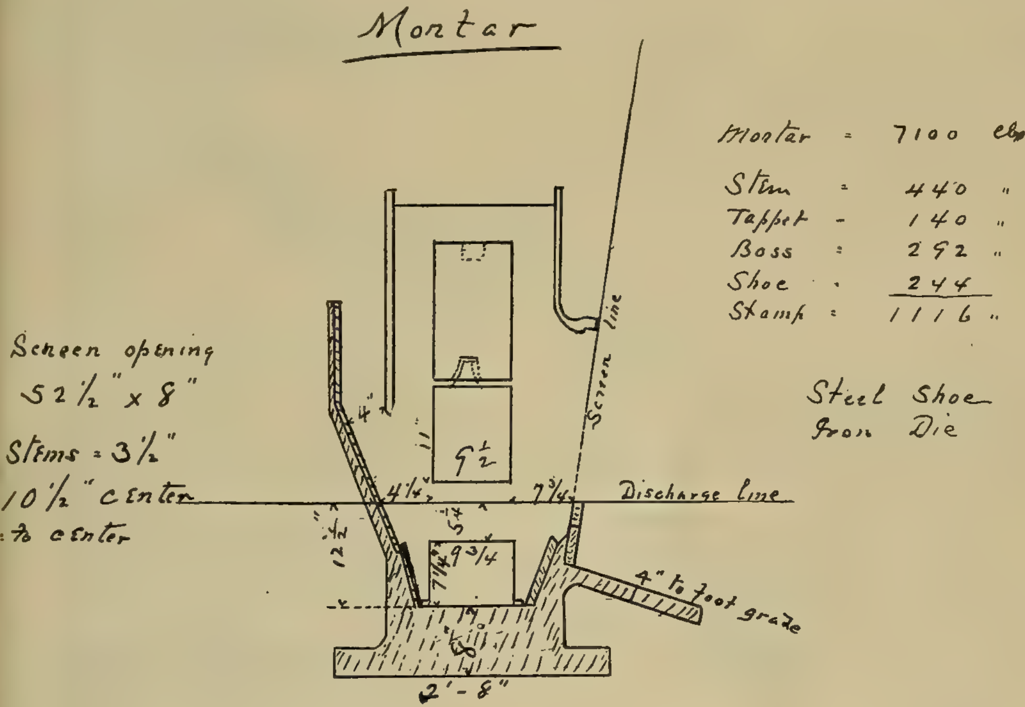


Fig 1

MINING AND SCIENTIFIC PRESS

As for the other matters of mill practice I would not have it understood that I have reached any one given method of treatment applicable to all ores.

I have learned to discard notions that once were holy as though from the Koran—these notions of ancient and honorable lineage, of good report, bearing the greasy thumb marks of the craft. I have been taught the secret work of the fraternity, for I have carried the dinner pail and have worn cotton in my ears, the pass tokens of the lodge. I call these notions, because none of them went to the root and logic of the business. Well, these have had decent burial. Let them rest.

There are, however, fundamentals to which I wish to address myself to-night. I believe that these underlying principles must be followed for all ores falling within the lines of my caption.

The local variance which must be had for ores of different localities are mainly those of screen and water, matters determinable by assaying the tailings.

Machinery.—Without going into the details of mill construction, it may be well to note some points bearing upon the work to be performed. Millwrights are seldom millmen.

There are all shapes of mortars and tables. Figs. 1, 2 and 3 show my own preferences.

There is such a wide difference in jar between the 850-pound and 1100-pound stamps that for the latter most substantial construction is essential.

Back Knee Frame.—I prefer the back knee frame because of its solid bracing to the ore bin, the tappets are in plain sight, the pull of the belt is downward on the cam shaft, it requires less lumber. I build a flat bottom ore bin in order to strengthen the anchorage and bracing.

The objections that such line shaft is subjected to dirt and awkward position need not be. Set the base of the mortar 6 feet above the ground, instead of 3½ or 4 feet, as is customary with contractors. This will give plenty of head room around the shaft and pulleys. Tight wood boxes encasing the shaft bearings will keep out dirt. Plank or cement this mud sill floor. Whitewash every post and wall; oil cups on bearings.

In figuring on power the uncertain factor is friction, and if bearings are to be saddled with dirt and gum, as in the dark they surely will be, power is wasted. There is a good bit of the personal equation in friction.

Mortar Blocks.—If wooden mortar blocks are used, make them long—16 feet—set on solid rock foundation, with a bedding of 1 inche of clean sand. Ram with concrete on sides and ends. This concrete should not be continuous all around the mortar blocks. There should be open spaces leading to the bottom of the pit, these spaces to be filled with sand, dry, or tailings run in. There is no better preservative to wooden mortar blocks than constant wetting. These sand pillars ensure thorough saturation of the wood.

Excavate the pit so that you can also build up a concrete pier for the battery posts to rest on. Have anchor bolts in these piers so that you can draw-bolt the battery posts solid to the concrete. Ordinarily the battery post is mortised into the line sill, the latter being bolted to the mud sills; but this method leaves a wide space and allows the post to spring.

The mortar blocks can be solid, i. e., two blocks bolted and keyed together, or they can be built up of 2-inch plank nailed and bolted together. The mortar bolts are usually 1½x30 inches. I think they should be longer, say 42 inches.

Concrete Mortar Blocks.—Within the past few years concrete mortar blocks are coming into vogue. The concrete is capped with a single block of granite or iron, a sheet of lead between the mortar and this capping. Another plan has been to omit the granite or iron cap piece and instead make the base of the mortar wider. Battery posts also set on concrete piers.

I do not know how well these have withstood the jar of heavy mills. Nor do I consider that their withstanding the jar of a 900-pound stamp is any evidence or proof of the effect an 1100-pound stamp will have upon them.

It is reasonable to expect greater crushing capacity from such rigid foundations. I should look for crystallized bolts because of this very rigidity. But I shall endeavor to show that we can crush as much as we are able to amalgamate in mortars set on wooden blocks.

It is urged against the wooden block that it will rot out in eight to twelve years; that it is well nigh ruined if the mill stands idle a summer or two.

For myself, I should say it does not matter what happens to a mortar block upon an idle mine.

It has occurred to me—and I throw it out as a suggestion only—that a durable composite mortar block could be constructed, the lower half of concrete up to the ground line, the upper half (6 feet) of wood block on end, this block to be anchor-bolted to the concrete.

This would secure solidity, would escape the excessive rigidity, and would permit renewal of the wood work at reasonable expense.

Guides.—Use the individual iron guide—guides without the wood bushing.

The stem will not be worn by rubbing directly against the cast iron guide with $\frac{1}{16}$ of an inch play on either side. Oil sparingly, say once a fortnight, by just touching the stem with waste moistened with a good quality of machine oil.

There are iron guides with wood bushings; but I have never seen one worth buying. It would be well to have the cap-piece of malleable iron and the bed-piece should be 2 inches thick to avoid breakage.

With the old-fashioned oak guides there is too much friction, too much wear from burning—in a few months the shoe won't center on the die.

With the individual iron guide the stems will keep cool. With the oak guide the stems are always warm and often hot. Heat means friction.

Screens.—I prefer the tin costing ¼ cent per ton crushed. Neither Russia iron, brass wire nor steel can compete with this. Put strips of ¾-inch wide of $\frac{1}{32}$ cheap rubber sheet packing between the tin and the wood frame and you will at least double the life of the tin screen. Before using, burn off the tin over a clear forge fire—just heat to redness, keeping the screen moving to and fro over the fire—this anneals and toughens the iron.

The three commercial sizes are: No. 0 = No. 8 needle; 441 holes to square inch. No. 1 = No. 7 needle; 324 holes to square inch. No. 2 = No. 4 needle; 225 holes to square inch.

No. 3 is too coarse for quartz.

If manufacturers would punch a size between the No. 0 and No. 1 and also a size a trifle coarser than No. 2, the range of tin screens would cover nearly all cases of quartz milling. The screen should have a selvage finish at both ends.

Liners.—Mortar liners removable at every clean up. The main back liner instead of being in one piece should be cut so as to give a lower piece of same width as the front liner.

Skylights.—Nearly every large mill is dark in the middle; none need or should be. Builders depend too much upon side wall windows. One skylight in the roof is better than four side wall windows. Fig. 4 shows a cheap skylight set flush with the shakes which I have used successfully even in heavy snow countries on half pitch roofs. The glass was ordinary 21-ounce plain. It won't leak and the snow slides over it. Whitewash walls and ceiling. Have a well lighted mill day and night.

Warmth of Building.—The plate and concentrator rooms should be built so as to be warm in winter season. Never have a draughty mill, icicles and plate amalgamation won't gee. A few dollars spent in tarred paper on the walls will be a wise investment in cold countries. A generous stove with a couple of hot air drums, 10 feet long by 30 inches in diameter, will prove economical of wood and keep a 20-stamp mill building comfortable and fit for amalgamation.

The items of light and warmth are not luxuries; they are the necessaries of the business.

Tables.—Tables should be heavy and solid. These flimsy tables made of thin boards and light scantling get out of whack. Figs. 2 and 3 show a table fastened to the the floor which to my notion has advantages over the rolling table. Ordinarily, 12 feet long by 5 feet wide will suffice; 10 feet of this is nailed to the floor; the 30-inch apron is removable to allow setting in shoes and dies.

The frame of three 4x6 inches by 10 feet dressed on upper edge and notched down ½ inch every 2 feet. The boards 1½ inches thick, 2 feet wide, 5 feet long, dressed on upper side, edges and ends. After dressing true, cross plane the board so that there shall be a fall of $\frac{1}{16}$ inch from ends to center. Each board is butted snug to the one next above it, and nailed or screwed to the 4x6-inch, the ends of the boards being flush with the outer edge of the outside 4x6-inch. The side rail is a plank 1½x10 inches nailed against the side of the 4x6-inch and forming a tight joint against the ends of the boards. To prevent leaking, bruise the edges of the boards with a blunt chisel, the blade 2 or 3 inches wide and ¼ inch thick. As soon as the table is wet these bruises swell.

At foot of table a double drain box with sheet iron flap. While mill is running the pulp flows into box (a), thence to concentrators through a 2-inch pipe, the end of the pipe projecting ½ inch above the bottom of the box (a)—thus forming sufficient quicksilver trap. When brushing up, the flap is lowered and the washings go over into box (b), whence they overflow through notches into box (a).

These double drain boxes will, under careful milling, recover $25 to $50 per month in amalgam which would otherwise be swamped in the concentrates or lost in the canyon. Under slipshod milling this box catchment might easily pay the mill payroll. This for twenty stamps.

Sketch shows the splashboard arrangement, Fig. 2.

By using a lip plate 17 inches wide, set on grade of

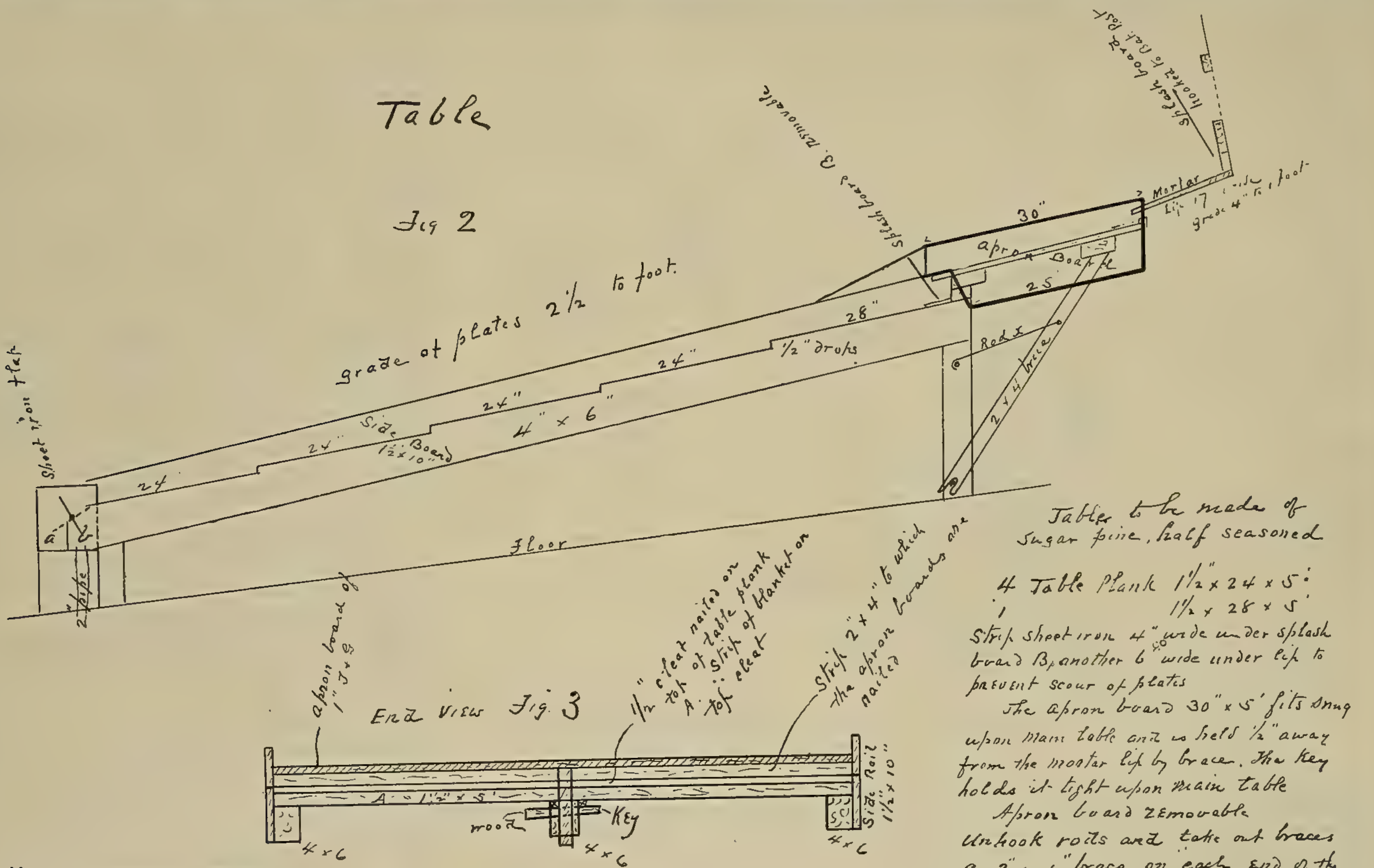
4 inches to the foot, there will be no clogging with sand and sulphurets, and the amalgam catchment will be heavy. Foundries will ordinarily cast a mortar with 1½ inches to foot grade on the lip. This will surely clog and prevent the amalgam from catching on the lip plate.

Let the pulp drop from the mortar lip (usually 1½ to 3-inch drop) upon a sheet iron strip 6 inches wide, whence it flows upon the copper plate. A drop of over ½ inch will scour the silver. Under the splashboard B is 4-inch strip of sheet iron over the plate to prevent scour.

LAUNDERS.—If of wood, let them be V shape, set to grade of 1½ inches to foot.

ROCK BREAKERS.—Every mill should have two rock breakers, coarse and fine. Set the jaws of the coarse breaker 4 inches apart, so that a sledge can slide through, thereby avoiding the breaking of the pitman or side rods. Dump all the ore, coarse and fine, as it comes from the mine, directly into this large breaker. The mixing of fine with coarse prolongs the life of the jaws. The crushed ore to pass over a grizzly—the fines going to the feeders, the coarse to be crushed in a second breaker. Manganese jaws are the most durable. Same material for mortar liners.

GRIZZLY.—Grizzlies often give much trouble by clogging—the rock begins to build against the thimbles. The most satisfactory that I have ever used is made of 12 or 16-pound T rail, downside up, bars 6 to 8 feet long, 1¼ inches apart, at an angle of 42° to 45°, the lower end of the rails rolled over, thus: (See Fig. 5.) If not over 8 feet long, it will be unnecessary to use a middle bar with its thimbles. The steep grade will give a fine product—there will be only occasional clogging.



Tables to be made of Sugar pine, half seasoned

4 Table Plank 1½ x 24 x 5'
1 1½ x 28 x 5'

Strip sheet iron 4" wide under splash board B, another 6" wide under lip to prevent scour of plates

The apron board 30" x 5' fits snug upon main table and is held ½" away from the mortar lip by brace. The key holds it tight upon main table

Apron board removable

Unhook rods and take out braces

a 2" x 4" brace on each end of the apron board

MINING AND SCIENTIFIC PRESS

So much for the working tools. Try for a mill site with plenty of fall—not less than 55 feet from track level to concentrator floor; better 75 feet. Heavy duty is exacted. Machinery is sure to break, therefore the working parts must be accessible.

MILLING.—I hold fast to four central ideas: First—On free gold ores the mortar has the two functions of crushing and of amalgamating. Second—On ores running less than $12 per ton the method used must be such as to extract practically all the recoverable gold. We will not now discuss $40 ore. If such is your luck, you may do quite as you please—either you will get rich and quit or the ore will quit. Third—If the ore is hard enough to require a rock breaker, build a heavy stamp mill, otherwise you may use one of the various rotary mills. Fourth—Do not skimp on rock breakers. It is the cheapest initial crushing; one to the mill not enough.

There is a good deal said nowadays about high duty of the mill, i. e., large crushing. Directors relish five and one-half tons to the stamp and superintendents do not object to this high duty, because it insures low costs per ton to their mining and milling record.

I believe in getting through all possible, consistent with full recovery of the gold. I can not bow down and worship a given type of mortar merely because it is a rapid crusher. High duty should mean low tailings.

The narrow, straight-back mortar, with low discharge, is not a new idea. The foundries are full of old patterns of this type. All our cement gravel mills are so built. For myself I can not escape the conviction that it is not enough to crush rock; one must also catch gold. I am constrained by my own experiments to believe that many are enjoying high-grade tailings because they sacrifice amalgamation to crushing.

Taking up now seriatim these four captions:

THE MORTAR HAS THE TWO FUNCTIONS OF CRUSHING AND AMALGAMATION.—Gold amalgam is a slippery eel—it rolls and floats unless fairly treated. Give it a show and it will settle in the mortar. It is not so hard to catch fine gold inside the mortar if the mortar is built for that purpose. So that I should say the limit of crushing in a given mortar must be measured by the percentage of inside amalgamation, except, however, on ores carrying values of $1 to $1.50 per ton of fine light gold. The aim should be to increase the inside catchment—keep it above 60%. The tendency of stamping is to combine the gold with the mercury. It is natural that this amalgam should stay inside; and it will unless the millman sets to to expel it in his scramble after a high-crushing duty.

EXTRACT PRACTICALLY ALL THE RECOVERABLE GOLD.—Whoever has used quicksilver has lost gold. Whoever has crushed ore has had uncrushed particles of sand carry (stowed away inside the particles) some atoms of gold. Therefore, tailings must assay something. It is a commercial question. You may be able to afford some loss in order to get through a larger tonnage. To illustrate:

Preparing a tailings sample for assay by screening through a 40-mesh screen, we find that 2% of the sand rests on the screen, and the fire assay shows values of 5 cents or 10 cents per ton in the fine sands and $1.50 per ton in the coarse.

The results may be tabulated:

98 tons @	5c. = $4 90	or @ 10c. =	$9 80
2 tons @ $1 50 =	3 00		3 00
100 tons	= $7 90		= $12 80

i. e., 8 cents to 13 cents per ton.

I am quoting actual results, not giving theories. The crushing was at the rate of 3 tons per stamp through No. 2 tin screen.

This 2% coarse sand could have been saved by using No. 1 tin, but it would have been at reduced crushing tonnage and would have shaved close to the sliming danger.

I call this extracting practically all the recoverable gold. And I should say it would be business suicide to jump this crushing to 5½ tons and the tailings to 75 cents per ton. I would call it suicide, regardless of whether there were 10,000 or 10,000,000 tons in the mine.

USE STAMP MILLS ON QUARTZ.—I suppose that somebody will invent a better machine than the California quartz mill for smashing rock and catching gold. It has its faults, and yet its much condemned sliming tendency is too often the fault of the millman. Somehow I like it, because it is a simple, relentless, conscientious brute, with fewer faults than cling to many of its operators.

If you want to stir mud buy a coffee mill and stir it. But if you have rock to crush, build a heavy California stamp mill with the shoe 9½ inches and the die 9¾ inches diameter—the whole stamp weighing 1100 pounds—10½ inches from center to center of stems. The ends of the mortar, after the liners are in, should be flush with the screen opening.

I have heard more than one man assert that his ore did not require a heavy stamp; but I have always found that the man had never had the luck to try the two weights on the same ore. If his ore on one mine happened to be harder than at another he would endeavor to effect a cure by giving more drop to his light stamp. If the rock still resisted and the stamp bounced, he would settle back on the excuse that he had very hard ore, for which misfortune he was not responsible.

My own luck has been different. I have had an 850-pound and a 1100-pound stamp on the same line shaft and identical ore. The former crushed 1¼ to 1½ tons per stamp and the latter 3 to 4 tons per stamp. The little fellows could not get away with the job, no matter what drop I gave them.

I may be all wrong. I am still open to conviction. But my present frame of mind is that my church is founded upon more solid rock than is the light stamp theorist's. I am through with theorizing.

Now, then, how fast shall we run this heavy mill? What drop?

We are mixing in with factors that belong to plate amalgamation, of which I shall speak later.

I want a heavy stamp because I don't want to waste time breaking rock. I want a shoe and die of large area so as to embrace many pieces of rock at every blow. If you reduce the crushing area from 9¾ inches to 8 inches you are compelled to make up the deficit by speed or long drop.

Bring a sledge whack upon a bowlder. If you don't break it you hit harder the next lick. You don't hit oftener unless you get mad and so make a fool of yourself. Probably you will strike slower—you get there by muscle, not by agility.

So it must be with a stamp mill. Stamp crushing is not a question of spalling rock—it is to crush and amalgamate ore that has been, as it were, already spalled by the rock breaker.

It happens that I am now running a mill upon unusually tough, hard ore—first-class road metal some of it. And this is what I find: With a speed of 92 to 94, and a drop of 6 inches to 7 inches, an 1100-pound stamp will crush about eighty tons in twenty-eight days, and save all the gold. Increase the speed to 100 to 102, and the drop to 8 inches to 9 inches this same stamp will crush about 110 tons in twenty-eight days, and by no means save all the gold.

So, then, my rule is to get weight and area of stamp, so as not to waste time, and to drop as the tailings assays dictate.

High speed means more wear and tear, hot boxes, greater percentage of breakdowns. If you can reach the limit of profitable amalgamation by a slower speed why not do it?

Railroad men run trains 14 to 18 miles an hour, not because they are regardful of your neck, but because they save wear and tear of rolling stock.

I have never run a stamp heavier than 1120 pounds, and from what I have learned and been told I am not aching for any greater weight.

I have found it easy to crush more than I can amalgamate. It is for this reason that I am unable to give assent to the theory of installing a system of rolls and crushers so as to deliver a cracked corn product to the stamps. For some mysterious reason there is benefit to amalgamation by churning rock in a mortar. I am no sufferer if it does take a little more time in the making of the butter. If the mine needs more stamps buy them.

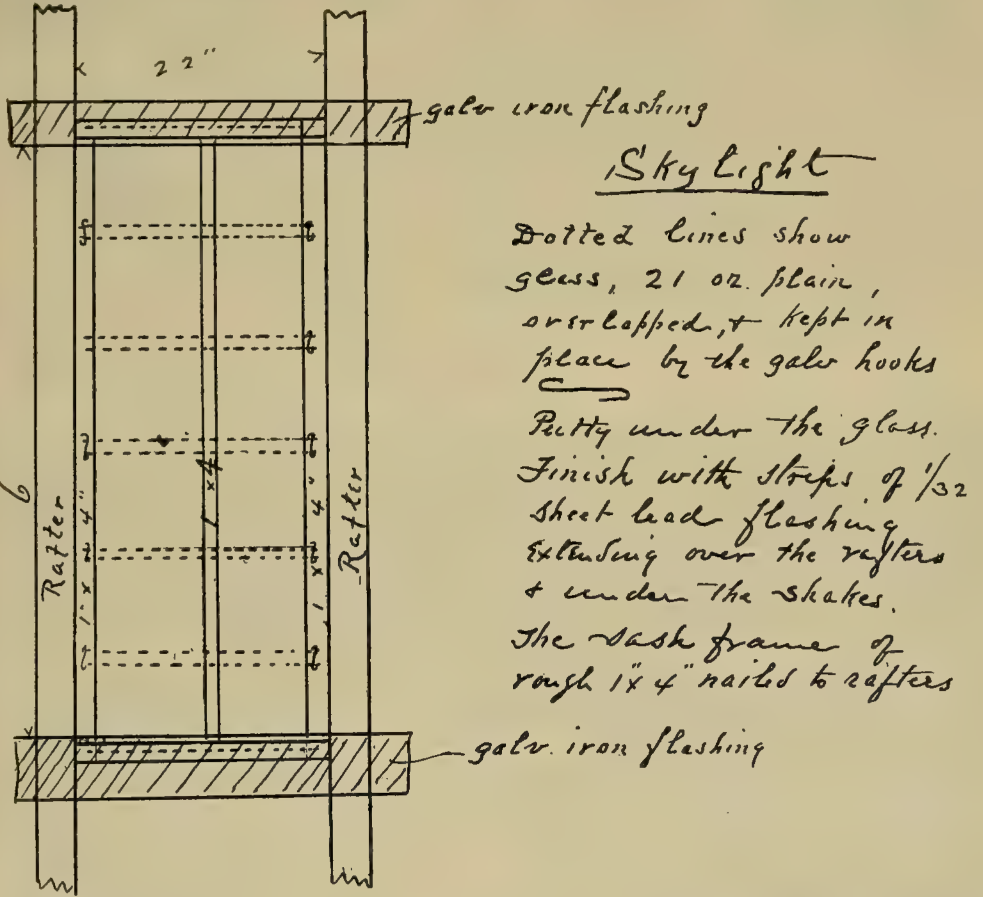


Fig. 4

MINING AND SCIENTIFIC PRESS

Before a 5-stamp battery 5 feet width of plate seems to be the practical limit. Six feet is too wide, and 5 will give better results than 4.

I have tried a launder before ten stamps, the pulp being thence passed to three tables each 4 feet wide. This was a failure. By no adjustment of gates and water could even distribution and flow be obtained. One table was all sand and another all slimes. The wave, the crescent bow, was not there.

Don't skimp on rock breakers. One breaker to the mill is the rule, and ordinarily this means that much of the ore going into the feeders will not pass a 2½-inch ring. It would not cost much to cut this product to 1-inch ring size, and a very noticeable increase in crushing will result. With a 1-inch ring product there will be fewer broken stems and consequent delays.

I have a 12x16-inch jaw crusher, into which is fed all the ore as dumped from the cars; thence the coarse rock from the grizzly is fed into a No. 1 Gates or 8x12 Blake. We have twenty stamps, one millman and one rock-breaker man on each shift. These two rock-breaker men you must have, as they assist the millman, look after the sulphurets, etc.

By way of illustration here is the rock-breaker water time for two weeks:

	Water bill.
12x16-inch ran 38 hours	$2.64
Gates or Blake ran 54 hours	3.84
Total	$6.48

Tons crushed, 937.

Here, then, are two men standing each a 12-hour shift, equals 336 hours in the fortnight; 92 hours of the 336 they were running rock breakers. Evidently these men have time to eat and to attend to other duties.

The rock-breaker end of the mill is too much neglected. One is not enough to any mill. On the other hand, I see no gain in going to the other extreme of too minute rock-breaker crushing.

Let us now cut deeper into the matter:

Catch the gold close to the die.

Don't use chock-blocks or inside coppers.

Don't slime by too fine crushing.

Don't crowd tables with too much pulp.

Don't sluice the pulp over the plates.

Don't add water outside the mortars.

Don't be afraid of steep grade to tables.

No distributing boxes.

Don't turn all the pulp on one-half the plate area when brushing up.

Don't scrape plates with chisel or rubber. Rub up with a cotton cloth and tepid water. Lip plate, however, is scraped off monthly with a chisel.

Feed quicksilver so carefully that never a globule of free quick appears on the plates.

Feed low; i. e., regulate the feeder so that the shoe is kept just cushioning on the die.

Run the batteries with the splash and not with the wave motion.; i. e., lift the shoe above the water at every blow.

Use automatic sampler on tailings.

Avoid the use of acids and cyanide on plates; common lye will cut grease.

Keep the quicksilver clean by retorting and then washing well with dry lime—follow this treatment with thorough washing in clean water.

Use well silvered plates. When they turn green, replate them, and don't waste time and gold over nostrums.

CATCH THE GOLD CLOSE TO THE DIE.—This requires a roomy, rather than a narrow mortar. You can't churn butter in a teacup, and you must churn if you want to amalgamate. I am now using two styles, both 1100-pound batteries. There is no difference in crushing, but the Fig. 1 mortar invariably makes the larger inside catchment. The other mortar is straight back.

It is a pretty safe rule to grab $20 when you see it, provided you can do it conscientiously. If you don't, something else will. I have found that whenever I neglect my inside catchment the tailings run up. Set the discharge too low and the mortar will throw out on the plates. It is the province of the plates to catch the fine gold, not the coarse. Coarse gold will roll down hill, and the table is a downhill proposition. Coarse gold makes good sized bits of amalgam, and the natural habitat of these is inside the mortar.

I should say that on quartz the discharge must not be less than 5¼ inches at the start, i. e., 5¼ inches depth of water measured from the top of the die to the bottom of the screen opening. Starting with this you will soon have 5¾ inches discharge. We will say now that the wear of the die is 2 inches in twenty-eight days. This would mean 7¼ inches discharge at close of the run, and would diminish the crushing.

To cure this make one screen frame with 3-inch strip on bottom and 2 inches on top edge; make another screen with a 1-inch strip on bottom.

As the run progresses you can change and turn screens so as to preserve a practically uniform discharge.

The drop is regulated by the tappet.

There is no harm in using a 6½ to 7½-inch discharge. But there is no gain to amalgamation, and you diminish the crushing capacity of the mill. In other words, work so as to obey the injunction, "Get through all possible consistent with full recovery of the gold."

Some interesting experiments were made at the Utica and Gwin mines on mortar shapes for 900-pound stamps. The back of the mortar was straightened to 77°. At the discharge line the distance from shoe to back is 2¼ inches and to screen 5½ inches. It was found that this mortar would crush 5 to 5½ tons to the stamp on Utica and Gwin ores, whereas the wide mortar crushed 4 to 4¼ tons—this with No. 2 tin.

I attempted to apply these lines to an 1100-pound mill, but did not increase the crushing, and can only attribute the failure to the fact that the heavier and larger shoe makes a more vicious splash. You can not bring the screen closer than 7½ inches to the shoe. On identical ore the Fig. 1 mortar will outcrush this straight back Utica mortar, and it is a better amalgamator. Outcrush it because of the greater weight and shoe area.

NO CHOCK BLOCK OR INSIDE COPPERS.—A copper plate in the mortar will attract amalgam. But copper is no greater magnet than is amalgam itself. Start a bed of amalgam in some secure cranny around the dies and you will have as eager an ally. Grooves in the liners are all humbug—they only shorten the life of the liner.

Nobody ever used a chock block but has seen it build with amalgam, and has also seen it scoured red, in whole or in spots—scoured, we are told, accidentally. Let us dissect this "accident."

Every battery is liable to be filled up with sand. Feeders fail, faucets choke, millmen yawn or are busy elsewhere—no matter the reason, true it certainly is that every battery fills up sometimes. It is this fill of sand that scours the chock block. Amalgam once scoured off, is rebellious metal—it is round and hard, it gets out on the plates where it rolls and tumbles, scorning to stick, content only when it lands in the concentrates or in the canyon. If in the canyon, it is lost for all time. If Selby happens to get a bit of it into his sample he rejects the sample as abnormal—Selby may be appropriating, he certainly is not buying abnormals. The millman blames the accident he himself has concocted—he has sandbagged himself. For the chock block lies within the zone of scour. Study this diagram Fig. 6.

Particles of gold and amalgam are flying about within the area a b c d.

These particles can be attracted upward to the chock block or downward below the line 3, 4, as you please. If you use a chock block they will fly to it. If you don't, they will sink around rocks—every particle lodged will attract another; soon it will be a mass. But note the difference; the chock block lying within the zone of scour 1, 2, 3, 4, your caught amalgam is in danger of loss. The zone 3, 4, 5, 6 being below the line of scour, your caught amalgam is safe till clean-up day. Millmen may sleep, faucets clog, feeders buck—your amalgam is safe.

Repeatedly do I find the entire front of my mortar below the line 3, 4 one mass of amalgam—cakes ¼ inch to ⅝ inch thick—this on $5 to $7 ore.

Take the year through and you will catch more gold inside without chock blocks than with them.

Another important advantage is that in case of overfeed of quick this excess will be safely absorbed by the mass of amalgam around the dies. Excess of quick on a chock block is fatal—it sloughs off the amalgam.

When one considers the varied duties of the millman and the sudden variations of gold ores there is full warrant for abandoning the chock block.

DON'T SLIME BY TOO FINE CRUSHING.—Especially vicious is this practice on slate ores. The correction can only be located by assaying the tailings through different meshes.

If you slime, you are also wasting power by dead, i. e., useless stamping.

Don't crowd plates with too much pulp.

Don't sluice the pulp over the plates.

Don't be afraid of steep tables.

No distributing boxes.

Don't add water outside the mortar.

These five may be treated together.

It is not easy to set down in words just what the conditions of the pulp should be. It is a question to be determined by the eye. When you run up against a millman who says he can run his mill by ear, fire him. Sand does not make much noise as it flows over tables.

Perhaps if you will let the mind dwell upon these negatives, some idea of my meaning may be realized.

Plate amalgamation and ground sluicing are two different arts. Gold is caught on plates because gravity settles the metal to the silvered surface. Therefore, don't be in such hurry to get rid of the sand, and try not to throw obstacles in the way of the laws of gravity. Gold and mercury have their full share of specific gravity, but upset the conditions and you easily offset this factor.

The pulp must not be too thick on the plates—you don't want a double deck of sand. Furthermore, there should be an even flow of water over the entire plate area. It is for this reason that the center of my plate is 1/16-inch below the edges—to draw the water away from the edges. Batteries tend to a greater discharge in the corners than in the center. It is a common sight to find a rush of water 4 inches to 6 inches wide along both edges of the table—one-fifth to one-fourth of the plate area is overflooded.

Many mills have tables 24 feet long with no break in grade. Drop a cork chip at the head of such table, and at the same instant another chip at the middle. You will find that the second cork will travel its 12 feet in less time than the first one, because the velocity of flow must be accelerated on such a table. If the flow is correct for the first 12 feet, it must be wrong for the second 12 feet.

It goes without saying that tables should be of the same width from top to bottom.

The sand should move over the plates slowly and evenly; the water will go in waves or pulses, while the sand below it will be kicked along by these successive waves, not moving any faster over the last 2 feet than it does over the first 2 feet of the table. Between the waves the sand almost, but not quite, comes to a standstill. Note this point especially: The sand is kicked along; it must never be swept along by a heavy flow of water.

Have a wave and use it. It is these successive kicks that tumbles the sand about; before the last plate is reached the gold is kicked into its proper place, viz: to some sticking point. The ½-inch drop every 2 feet assists the process in two ways: (a) the drop bowls the particles over; (b) it prevents acceleration of flow.

With this thin, carefully regulated flow and a sticky, pasty plate, good amalgamation will be had.

One reason for the excessive use of water, so common, is that the table has too little grade.

The millwright turns over a table 1¼-inch to 1½-inch grade to the foot. It should be 2½-inch to 2¾-inch.

Don't be afraid of steep grades, for it means less water and clean table; no danger of scour.

Distributing boxes are an abomination. The holes get plugged up; they incite the millman to careless use of quicksilver when rubbing up; they are traps to gather quicksilver, and let it out in lumps on the plates; they don't distribute pulp as evenly as the plain splash board (Fig. 2).

Globules of free quicksilver on the plates should never be tolerated. If there is a distributing box the millman can lay the blame to the box. Take away the box and rob him of his excuse.

Don't add water outside the mortar. I think one needs just the same amount of water inside the mortar as out, and I know of no better guide as to how much water to use in the mortar than to use just enough as will move the pulp properly over the plates. No reliance can be placed upon stated formula of so many gallons per ton of ore.

I regard this point of quantity of water as vital, and so far as my observation has gone nine millmen in ten use too much. Not one of these nine will agree with me in this—which only shows how obstinate men can be.

Don't turn all the pulp on half the plate area when brushing up.

We have all seen the 4-foot plate with partition strip in center. The battery is not hung up when brushing the plates, but all the pulp is turned to one side of the strip, while the men are working on the opposite side.

It seems to me there can be no logical defense for this custom. If 4 feet width is needed at any moment, it is for all the moments. To confine all the flow to 2 feet width must inevitably scour. The only excuse urged is that it does not pay to hang up. I hardly think it pays any better to scour—the richer the ore the greater the loss. Build another battery if the mine will stand it. The average mine will survive the shock of a little hanging up.

The champions of the never-hang-up theory seldom, if ever, sample tailings when brushing up. They don't know their own losses. It is a well-known fact that upon ore of only $8 value the plates just before brushing up will be plentifully sprinkled with coarse bits of amalgam barely hanging on against the flow. I suggest, by way of proof, that three tailings samples be taken from the 4-foot plate width within the ten minutes preceding the rubbing up, and then three samples from the 2-foot plate width during the ten minutes of rubbing up. Do this for thirty days, making careful assays of all the samples. Note the per cent of assays abnormally high due to particles of amalgam.

I hold that it is not sufficient to reply that what is lost in amalgam is recovered in the concentrates.

Every concentrator passes more or less of amalgam and mercury over into the tail race.

Don't scrape main plates with chisels.

No globules of free quicksilver on plates.

It is essential to keep a well silvered surface, sticky and pasty. The apron plate may require replating every three or four months. The lower plates should wear several years. The cost of replating varies with the ore. I have found it amounts to 1 to 1½ cents per ton crushed, using a plating of three ounces silver per square foot of plate.

I take off every morning the excess of amalgam, but never skin it closely. Rub up with a piece of cotton domestic several folds thick, sprinkling the plate with quick from a small shaking bottle. I have seen used a beer bottle with quill through the cork; but this wholesale fashion of sousing quicksilver on a plate is malpractice. Use a small vaseline jar with a piece of cotton tied taut over the mouth; clear, tepid water in a kettle to dip the rag in frequently. Rub the plate briskly and thoroughly, being careful every day to remove all blisters of amalgam. These blisters eat out the silver, and therefore should not be permitted to form. In cold weather they are especially troublesome. If they stick too tight for the rag, they may be gently scraped off with a piece of No. 24 stove pipe iron shaped like a flat scoop 2 inches wide. Do not use a steel chisel. Finish with a final light sprinkling from the jar and thorough rubbing with the cotton rag, then brush over with a whisk broom.

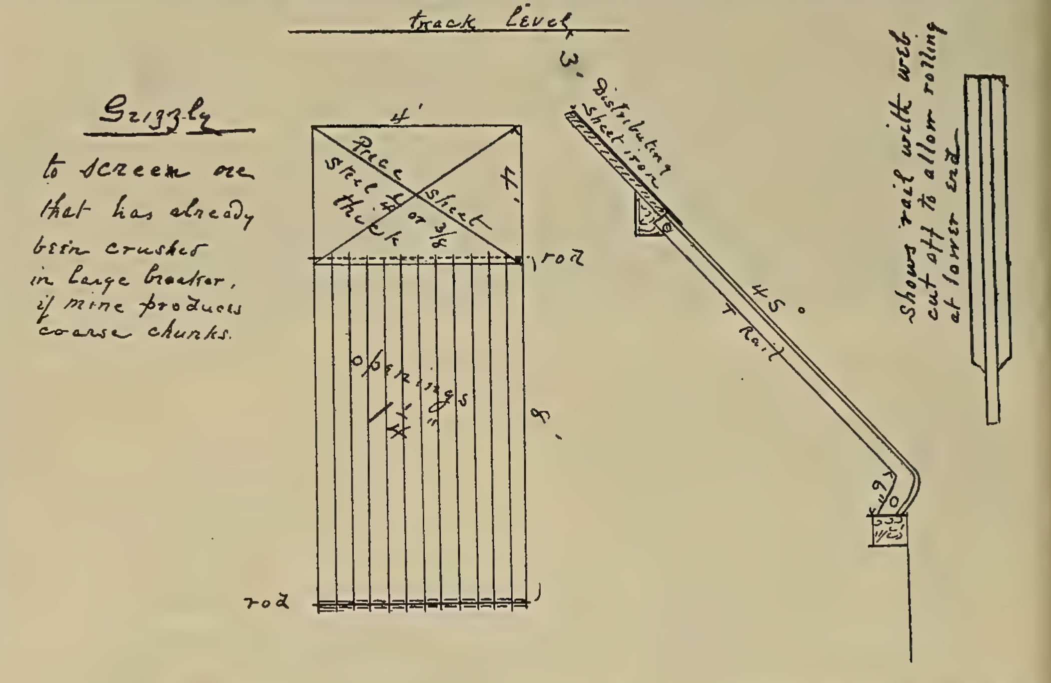

track level
Grizzly
to screen ore that has already been crushed in large breaker, if mine produces coarse chunks.
4'
Piece
sheet
steel
¼ or 3/8
thick
4'
rod
openings
1½"
8'
rod
3' distributing sheet iron
45°
T Rail
90
Shows rail with web cut off to allow rolling at lower end

Fig 5

MINING AND SCIENTIFIC PRESS.

The lip plates are never softened with quicksilver, but are every morning brushed off, or rather scrubbed off with the broom to clean out the sulphurets. The lips will stand a good stiff brushing daily.

At 4 o'clock P. M. and at midnight my plates are again rubbed up, but no amalgam is taken off at these times. It therefore takes only a few moments for these two rubbings. I find that my running time on a 20-stamp mill is twenty-three hours daily because of this careful plate treatment.

There are never any globules of free quicksilver on the plates, top or bottom. If the ore is lean, we feed less in the battery and the rubbing up is so carefully done that it never leaves drops of quicksilver on the plates.

The quicksilver fed is weighed at every shift in troy ounces and a daily record kept. I never weigh out an allowance to my millmen. They know what is expected and careless work reveals itself immediately on a plate. At clean-up there should be little or no free quicksilver in the mortars around the dies.

Battery water at 55° Fahr. will give good results. It is essential not to have sudden changes. I never saw a reliable mechanical heater. Perhaps, where oil is cheap, the incubator racket would work.

I rely upon keeping the plate room warm because I am afraid of the sloughing off of amalgam, which inevitably follows a sudden rise of 20° to 30° of the water. I am still studying on the problem to keep the water uniformly at 65°.

AUTOMATIC SAMPLING.—The custom of sampling tailings with a dipper by hand every half hour, more or less, has but little to commend it.

It is to the owner's interest to know exactly what the tailings assay. It is to the millman's interest to keep the tailings low.

The hand sampler will soon learn how to sample judiciously from his point of view.

Nobody can coach an automatic sampler driven by machinery.

It is absurd to take off the sample by hand from the tail of the vanner.

There are several kinds of excellent automatic samplers in use which I will not take the time to describe. However the sample be taken, it should be evaporated to dryness for the assayer. Do not pour off the clear water; you may use a siphon.

CLEAN-UP APPARATUS. — To clean up I use: A wooden trough 5x2x2 feet; a man with the hoe; a '49 rocker 4 feet long by 16 inches wide; a clean-up board 5 feet long by 12 inches wide, with 3-inch side rails, covered with a silvered plate; a buck and a wedgewood mortar; a small iron screen ⅛-inch mesh.

Into the trough throw all the mortar dirt; sprinkle freely with quicksilver; turn in boiling hot water; then hoe the mass about thoroughly with hoe and strong four-tined rake so as to break up all lumps. The dirt is then rocked out and the resultant amalgam, iron scraps and fine sands dumped upon the clean-up board and the sand washed out with a hose stream. The iron is taken out by magnet. Grind the amalgam a few minutes in the buck mortar; rewash on the board, giving a final bath of quicksilver in a wedgewood mortar to skim off the dross. To make sure there are no lumps or bits of iron, copper or brass, strain through the ⅛-inch screen and regrind the lumps.

I venture the assertion that by this process two men will in two hours clean up a 20-stamp mill and leave not over $50 in the sands.

These sands are, of course, put back in the batteries at the following run.

I would clean up a 100 or a 500-stamp mill by the same process, except that the mixing would be done by what the macadamizing men call a "rattler" or revolving trommel. Rattler and rocker to be driven by power.

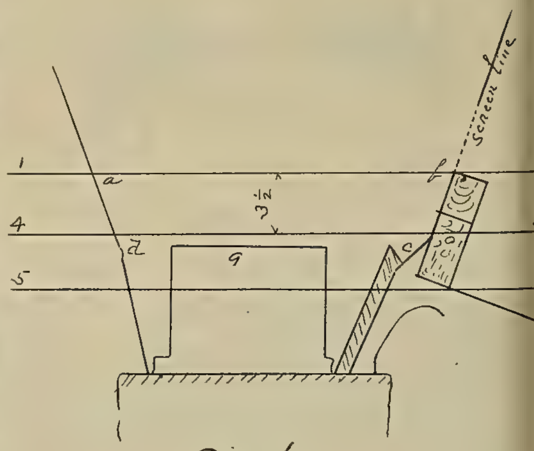


Fig. 6

Clean-up barrels and pans flour quicksilver and thereby entail unnecessary losses of gold.

The clean-up room should have a cement floor. All wash water should pass into settling boxes or tanks.

CONCENTRATORS. — Concentration is too broad a question to be discussed here; so much depends upon the characteristics of the metals and the gangues.

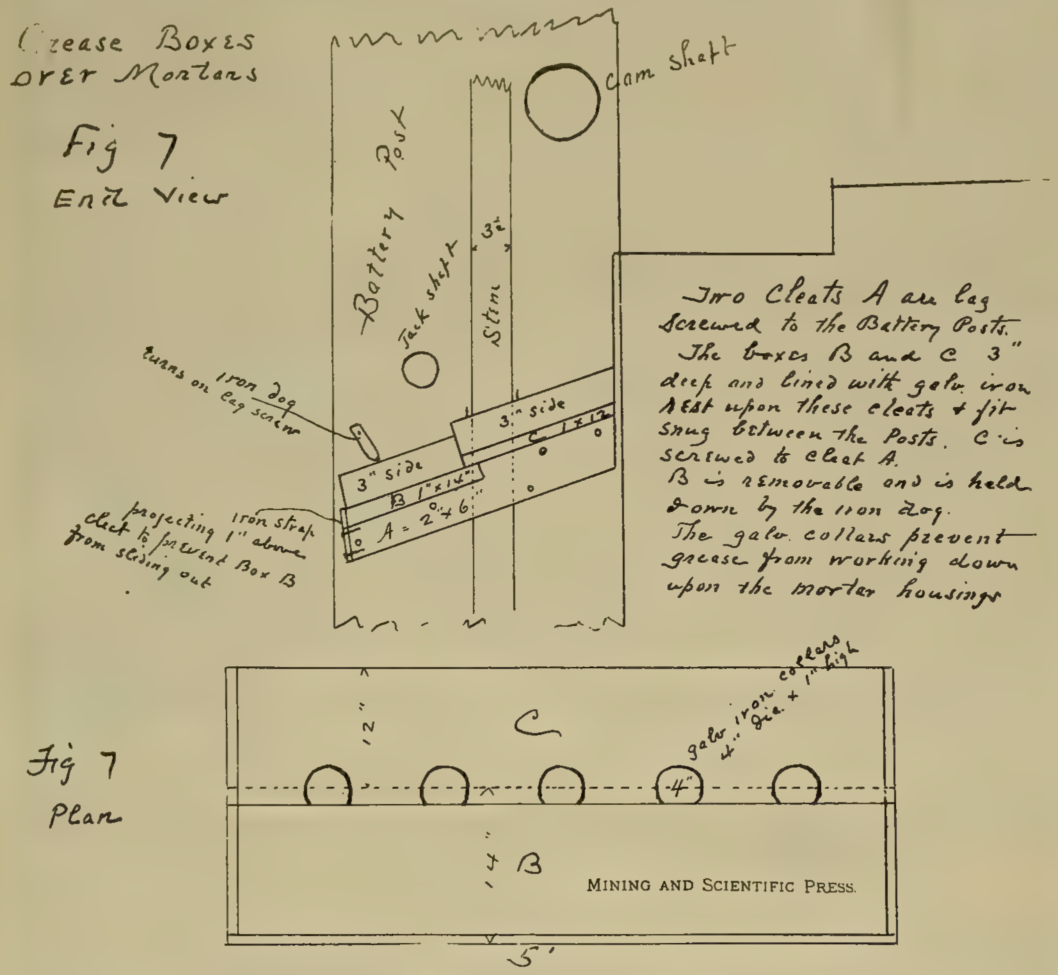
In too many mills the crew is inadequate, so that both batteries and vanners suffer alternately, as the solitary millman trots up and down stairs vainly attempting to straddle too much job. I never saw a dozen belt vanners in any mill all working right for over five minutes at a time. This may sound like an exaggeration or a confession of bad luck; in point of fact, it is merely naked truth.

For the average gold mill the concentrator question may be summed up in the rough about thus: Buy one that is not over-sensitive; there is a wide difference in this respect between the various belt vanners; don't pay much heed to the advertised competitive tests.

It is because of their extreme sensitiveness to variance of load or water that I am disposed to think that the reign of the belt vanner is about over.

What is wanted is a machine with some common sense—one that won't kick and go awry at every little variance of pulp.

The belt vanner is about as helpless as an infant; it seems to require some experienced old hen camped alongside it all the time. That's the way the makers conduct their misleading competitive tests. The trouble is there is not much time for the nursery business about a stamp mill.


Grease Boxes over Mortars
Fig 7
End View
Battery Post
Jack shaft
Stem
Cam shaft
3½
turns on iron dog lag screw
3" side
3" side
B 1"×14"
C 1"×12
A = 2"×6"
projecting iron strap cleat to prevent Box B from sliding out 1" above
Fig 7
Plan
C
12"
galv. iron collars 1" high + 4" dia.
4"
B
5'
MINING AND SCIENTIFIC PRESS.

Two Cleats A are lag screwed to the Battery Posts. The boxes B and C 3" deep and lined with galv. iron rest upon these cleats + fit snug between the Posts. C is screwed to cleat A. B is removable and is held down by the iron dog. The galv. collars prevent grease from working down upon the morter housings

The Wilfley concentrator requires a heavy load to do effective work—twenty to forty tons. Consequently, there would seem to be no room for it in a 5-stamp mill. Possibly a smaller table would scale down to, say, a 10-ton load. Manifestly, any concentrator with so wide a range as twenty to forty tons will not be going wrong every five minutes.

It is worthy investigation, and it is idle to object that it has no belt.

COSTS.—To close with some details of cost per ton in 20-stamp mill—based upon a year's average—16,000 tons:

Freight, $1.10 per cwt. from San Francisco.

Wages: Amalgamators, $3.50; rock-breaker men, $3.

Water power: Rock breakers	.0102
Water power: Batteries	.0884
Labor, all, including repairs	.2862
Shoes, dies, mortar liners	.0721
Oil: Light and lubricating	.0131
Replating	.0100
Sundries	.0024
Firewood (4600 feet altitude)	.0081
Rockbreaker jaws, tappets, bosses, extras.	.0130
Quicksilver loss, .145 troy ounce per ton...	.0052
Total per ton crushed	.5087

Quicksilver loss includes the mechanical losses from retorting, cleaning up, etc. Nothing phenomenal, you note. It is, however, authentic. The tailings ran from 5 cents to 20 cents. The ore at the monthly clean-ups ran from $4.75 to $10.25 per ton.

RECAPITULATION.—To recapitulate; my argument runs in about this wise:

Use a stamp mill because the sons of Adam have not as yet invented a better machine for the purpose in hand.

Use a heavy stamp because it won't waste time and can be run slow enough to save wear and yet fast enough to churn and therefore amalgamate.

Have large shoe and die areas, so as to embrace plenty of rock at every blow.

Crush and also amalgamate, the limit of your crushing to be taught by the tailings assays.

Extract all the practically recoverable gold. If more stamps are needed, build them.

The speed and drop suitable can only be determined by assaying tailings.

Catch the gold close to the die.

Renounce chock blocks.

Don't slime by too fine crushing.

Beware of too much water.

Don't crowd the plate with too much pulp.

Have the plate sticky and pasty with amalgam, and never dripping with quicksilver.

Use a broad, steep plate and hang up when rubbing up; note the use of the word rub, not wipe. Put elbow grease, and none other, on the plates.

Don't be parsimonious about replating.

Sample automatically.

Battery water temperature not below 50° Fahr.; better keep it at 65°.

Have a good mine; do these things and the great god of battle, with whom every man must reckon, will be with you.

Joshua Hendy Machine Works, San Francisco.

Few of our readers to whom the advertisements of the Joshua Hendy Machine works are familiar realize the prominence of this well known institution, ranking as it does among the largest of manufacturers of mining machinery in the West.

Years ago it became apparent to the Hendys that the larger foundries and machine shops would be compelled to leave the old district south of Market street, San Francisco, where all the pioneer foundries were located, and in their judgment they properly established a nucleus for their growing business by locating on the block bounded by Kearny, Bay, Francisco and Dupont streets, San Francisco, and opposite the sea wall.

The Hendys, having been identified with the mining industry over forty years, and having by their own efforts created a demand for their machinery, it naturally follows that their plant has reached the large proportions shown in the illustration on the front page in order to facilitate the execution of increasing orders in their various lines. The recent purchase of adjacent property will enable them to erect additional buildings and materially aid them in keeping up with the times in furnishing modern mining machinery. Their San Francisco city office is 38–44 Fremont street.

Weber Gasoline Engine Works.

On the front page of this issue appears an illustration of the main office and works of the Weber Gas & Gasoline Engine Company of Kansas City, Mo., a company closely identified with the development of the gasoline engine as applied to mining equipments, hoists and pumping outfits, turning out gasoline engines for all purposes from 1 H. P. to 100 H. P. capacity, the new plant illustrated covering a ground space of 300,000 square feet. The new factory site covers two entire city blocks, on which is built a single-story factory of stone and steel throughout, making it entirely fireproof. It is divided into five main departments devoted to gasoline engines and hoists, electric lighting engines, marine engines and automobile engines. Each department is equipped with electric cranes, by which heavy castings are handled conveniently. The power for operating these cranes is supplied by an electric plant driven by gasoline engines. Gasoline engines are used throughout the factory, separate plants being installed for the several departments, the company being thus enabled to present a practical demonstration of one of the most important advantages to be derived from the use of this class of motors. Gasoline engines are placed at convenient points and supply the power for operating machinery and tools in the different departments. The records of the company show that this is an economical arrangement.

"The Light of Genius."

TO THE EDITOR:—C. M. Fassett has an article in the issue of Oct. 20th on "The Selection of a Working Process," which is so good and sensible throughout that one is surprised to find in it a piece of advice fraught with gravest danger to the inexperienced, for whose benefit the article was evidently written. I refer to the following: "Send part of your ore to the smelters, and to any crazy scientist who, you may hear, is working on a new process. Take time to let them all have a trial at it, and remember that as no two ores are alike yours may be just the ore that is adapted to some embryotic method that will treat it succesfully. When they have solved the problem the world sees the dazzling light of genius in their eyes."

It is hardly necessary to point out that "crazy scientist" is a contradiction of terms; every mining man knows the class to whom the epithet is applied. One could hardly throw a club in the streets of San Francisco without hitting the inventor of, or the investor in, a machine or scheme that was to "revolutionize the mining industry;" yet the mining industry has never been revolutionized. Its wonderful progress has been the result of evolution, never of revolution. Mining men are constantly looking for improved methods, and finding them, too, but not in the workshops of the "crazy scientists." To advise the inexperienced mining man, in search of a process for treating his ore, to consult a "crazy scientist," or, in other terms, impracticable theorist, is to advise him to commit hari-kari.

The experienced mining man knows him by sight, or, at least, by sound; but the inexperienced is too likely to mistake the glare of insanity for the "light of genius," and present himself, a living sacrifice or a burnt offering, on the altar of "embryotic methods." With a less stretch of imagination than these theorists are generally endowed, one might almost play hop-skip-and-jump from Montana to Mexico, on the tops of smoke (less) stacks erected by "the light of genius," and abandoned by the light of experience.

There is no reasonable excuse in these days for a mine owner to make a vital mistake in selecting a method to treat his ore. If he has ore of the required formula, q × q = p (quantity × quality = profit), he can learn how to treat it successfully by consulting one or more of the great mining machinery manufacturers whose names are familiar in mining circles all over the world. And if some of these gentlemen can not advise him, even to the point of a guarantee, how to treat his ore properly, the sooner he quits that particular mine the better.

When his reduction works are completed after plans approved by experience; when the time of Irish dividends has passed; when his proposition is on velvet, and he has money for foreign missions, it will be soon enough to monkey with "the light of genius."

F. N. F.

Without assuming to speak for Mr. Fassett, who is at present in Corea, it is probable that the words "crazy scientist" in his article are not taken as a belief that the scientist is "crazy," nor are they to be assumed as suggesting that it would be good business to send part of the ore to any one who is "crazy," be he scientist or otherwise. Probably Mr. Fassett intended ironical allusion to the belief still prevalent in some quarters that men who are experimenting with ores and metallurgical processes are "crazy" in their aims and intents, while in reality they are, ofttimes, avant couriers of new metallurgical discoveries. The context of the article would seem to indicate that such was his intent, and that in that way he meant to convey brief censure on the too oft used notion that because a man in an assay office or a laboratory does not produce immediately profitable results, he must be "crazy" in his experiments and embryo processes. Probably men not knowing any better who first saw the pioneers in the cyanide process in their crude experimental work, considered them "crazy scientists," but it is from the work of such "crazy scientists" as these that much of the present mining and scientific progress is due.

Regarding the last sentence that our correspondent quotes from Mr. Fassett's article, it would appear to us that that sentence is merely another way of saying in a semi-sarcastic manner that success is the criterion of merit; that results determine what place a man shall occupy in the esteem of his fellows; and that the obscure light in which the "crazy scientist" of to-day may be working, in the event of his success may develop into a halo of light, irridating and surrounding him as a genius, when success is made manifest. The diver, as he poses to plunge, may be a pauper, but, as he emerges from the depths with a pearl, may be possessed of the wealth of a prince. And so with the scientist, the inventor, or the theorist, who, if his science, invention or theory is based upon fact, may emerge from the shadow of universal disbelief to the splendor of noon-day success, and be hailed as a "genius," because successful, yet not the less a genius before.

It is believed that from this point of view Mr. Fassett's remarks are not wholly open to the interpretation of our correspondent, though from his standpoint and construction of the meaning of the article to which he refers his position is eminently correct. The latter is certainly right in the statement that there are a great many men who never get beyond the "crazy" stage in mining and metallurgical processes, but that is because their conceptions or theories were never susceptible of successful demonstration.

There is a wholesome conclusion to be derived from our correspondent's suggestions, namely: that it were better for mine owners and operators to let others do the experimenting; to disregard anything that has not been proved to be good; and to profit by wise observation rather than costly experience.

Pyritic Smelting in the Black Hills.*

NUMBER III.

The slag and matte at Deadwood run together from the end of the furnace into a forehearth, either 3x5 or 4x4 feet in size, and 2 feet deep, where the matte settles in the bottom, while the slag overflows into large slag trucks. This forehearth is upon wheels high enough to run a matte pot under its tap hole. As fast as the matte accumulates, it is tapped from the bottom of the hearth into a pot. The forehearth is lost, usually by the accumulation of metallic iron or "sow," that raises the bottom above the tap hole. These forehearth sows are identical in composition with those formed in the interior of the furnace, and are treated in the same manner as the furnace sows. Owing to their small size, they offer no difficulty in the way of handling or breaking up. They usually weigh from 800 to 1000 pounds.

It was my theory that this metallic iron helped to clean the slags, and I did not really care to overcome its formation; but others have tried to do so. It was my theory that if the gold were not recovered in the sows, it would be lost in the slags; and here is, in my opinion, the solution of the question of clean slags in the use of iron pyrites free from copper.

The Deadwood iron matte was never a pure monosulphide, but a subsulphide carrying metallic iron, some of which could be separated as "metallics" by grinding and sifting. Traces of copper existed, while the matte always carried silver and arsenic. The traces of copper, silver and arsenic would, of couse, take it out of the experiments of Dr. Pearce, to which reference is above made; but to my mind it was the metallic iron which cleaned the slags.

In a discussion of this question before the Colorado Scientific Society, it was remarked that if Dr. Carpenter would add more pyrite, he would avoid sows. It is a question whether, with our slags, this would be the case. At Kongsberg, where pyrite is added to the smelting as we added it at Deadwood, Samuelson found that an increase in pyrite meant an increase in the metallic iron so reduced. This was our experience at Deadwood. The formation of sows could be lessened, however, by cutting down the amount of coke used, and thus lessening the reducing action of the furnace. As this invariably meant an increase in the amount of gold lost in the slags, I aimed always to make some "sow."

Before it was possible to obtain copper it was Mr. Knutzen's idea that it paid to add waste metallic iron to the charge, purposely, to make sure of the presence of metallic iron in the furnace.

I believe that a process for smelting the Siberian black sands, so that the gold might be recovered in metallic iron, was once proposed. From our experience at Deadwood, I have not the least doubt that it would have been successful. Even after we obtained the copper ores from Butte, the amount of "sow" was in no way diminished. At Mansfield it has been found impossible to prevent the formation of these sows, although there they serve no possible purpose unless it be to collect the small traces of nickel and cobalt in the ores. As the pyrrhotite was not known to be nickeliferous, I often intended to have our "sows" tested for nickel, but never did so.

The percentage of matte made at Deadwood is very low, seldom exceeding 5% of the weight of the charge, and formerly sometimes fell to 2% or 3%; and here I wish to note a peculiar experience. Before the use of copper we could not always control the percentage of matte to be made. Sometimes almost the whole of the iron would go into the slags, and no matte would be made. At such times one would expect that the slags would carry the whole of the gold, but such was not the case. They were not noticeably more foul than at other times. I note one run of eighteen hours without matte, while it was common for hours to pass with little or no matte appearing. "Sow" was doubtless formed, but, if so, it remained in the furnace, and with it the gold.

In the Altai mountains, where pyritic smelting is practiced (I use the term "pyritic smelting" always in the sense in which Percy first used it), the matte frequently falls to 2% or 3%. We found the matte, however, much richer than usual, and I have made iron matte at such times exceeding twenty-five ounces of gold per ton. I am strongly of the opinion that, if the reduction of iron can be controlled in this form of smelting gold ores, copper may be disregarded, especially when it is handled at a great loss, as at Deadwood.

Many persons have supposed that these high-silica slags are made only at a high formation temperature. Prof. Hofman, in a most valuable paper, has recently investigated the temperatures at which certain silicates are formed. In one series he gives the result of the addition of silica the ordinary slag of the lead smelter. He adds silica by regular steps, and plats the result in a curve. The formation point from 0.5 to 1.25 silicate degrees shows hardly any variation. The slags are formed at about 1180° C. The formation temperature then falls off rather rapidly until the bisilicate (2) is reached, and then less rapidly to a point half way between the 2½ and the trisilicate (3). After the trisilicate, which is formed at a much lower temperature than the monosilicate, the curve rises very rapidly. At the basic end, however, the slags, he says, are very fluid, and melt down very rapidly, while toward the acid end they melt down rather slowly and are far from fluid, notwithstanding their low formation temperature.

(TO BE CONTINUED.)

---

*F. R. Carpenter, August Meeting, 1900, Transactions A. I. M. E.

Oil and Gas Yielding Formations of California.

NUMBER II.

The official State bulletin shortly to appear will contain much of value to California oil men. In it W. H. Watts says:

The oldest rocks exposed in the Sunset oil district consist of sandstone, calcareo-siliceous rocks and impure limestone, dark-colored shales, massive light-colored shales—showing a hackly fracture—strata of sandstone with rounded concretions, calcareous sandstone, and fine calcareous conglomerate. The exposures of formation are scarce, and the few that exist show great geological disturbance. Within short distances the strata frequently dip in opposite directions and at different angles of inclination; the prevailing dip, however, appears to be northeasterly. This formation yields springs of sulphuretted brines, and in one place a small quantity of greenish oil accompanies the brine, but no calareous tufa nor any solid bituminous deposit is formed. No fossils were found in these strata. The most characteristic features of this formation are the dark-colored argillaceous shales, and the sandstone containing rounded concretions. The stratigraphical position and the physical character of this formation warrant the assumption that it belongs to the same geological horizon as do the Eocene shales and sandstones underlying the light-colored siliceous shales in the oil district 9 miles north of Coalinga, in Fresno county. Overlying the formations, which we may tentatively class as Eocene, in the Sunset district is a formation composed mainly of light-colored siliceous shales and constituting the first tier of foothills. These shales are for the most part of a brownish color when first mined, but they become almost white under the action of the atmosphere; indeed, the outcroppings of this rock are white or light-colored for several feet beneath the surface. In places the bleaching of these shales can be traced directly to the action of sulphuretted vapor.

The light-colored siliceous shale is by far the most characteristic rock of the bituminous formations. Much of it is of low specific gravity and porous, sticking readily to the tongue, and is easily scratched. Some of it, however, especially in the lower portion of the formation, is indurated, apparently by the infiltration of siliceous water. Occasionally pieces of this shale are found which show siliceous induration only in the outer portions of the laminæ of which it is composed; a cross-fracture reveals soft, light-colored shale within.

The chemical composition of these shales is as interesting as their physical appearance, the characteristic feature being the large amount of silica they contain. Two specimens from the Sunset oil district were examined which showed as follows:

	Insoluble in acid.	Silica soluble in sodium carbonate.	Total amount of silica.
	%	%	%
(a)....	99	12	98
(b)....	92	24	89

The light-colored shales are much less disturbed than the formation on which they rest. The prevailing direction of the dip of the light-colored shales in the Sunset oil district is N. 30° E., and the angle of inclination is in some places as low as 20°, while in others it is as high as 80°. Although the southern limit of the light-colored shale in the district is tolerably well defined, it is not unlikely that in some places, where this shale has escaped erosion, it may extend a long way up the northeastern slope of the coast ranges. In one instance a well was dug at an altitude of nearly 3000 feet, in which light-colored shales, similar in appearance to those found in the lower foothills, were penetrated.

Investigations in various parts of the Coast Range warrant the classification of these shales as Lower Neocene (Miocene). There is reason to believe that they rest non-conformably on the underlying rocks.

Numerous seepages of heavy petroleum exude from these shales, forming beds of asphaltum, which, in some places, before these deposits were mined by Messrs. Jewett & Blodgett, extended over an area of several acres. This asphaltum, much of which remains, is principally black, pitch-like bitumen, varying from solid to viscous; some of it is of a yellowish brown color; it is of different degrees of purity and exists not only in beds and mounds, but was found by excavation to extend beneath the superficial drift. In some of these beds the bones of animals, stone mortars and other Indian relics were found beneath 4 or 5 feet of asphaltum.

In several places springs of brine and sulphuretted water issue from the light-colored shales.

Near Coalinga, in Fresno county, the writer found evidence of this formation resting non-conformably on the light-colored shales, and in some places it contained fragments of shale, apparently similar to the light-colored siliceous shales previously mentioned. At the Sunset oil wells and in the Coalinga district oil sands are found in the lower beds of this formation.

The record of a well drilled in S. 28, T. 11 N., R. 25 W., S. B. M., is as follows. This well was commenced with a 11½-inch casing:

	Feet.
Sulphur and apparently tufa deposited by mineral water to	45
Very hard gray and blue limestone to	80
(At a depth of 58 feet there was a little oil and mineral water.)	
Gray sandstone, with soft streaks and more mineral water, to	160
(At this depth the casing was reduced to 8⅝ ins.)	
Soft blue sandstone, with hard shells and more water, to	402
(At this depth the casing was reduced to 6⅝ ins.)	
Blue sandstone to	420
(At this depth the water was shut off.)	
Coarse sandstone, with oil and water and much gas, to	440
Light-blue sand to	445
Sand, with water, to	820

This well was cased from the depth of 420 feet to that of 820 feet with 5-inch casing. Supt. Youle states that this well was tested, and that about 100 barrels of brine and 6 barrels of oil were pumped from it daily for three months. It also furnished enough gas for a cook stove.

(TO BE CONTINUED.)

Packing Mining Machinery for Export.

On the front page is an illustration of six cases containing mining machinery and parts at the shops of the Gates Iron Works, Chicago, packed for shipment to Johannesburg, South Africa. The illustration, specially made for this paper, is of interest; the strength, security and marking will be noticed. P. W. Gates, in American Trade, says the picture shows fairly well the system and way of marking. "Every package of every consignment is numbered, and the gross and net weights, as well as the outside dimensions of the package, are given plainly on surface of box, and we usually try to put on such a surface as will be below the general or outside dimensions of the box, so that there shall be as little chance as possible of this marking being erased. We would call attention to the tin marking tag which is nailed to each box in a recess cut out below the general surface of the package. On all foreign shipments we use this form of marking; the letters on this tin tag are stamped into the tin, and consequently will remain there as long as the body of the tag lasts. In figures in the upper left-hand corner are the day and the number of the month corresponding with the date of the order, and this is done for the purpose of identifying the consignment, so that the agent or purchaser, even though he may have several consignments in his warehouse, and among these several consignments several boxes marked No. 6, or any other number, will know, by consulting this date mark in the upper left-hand corner of the tag, to which consignment this numbered package belongs."

MINING SUMMARY.

ALASKA.

Coal is reported found in Kasaan Bay, Prince of Wales Island.

Galena is said to have been found on the west side of Prince of Wales Island, assaying ten ounces silver to the ton.

Statuary marble is found on the island of Koscirishko, 2 miles square, at northern end of Prince of Wales Island.

The Kasaan Bay M. Co. has men at work on the Copper Queen and other properties on Kasaan Bay.

Swift & Co. of Chicago will probably put in a mill, water power plant and wire-rope tramway on their Cracker Jack group, Prince of Wales Island.

F. Anderson of Boston, Mass., will put men at work on six claims on Prince of Wales Island which he recently bought from R. Allison.

ARIZONA.

COCHISE COUNTY.

The Bisbee West Copper M. Co. will work property near the Copper Queen, Bisbee.

The Copper Crown of Arizona M. Co., operating property near the Dragoons, are taking out ore from the Copper Chief, and will sink a shaft on the same.

W. H. Pomeroy projects a cyanide plant at the old Grand Central mill, Fairbanks, to treat the tailings from same.

The Middlemarch Copper Co., at Middlemarch, will increase the capacity of its plant by the addition of new machinery. There are thirty men employed at present.

GRAHAM COUNTY.

W. Climo, Supt. Shannon M. Co., Clifton, reports 1000 feet of development work being done monthly.

MOJAVE COUNTY.

The 300-ton concentrator at the Tennessee, Chloride, is nearing completion. The shaft will be sunk 100 feet deeper.

C. Gracey has twenty-five men at work near El Dorado canyon on a new 25-stamp mill.

Bodegee, Spanoble & Smith are reported to have made a strike on the old Blaine, and to be taking out a ton of ore per day.

The shaft at the Occidental, now down 700 feet, will be continued to the 1000-foot level.

J. A. Halsey is shipping ore from the White Hills.

PINAL COUNTY.

The Chapin C. M. & S. Co. has bought the Grand View group (copper), 18 miles northwest of Tucson. Men will be put on and work pushed. A smelting plant may be put in.

The Milwaukee & Arizona M. Co., the Chief M. & S. Co. and the Casa Grande M. Co. are pushing work on their properties in Quijotoa district, near Casa Grande.

YAVAPAI COUNTY.

Ore from the New Year's Gift, near Prescott, runs $4 gold to the ton, and costs 30 cents per ton to mine. G. Rohpeter of Prescott owner.

The Verde King Copper Co. is pushing work on its property south of Jerome. Day and night shifts are working on the tunnel.

Owing to delay in the arrival of new hoisting machinery, work on the main shaft of the Decatur, Jerome, is delayed. A strike is reported made.

Good copper ore is opened up on the 60-foot level of the Crain mines, near Mayer.

W. J. Martin, Supt. Eclipse group, in Cherry Creek district, near Cherry, is pushing work.

At the Cash, near Senator, the shaft is down 315 feet. A 500-foot drift has been run on the 100-foot level. Drifts will also be run on the 200 and 300-foot levels; Supt., H. Blauvelt.

Ore from the north shoot of the First Home, Big Bug, carries gold, silver and lead, while that from the south shoot carries gold mainly, with but little silver and lead; Block & Gray owners.

The Blue Dick M. Co., of Cleveland, O., operating the Blue Dick and other mines in Hassayampa district, will put in a smelter on the properties.

The Cypress shaft is down 195 feet. A vein 2½ feet wide opened up at this depth.

A 10-stamp mill will be put in on the White Horse group, on Lynx creek. Men will be put on and work will be pushed.

According to a Boston paper, W. A. Clark has a proposition from the Amalgamated Copper Co.: "End this Montana warfare and we will buy of you your United Verde mine. We will give you $55,000,000 for it—one-half to be in cash and the other half in Amalgamated stock, you to devote your time in the future to that company, taking the position of president." The Boston papers assert that Mr. Clark accepted the proposition, and that, on the perfection of details and the passing of final papers, formal announcement will be made.

YUMA COUNTY.

F. Guerra has twelve men working on a group of claims in Picacho district. It is locally reported that Senator Jones of Nevada and S. Jones and H. T. Graham of New York are interested in the group, and that they will put in a 100-stamp mill.

A strike is reported in the King of Arizona district.

The Empire Copper Co., operating in Empire Flat district, project the erection of a smelter.

The Arizona Giant Copper Co., operating near Ehrenburg, are down 114 feet on the Self Defense group.

CALIFORNIA.

AMADOR COUNTY.

Repairing the Zeile, Jackson, shaft is in progress and most of the men underground have been laid off.

A strike is made at the Mutual, near Amador.

Supt. W. A. Prichard is pushing work on the Keystone and has opened up good ore on the 600-foot level. Crosscutting is in progress on the 900-foot level.

Work at the Defender is suspended indefinitely.

The new machinery at the Kirkwood is in and operations will begin Dec. 1st.

BUTTE COUNTY.

P. R. Welch proposes to tunnel under Welch hill, near Oroville, and expects to reach bedrock in a distance of 40 rods. He will use a large pump operated by electric power to keep the mine clear of water.

CALAVERAS COUNTY.

Fourteen men are working at the Demarest, near Fourth Crossing, cleaning out the shaft and extending the 300-foot level.

Sinking is in progress at the Ghost. The shaft is down 1400 feet.

Work is progressing at the Tulloch and Ophir mines.

INYO COUNTY.

Ashford & Inman have bonded the Emily Enid and Bonanza Jim mines, near Bishop.

KERN COUNTY.

The Jewett–Blodgett–Beal Co., Bakersfield, is putting up a rig on No. 2 well.

No. 1 well of the Lion Oil Co., Bakersfield, is producing sixty barrels of oil per day. A 1000-barrel storage tank is going in. A 3-inch pumping plant is also going in.

The Sunset P. & R. Co.'s No. 1 is reported flowing thirty barrels of oil per day.

The Toltec Co. has put in a rig on No. 1 well, Section 30–28–28.

LOS ANGELES COUNTY.

The Reliance Oil Co. has resumed drilling on its property on Welcome street, Los Angeles.

At Whittier the Whittier Grande Oil Co. has a new rig in and drilling will be pushed.

MARIPOSA COUNTY.

(Special Correspondence).—At the Mary Harrison mine the main shaft is now below the 900 level, and a connection on this level has been made with the winze, which is being sunk in the ore body.

Coulterville, Nov. 25.

If the ore shoot continues for the remaining 300 feet, the local management considers that it will be justified in moving the 40-stamp mill up to the mine, preparatory to resumption of gold output.

MONO COUNTY.

The Crystal Lake M. Co., the new owners of the old Lakeview & Jackson mining property, a Colorado company, are putting up an extensive milling plant on the property, near Lundy.

In the Standard Con. mine, at Bodie, for the week ending Nov. 17th, 400 tons of ore were crushed. Average assay vanner tailings, $6.50; concentrates produced, 1.17 tons; assay value, $70.71; amalgam produced, 1246 ounces; value per ounce, $3.09.

PLACER COUNTY.

The Blue Lead, Dutch Flat, only has four men working, and when the mine is opened up more will be put on.

SAN DIEGO COUNTY.

A rig will be put in on the Eummelen ranch, near Lakeside, and drilling for oil begun.

The well on the La Jolla, La Jolla, is down 160 feet.

At the Victoria, near Encinitas, drilling is being pushed.

SHASTA COUNTY.

New York reports curb trading in the stock of the Old Colony G. M. Co. last week of 1000 shares.

SISKIYOU COUNTY.

Supt. W. T. Shurtleff of the North Star, Humbug district, is pushing work. The mill is running steadily.

The old Spencer may be reopened.

Sixty men are employed at the Jillson and mill is running steadily; monthly yields average $17,000.

The La Flesh, now equipped with a 3-stamp mill, may put in a larger plant.

Manager F. Beaudrey has 150 men working on flumes, laying pipe, etc., at the Wild Cat group (hydraulic), near Callahan, and mining operations will probably begin by January.

TULARE COUNTY.

The Minnie Ellen mine, Deer Creek, has closed down on account of being filled with water.

TUOLUMNE COUNTY.

Treasurer Howard of the Pioneer G. M. Co. states that the assessment of 20 cents per share has been paid on 93,681 shares out of a total of 100,000. The stockholders who have paid their assessments have subscribed for a total of 352,492 shares of stock assessment unpaid, and there is a balance of 6319 shares. The new certificates will be ready next month.

A good body of ore is opened up on 30-foot level of the Standard, Sonora.

W. H. Barron is pushing work on a double-compartment shaft at the Parole, near Soulsbyville.

A strike is made at the Golden West, Sonora. A new 10-stamp mill is going in and a 1000-foot double-compartment shaft will be started soon.

At the Draper sixteen men are employed. New pumps are in and sinking is in progress. A mill is going in. A new mill is also going in on the Starr King, operated by same company.

Good ore is opened up on the Independence, near Sonora.

At the Draper, Carters, buildings are nearing completion. Machinery is going in and the mine will soon start up.

It is reported that the old Soulsby, Soulsbyville, may soon be reopened.

VENTURA COUNTY.

The Searchlight Oil Co., on Section 35-5–20, is putting in a rig in Sespe canyon.

The Sespe Canyon Oil Co. will put in a standard rig.

Owing to delay in arrival of tools, etc., the Crawford wells, in Section 35–5–20. are temporarily closed down.

COLORADO.

BOULDER COUNTY.

A mill may be erected on the Superior mines, near Wark: Manager Olympius.

Crosscutting is progressing on the Ward-Rose.

On the Golden Eagle two tunnels are in 800 feet. Ore from a recent shipment ran 1.64 ounces per ton.

Conger, Wannamaker & Co., Nederland, recently shipped sixteen tons high-grade tungsten concentrates.

Supt. W. J. Barrett reports a strike of mineral resembling tellurium associated with gray copper in the Grass Mountain tunnel.

C. W. Caryl of Wall Street recently had an assay made of ore from the Gladys which returned 1.37 ounces gold to the ton.

Two samples taken from the 14-foot level on the Tornado yielded respectively $14 and $25 per ton in gold.

A strike of free-gold tellurium is reported made on the 300-foot level of the Lucky Star, at Wall Street.

A 100-foot shaft will be sunk on the John Jay, Ward.

Sinking is in progress at the Superior.

A shaft house is going up at the Milwaukee Extension, or Emma Daniels.

On the B. & M. 300-foot tunnels are run on the 700 and 800-foot levels.

The Big Five has resumed, after a temporary shut down for repairs and machinery. Supt. J. J. Willis has two nine-hour shifts working.

CLEAR CREEK COUNTY.

(Special Correspondence). — The Gold Fissure G. M. Co. have just completed a shaft house 28x60 feet in size and installed a 60 H. P. boiler and steam hoist capable of operating to 1000 feet depth. The shaft has reached 140 feet depth and sinking will continue to perhaps 200 feet, when a crosscut will be run to the vein, which has been opened on adjoining properties. Drifts will also be run from the shaft to parallel veins. The shaft is well timbered and is planked up.

The Empress Co., owners of the Gold Dirt, have this property opened by a 500-foot shaft, with drifts on the vein at various levels. Besides, they are driving a tunnel to cut the ore body at greater depth.

Misses Dillingham & Stewart are making a success of their Silver Mountain mine and now contemplate erecting a tram line to transport ore from the mine to their mill at the railroad, and they will increase their mill capacity.

Empire, Nov. 20.

E. Bondy has bought the Mayflower, on Democrat mountain, and the Empress Augusta, in Argentine district, near Georgetown.

DOLORES COUNTY.

H. L. Jones has leased several dumps at Leadville and he has put the old Rico mill in shape for zinc-lead concentration. Operations will soon begin.

Work on the Robinson group, in Floral gulch, is suspended for the winter.

Air connections in the Wellington tunnel, Rico, are made.

The Colorado M. & C. Co.'s plant at the mouth of the Group tunnel is running.

FREMONT COUNTY.

The Rocky Mountain smelter, Florence, will start up this month.

The Dorcas cyanide plant, Florence, 120x200 feet, with an elevation of 80 feet, is expected to be in full operation next month.

GILPIN COUNTY.

H. C. Eastman, manager Ontario, Central City, reports the shaft down 500 feet, and 1400 feet of drifting. A double-geared 1000-foot lift hoist, air compressor and Sullivan drills are in. Work is being pushed.

Four cars of ore from the Outonagon, on German mountain, were recently shipped to the Randolph mill, Black Hawk.

The Concrete G. M. Co. is putting in Leyner drills.

Owing to the scarcity of water, the Daisy 15-stamp slow-drop mill, Perigo, is closed down.

The shaft on the Scandia is down 550 feet. Sinking will be continued to the 800-foot level.

The Cashier G. M. & R. Co. has ceased sinking until it can establish stations at 500 feet in the Brooklyn, Lake district. The company is extending the 400-foot west level and is driving a crosscut south from this level.

Returns from twelve and one-half cords of ore treated at the 50-stamp mill of the Gilpin Mill Co., Black Hawk, from the East Boston gave thirty-two ounces gold per ton, besides twenty-five tons concentrates worth $30 per ton. The 300-foot level workings east of the main shaft are improving with development.

M. Stedman has a body of ore on the Sweet Home, Apex.

The West Notaway, Black Hawk, is shipping three cars concentrating ore weekly to Idaho Springs.

Hall & Trennery are down 50 feet on the I X L. The ore carries considerable iron.

Sinking on the National is in progress.

GUNNISON COUNTY.

(Special Correspondence).—The 48-inch round copper matte furnace of the Hoffman S. & R. Co. will soon be set up at Marble. It is designed to operate on the Carbonate and other groups of mines which are well opened in this district. On the Carbonate group about 10,000 tons of copper carbonate ores are exposed, which it is estimated will yield about 10% copper, with some silver.

Scott & Ogden of Aspen have a 2½-year lease on the Black Queen group, in the same locality, which is expected to produce a considerable tonnage of silver-gold-bearing ore for the Hoffman smelter.

Marble, Nov. 21.

The tunnel on the Gold Link group, in Gold Brick district, near Pitkin, is in 50 feet. A new track and a car are in, and buildings are going up.

On the Walter Wilson, in Italian basin, the shaft is down 150 feet.

R. McNeil is shipping lead ore from the Undine, near Marble.

HINSDALE COUNTY.

Smith & Gaines will push work on the Ajax and Moro claims, on Henson creek, near Capitol City, during the winter. Twelve men will be put on, and next spring they expect to put in a tramway and mill.

LAKE COUNTY.

(Special Correspondence).—J. S. Loder reports that the two additional Loder hot-blast furnaces being installed at pyritic smelter of the Boston Gold & Copper Reduction Co. will be in operation by Dec. 15th. There has been one furnace in operation for some time. The new ones are 36x140 inches on the interior. Four high-pressure boilers, 150 H. P. each, and a 500 H. P. Corliss engine are being put in, to bring the power up to the requirements.

Leadville, Nov. 24.

Operations are resumed at the No. 2 shaft of the Weldon, Leadville, recently burned.

Sinking is resumed at the A. V. shaft of the A. V. Co., near Harrison avenue, Leadville. A 10x10x16 water tank will go in.

Drifting is in progress on 500-foot level at the Valentine.

The Capitol hill shaft is down 200 feet.

Improvements to the Gold–Copper smelter are under way.

Ore from 700-foot level of the Sedalia, Leadville, recently gave forty ounces gold, fifteen ounces silver and 20% lead—about $32 per ton. A new electric lighting plant is going in; O. C. Bartholomew, manager.

Manager Guth is pushing work on the Banker, Leadville. Ore from the 800 level recently assayed eighty-two ounces gold, six ounces silver and 3% copper to the ton.

The Belle of Granite is producing from forty to fifty tons ore per day.

Manager Mamlock of the Doris expects to open up good ore bodies this winter.

The Resurrection shaft No. 2, now down 300 feet, will be sunk to the 1000-foot level. Drifting will begin at the 800-foot level. Ore bins with double tracks underneath have been put in.

Several projects are on foot at Leadville to inaugurate electric power at the mines near there.

LAS ANIMAS COUNTY.

The La Belle Coal Co., operating the La Belle, at La Belle, 6 miles from Trinidad, is shipping coal to Denver. The company is advertising for fifty coal miners.

The Prospect Coal Co., operating one-half mile from Trinidad, has 100 men working.

The mines of the Colorado Fuel & Iron Co., at Sapris, Starkville and Engleville are running full time; 4000 men are employed.

The Victor Fuel Co., at Hastings, Downing, Gray Creek, Chandler and Maitland has 3600 men employed.

The Colorado & Southern, it is said, will soon begin shipping coal to Galveston and New Orleans, and eventually to South America. The company will increase number of employes at Trinidad to 100.

OURAY COUNTY.

It is estimated that ores running from $12 to $15 per ton, after a reasonable wagon haul, can be treated at a profit by the new Home pyritic smelter at Ouray, which is expected to be blown in in latter part of December; W. West, manager.

The Silver Link (copper), near mouth of Poughkeepsie gulch, will put in a gasoline hoist. Shaft, now down 85 feet below tunnel level, will be sunk an additional 15 feet, at which level drifting will begin.

The new Loder matte smelter at Ouray is nearing completion.

PITKIN COUNTY.

The Bushwhacker M. Co., Aspen, has reduced royalties to leasers in the Bushwhacker as follows. Old royalties above tunnel level on net value: Up to 25 ounces 25%, 25 to 35 ounces 30%, 35 to 50 ounces 35%, 60 to 70 ounces 40%, 70 to 100 ounces 45%, over 100 ounces 50%. Old royalties below tunnel level: Up to 20 ounces 15%, 20 to 30 ounces 25%, 30 to 40 ounces 35%, 40 to 50 ounces 45%, 50 to 50 ounces 50%, 60 to 70 ounces 55%, 70 to 80 ounces 57½%, 80 to 90 ounces 60%, 90 to 100 ounces 62½%, 100 to 120 ounces 65%, over 120 ounces 70%. New royalties above and below tunnel level: Up to 20 ounces 15%, 20 to 25 ounces 20%, 25 to 30 ounces 25%, 30 to 40 ounces 30%, 40 to 50 ounces 35%, 50 to 70 ounces 40%, 70 to 100 ounces 45%, 100 ounces and over 50%.

SAGUACHE COUNTY.

The San Luis Valley Land & M. Co. has put in a 100-stamp mill, capacity 200 tons per day, on the Independent, on Cottonwood creek, near Crestone. The mill also has forty Frue vanners. The company has also put in a sawmill, with capacity of from 10,000 to 20,000 feet per day, on Spanish creek.

SAN JUAN COUNTY.

The 40-stamp addition to the Gold King mill, Silverton, is about completed. Mill will have a daily capacity of 200 tons. Big bodies of ore have been opened up recently, and it is thought that capacity of mill will have to be doubled within a year.

The two mills on the Sunnyside are running steadily.

The new Kendrick & Gelder smelter is running. The furnace has a daily capacity of 200 tons.

SAN MIGUEL COUNTY.

F. Smith of Ouray has an option on the Parnell and Emmet mines of Telluride. Ore from the Parnell has assayed .08 ounce gold, 12 ounces silver and 46% lead per ton, while that from the Emmet has run 252 ounces silver and 37% lead per ton.

At the Gold King, Telluride, twenty stamps are dropping on that property, now being worked by leasers. Ore returns $20 per ton. Ten stamps are dropping on ore from the Alta, connected with the plant by a bucket tramway 1400 feet long. Work will be continued through the winter.

J. B. Bailey, general Supt. San Miguel Con. G. M. Co., has men driving a tunnel from the Hamburg workings, 250 feet above main level, to cut vein of the Elizabeth, adjoining.

Another tunnel is being run from the Golden Chief to cut vein of the Savage. It is in 700 feet and will be driven to 1450 or 1500-foot mark.

On the Little Eva, from a point 1100 feet in tunnel, a 300-foot upraise is being driven.

Dutton & Moorehead are pushing work on the Overlook, near Telluride.

The Hamburg and Champion mines, on Bear creek, are equipped with a 120-stamp mill and are connected by a tramway ¾-mile long.

The 60-ton concentrating plant of the San Bernardo M. & M. Co., near San Bernardo, is treating an average of fifty tons ore per day; fifteen cars of concentrates are shipped monthly.

The additions to the mill of the Liberty Bell are completed and plant now has eighty stamps, with capacity of handling 300 tons ore per day.

SUMMIT COUNTY.

(Special Correspondence).—R. S. Jones, owner of the Wintergreen mine, at this place, is preparing to start operations on that property again, after a close-down of two years. Mr. Jones has a contract to supply the Rocky Mountain smelter at Florence with fifty tons per day of Wintergreen ore, which carries about 45% excess of iron, 23% sulphur, 5% to6 % silica, a small per cent of copper, and gold and silver to the amount of $5 to $7 per ton of ore. He is putting in a compressor so that air drills may be used.

Kokomo, Nov. 21.

The Ten Mile Leasing Co. is incorporated to work the New York and Surplus properties, at Robinson, containing 108 acres; H. M. Shepherd, manager.

TELLER COUNTY.

(Special Correspondence).—The building over the Gold Coin shaft is constructed of brick, with roof supported by a steel structure; is of such design and finish as to make an attractive appearance. The interior is well arranged and includes shaft house, compressor and engine room, boiler room and blacksmith shop. The gallows-frame, constructed of heavy Oregon pine timbers, rises about 60 feet above the collar of the shaft, the roof over the sheaves forming a cupola to the main building; hoist cylinder 24i nches diameter, 48-inch stroke, 12-foot reels for 3000 feet of steel cable. It is operated from a platform, on which are hand and foot levers. The disc strap and post brakes are operated by compressed air, as is also the reversing gear of the engine. The shaft is three-compartment — two for double-deck cages and one for pipe space and ladderway. The depth of the shaft is over 1000 feet

The air compressor is a cross-compound; high pressure steam cylinders 20 inches diameter, low pressures 34 inches. The same figures apply to the dimensions of the air cylinders. Both high and low pressure cylinders have 36-inch stroke. The steam cylinders have a position behind the air cylinders. The flywheel is grooved for rope transmission from an electric motor in case the latter should become the motive power, in which case the steam cylinders could be disconnected.

This compressor is rated 400 H. P., with capacity to operate twenty-four drills, and it is calculated that a duplicate of it will soon be put in to be operated by electricity, hence the air cylinders to be left out of the construction.

The Denver Leasing Co. is sinking and developing on the Victor Con. claim, which belongs to the Calhoun M. Co. The shaft is 150 feet deep, over which is an electric hoist. The property is on Battle, near the Ajax.

The Ajax is preparing to put in a 25-drill air compressor. The shaft is still sinking. Its depth is now 700 feet and it will be sunk to 1000 feet. At present about ninety tons per day are being hoisted.

The Coriolanus group of several shipping properties on Battle mountain is being equipped with a complete plant of machinery, consisting of two Fairbanks, Morse & Co. boilers, a Leyner air compressor, a Mine & Smelter Supply Co. hoist, a heavy wood gallows-frame and a shaft house to enclose all, including blacksmith shop. The equipment is being put in under the directions of C. L. Cleaver. The main shaft, over which this equipment is being placed, is 500 feet deep, double compartment and well timbered up.

The Whisper shaft, on the Gold Sovereign group, has worked under lease for three or four years to Allison, Myers & Stumpf, who now ship 125 tons per month of ore running one and one-half to two ounces gold to the ton, from their 400-foot shaft. Some of the shipments have been high grade. The Gold Sovereign ground has been under lease since it was opened up. There are nine to ten acres in the group on the west slope of Bull hill.

The John A. Logan is now equipped with a new plant of machinery, which consists of three Heine safety boilers, aggregating 900 H. P., a Norwalk 35-drill air compressor, having compound air cylinders, a 38x36-inch steam cylinder, with intercooler between the high and low pressure air cylinders, a first-motion, duplex hoist, having a capacity for 2000 feet depth, with a speed of 3000 feet per minute. Over the 1030-foot shaft is a heavily timbered gallows-frame, which reaches 60 feet above the collar of the shaft. Electric motors will be put in to supply power in the machine shop and to operate a blower in the blacksmith shop.

At a point 1100 feet east of the Logan, but 300 feet higher, is the American Eagle shaft, which is equipped with a roomy shaft house and a hoisting engine with 24x48-inch cylinders. This shaft is 1200 feet deep. Air drills will be operated here by air from the Logan compressor, which will also supply similar power for the Orpha May. In a short time the underground workings of the Eagle, Logan and Orpha May will be connected, the entire group being now the property of W. S. Stratton. John Stark is superintendent and F. E. Ramsay master mechanic.

The old Wild Horse shaft is now known as the Bull Hill shaft, the new Wild Horse shaft, adjoining it, having been equipped with machinery for hoisting. The entire group belongs to the Consolidated Gold Mines Co., controlled by the Woods Investment Co. WASCOTT.

Victor, Nov. 24.

(Special Correspondence).—Recent improvements and developments at the Granite mine, on Battle mountain, put that property in first-class condition. A new steam hoist of slide valve type, with cylinders 18x36 inches and conical reel for round cable, good for 1500 feet depth, will be ready for operating by Dec. 1st. Its power will be furnished by two boilers of 225 H. P. The shaft is now 1000 feet deep, having recently been sunk from the 800 to the 1000 level. Crosscuts have been run from the shaft to the vein on the ninth and tenth levels and upraises are being made to connect the two lower levels with the upper workings at the eighth. During the progress of this development ore shipments have been merely incidental; but, after Dec. 1st, a large tonnage will be shipped regularly. The new shaft house is ample and the shaft itself is well timbered, and the character of the underground timbering is the pride of those in charge. Compressed air for drill power is conveyed from the La Bella power plant at Goldfield, a distance of 2500 feet, through a 4-inch pipe line. This is one of the Smith–Moffat groups. C. H. Cannam is Supt. WASCOTT.

Victor, Nov. 24.

On the Uncle Sam, Cripple Creek, the shaft is down 350 feet.

Drifting is in progress on the 140-foot level of the Gold Bond.

T. J. Moynahan is hoisting ore from the 150-foot level of the Mariposa.

F. O. Wood has opened up ore on the 200-foot level of the Last Claim, on Mineral hill.

Two shifts are working on the Moose. The shaft is down 1000 feet and drifts are being run both ways at this point.

The Anchor G. M. Co. will work the Black Jack, on Beacon hill, Cripple Creek. A 150-foot shaft is on the property, but it is probable a new one will be sunk.

A duplex sinker will be put in on the Acacia and water drawn from the 500-foot level.

Crosscutting is in progress on the 100-foot level of the Anaconda of the Arno Co.

The Mattie Williams, on Galena hill, is shipping ore.

The main workings of the Bonanza King above the 300-foot level are reported about played out.

Work is started on the Ida May and Silver Lake.

A 100-foot shaft will be sunk on the property of the Olympian G. M. Co., on Bull hill.

Supt. Camp of the Elkton, Victor, thinks the new plant will start in a week or so.

The initial shipment of ore from the 178-foot level of the Deadwood was recently made.

Ore from the 260-foot level of the Bonnie Nell, on Raven hill, Victor, assays $12 gold to the ton.

Lessee Burris of the Australia and Little May claims is shipping smelting ore.

Lessee Kellum, operating the Sunshine and Anna Bell claims, is pushing work with good results.

Drifting is in progress on the 78-foot level of the Gold Sovereign.

Timbering is being done in the levels of the Joe Dandy.

The tunnel on the Ben Harrison, on Bull hill, is in 140 feet.

Snyder, Holbrook & Co., leasing the first block of the Trail, on Bull hill, are crosscutting on the 175-foot level. Work is slow, owing to hardness of rock.

On the second block of the Trail, Williams, Holbrook & Co. are drifting north on the 51-foot level. Ore from this level recently ran $12 to the ton.

The El Paso M. Co. will take over the management of the Kimberley M. Co. on Dec. 6th, it having secured control of 600,000 shares of stock in the latter company. During October the Last Dollar shaft was sunk from the 800 to the 900 foot level.

During the week ending Nov. 17th the Independence produced 960 tons ore that averaged $55 per ton, making a total value of $52,800.

The Nabob G. M. Co. has put in a four-drill compressor on the Nabob. The shaft is down 400 feet. At 500 feet drifting will begin.

F. Murray, leasing the Gold Coin dump, is saving about two tons ore per day, half being screenings and balance coarse rock. The former average about $30 to the ton, the latter about $50 per ton. On the Triangle, of the Jack Rabbit, a basalt dyke is struck at 125 feet.

Two ten-day runs at the Butterfly-Terrible, Cripple Creek, recently returned two gold bricks—216¾ ounces and 298 ounces, respectively—valued at $8000. The mill is running steadily.

On the Providence, Victor, crosscutting is in progress on the 300-foot level.

Keller, Jack & Co. are sinking a 500-foot shaft on the Jolly Jane.

Morrell, Smith & Co. are sinking on the Maggie, and are putting in a hoist and house.

S. Stafford is shipping ore from the 60-foot level on block 20 of the Anaconda.

The Pointer shaft cut the vein at 525 feet.

Whipp & Glenn have opened up a body of ore on the Uncle Sam, Cripple Creek.

A shipment of twenty-five tons of ore of the new strike on the Colorado King is made.

The Woods Investment Co. will sink a new shaft on the Maybelle block, Lawrence townsite. The old shaft will be retimbered and sunk to the 500-foot level.

IDAHO.

BOISE COUNTY.

Twenty-two tons of ore from the Mattie, on Willow creek, near Idaho City, owned by Charles Small, recently yielded $50 a ton.

IDAHO COUNTY.

(Special Correspondence).—The Imogene, carrying high-grade ore, has been bonded by W. Houston and associates to Spokane, Wash., men. The property is located on Meadow creek, in Newsome district, and shows from 5 to 10 feet of ore.

The Alamance (a California corporation) Co.'s mill at Elk City, installed this season on the old Blue Dragon, has started up.

Butters Bros.' dredger, on lower Red River meadows, is reported to have made a successful season of eight months.

Moose Creek placers are opening up a continuation of their old channel for next year's operations. Two short flumes 30 inches wide and 7½ inches to 12 feet grade, with undercurrent and tables, have been set. Tailings from upper flume run through bedrock race and through lower flume. The channel will be tapped by an open cut through the rim. Gravel to the depth of 140 feet has been shown at the present stage of work in place of 100 feet anticipated. The deposit is proving larger in every way than was expected, what was supposed to be the limit of the channel proving to be a slide of country rock, cutting out a portion of the channel, but showing old wash intact thereunder.

The Iron Crown mine and mill at Newsome have shut down.

The Montana placers, R. G. Huston manager, are to resume work in the spring.

Newsome, Nov. 25.

D. Reber of the Crown Point, Dixie, says that machinery will be put in, and that competent miners are needed.

LEMHI COUNTY.

The Idaho Exploration & Copper Co., which recently bought the Queen of the Hills, Salmon City, will add five stamps to their 5-stamp mill; M. Rosenkrands, manager.

SHOSHONE COUNTY.

The Montana & Idaho M. & D. Co., capital $1,000,000, is incorporated at Wallace.

Near Wallace, there are ten concentrators in operation, having a combined capacity of 4850 tons per day.

MICHIGAN.

HOUGHTON COUNTY.

Fifty tons Mohawkite copper ore, shipped last June by the Mohawk mine to New Jersey smelters, was taken to Swansea, Wales, no American smelters being prepared to treat arsenical ores. Returns received show $143 per ton; smelters want all of this ore that can be given them.

The Calumet & Hecla Copper M. Co., Houghton, has filed articles of association in renewal; corporate existence of the old company will expire April 21, 1901. In less than thirty years the company has paid dividends of $70,000,000.

MONTANA.

BEAVERHEAD COUNTY.

Men are employed on Stone Creek copper claims, operated by Chicago companies. Tunnels are being driven and a shaft sunk below water level.

FLATHEAD COUNTY.

J. O. D. Ross will work his copper properties on Bull river, near Troy, during the winter.

GRANITE COUNTY.

The Albion C. Co. of Butte will operate the Albion, Revenge and Teutonic claims, near Flint, next year.

LEWIS AND CLARKE COUNTY.

A Sadtler process smelter is projected for Helena, to have a capacity at first of 300 tons ore per day.

MADISON COUNTY.

Brakey & Miller are down 50 feet on the Hobson, near Sheridan.

Timbers are going in on the Centennial-Toledo, Brandon.

A strike is reported on the Madison.

H. Dillabaugh is pushing work on the Lulu, in Georgia gulch, Sheridan, and last week shipped ten tons ore to Pueblo, Colo.

Machinery is going in at the Lake Shore.

E. L. Shafner of Cleveland, Ohio, operating the Lake Shore, near Sheridan, expects to have the 20-stamp mill running by Jan. 15th.

E. H. Trerise, general manager Madisonian, near Meadow creek, has fifty men working. New machinery is going in and more men will be put on.

MEAGHER COUNTY.

The Sparta, Banner, Anna Paul and Frances claims, on Willow creek, 4 miles east of White Sulphur Springs, are leased to G. Hailey and others of White Sulphur Springs and G. W. Towers of Butte. Men will be put on and work pushed.

The Silver Belt, Neihart, has twenty men working. The drift is in 125 feet.

Machinery weighing 39,000 pounds for the Porcupine M. Co., Dorsey, is on the ground and construction is under way. The mill will be enclosed and worked during the winter.

SILVER BOW COUNTY.

The Butte & Boston, Butte, has 600 men employed.

The Silver Bow shaft No. 3 is down 575 feet; 200 feet were sunk during the past year.

A depth of 1075 feet is reached on the Blue Jay.

Work is progressing at the East Gray Rock, 175 men being employed.

NEVADA.

ESMERALDA COUNTY.

Supt. McCormick of the Vulcan, Hawthorne, says that the Parrot will resume shortly, and that thirty men will be employed.

LINCOLN COUNTY.

A mill is going in at Quartette for the Searchlight mines. The latter employ sixty men.

A 20-stamp mill is going in at El Dorado canyon.

The Highland mill, Pioche, recently made a run on twenty tons of ore from the Bristol mines, near there. E. F. Freudenthal manager.

STOREY COUNTY.

The recorded output to the end of 1899 of the principal mlnes on the Comstock lode is approximately as follows:

Con. Cal. & Va.	$131,759,340
Belcher	36,810,500
Crown Point	34,000,000
Yellow Jacket	19,000,000
Savage	17,242,100
Gould & Curry	15,707,707
Chollar-Potosi	15,354,800
Ophir	11,090,000
Hale & Norcross	9,951,600
Kentuck	6,550,000
Imperial	5,733,500
Justice	3,270,000
Sierra Nevada	3,000,000
Union Con	2,500,000
Confidence	2,000,000
Overman	2,000,000
Empire	1,966,199
Occidental	1,000,000
All others recorded	3,857,600
Total	$322,793,346

There was a considerable production before the records were kept, probably $20,000,000 to $30,000,000. Recorded dividends to date amount to a total of $119,240,780. Total assessments levied up to the present time do not foot up $100,000,000.

The tunnel in the Burning Moscow, Virginia, is in 140 feet.

A raise is started 140 feet in on the 1750-foot level of the Con. California & Virginia.

Crosscutting on the Central tunnel level is in progress at the Mexican.

On the 1600-foot level of the Sierra Nevada 350 feet of the west drift are cleaned out and timbered.

The Holman tunnel on the Silver Hill is in 682 feet.

At the Chollar work in the main north drift is resumed. Wires for electric lighting purposes are going in throughout the mine. The south drift from the main tunnel, 40 feet east from the end of the drift and 972 feet in from the mouth, is in 169 feet.

During the week ending Nov. 24th 344 tons of ore were taken from the stopes on the 325-foot level of the Gould & Curry.

The Utah surface tunnel No. 2 is in 752 feet.

The Hale & Norcross tunnel is in 1884 feet, 10 feet having been driven during the week ending Nov. 24th.

The air compressor and electric motors at the Yellow Jacket are in.

WASHOE COUNTY.

The following officers of the Reno Smelting & Reduction Co., Reno, were elected on the 22nd inst.: O. J. Smith, president; H. Martin, vice-president; A. D. Ayers, secretary; Washoe County Bank, treasurer. Operations will soon resume.

The Reno Star, Reno, is shipping two carloads of ore weekly. Returns run from $752 to $1640 per carload.

WHITE PINE COUNTY.

The pumps at the Chainman, Ely, are undergoing repairs preparatory to clearing the shaft of water.

NEW MEXICO.

COLFAX COUNTY.

The new 3000-foot tunnel which will run under Baldy mountain, near Elizabethtown, is under way. Hand drilling will be done during the winter, and next spring machine drills will be put in.

RIO ARRIBA COUNTY.

The Standard M. Co., Petaca, is pushing work on its mica mines near there.

SANTA FE COUNTY.

The smelter at Cerrillos is reported sold to the Con. M. & S. Co. of West Virginia for $125,000.

TAOS COUNTY.

The Black Copper M. Co., now putting in a 10-stamp mill on the Black Copper, Red River, will also put in Bartlett concentrating tables.

The Red River Copper Co., C. S. Bristow Supt., will sink to 300-foot level.

T. Smith has men working in Cunningham gulch, near Tres Piedras.

The vein opened upon 100-foot level of the Strawberry is increasing in size as development progresses.

Work on the Freeport and Cinnabar claims, near Good Hope, will be pushed. Ore recently taken out ran $2000 to the ton.

OREGON.

BAKER COUNTY.

D. H. Stearns plans to work property near Huntington, dredger to be operated by electricity.

The Sumpter Miner states that there have been shipped into the Sumpter mining district within the last twelve months an aggregate of 5,000,000 pounds of mining and milling machinery.

The tunnel on the Tammany, in Cracker Creek district, near Baker City, now in 100 feet, will be driven an additional 500 feet.

The new mill for the Mammoth, Baker City, will be started up on the 5th.

A new 10-stamp mill will go in on the Bald Mountain.

At the Cornucopia the new electrical machinery is going in and will, it is stated, be ready by Jan. 1.

At the Concord, Sumpter, recently bought by the Concord G. M. Co. for $35,000, 1000 feet of tunneling has been done since last January. Work will be pushed during the winter.

JACKSON COUNTY.

Kubli Bros., operating on Gall's creek, near Ashland, have seven men working. A 60-foot shaft is sunk from 425-foot level, and east and west drifts are run, showing up good ore. Work will continue through the winter.

W. Bleckart, who has been operating on Gall's creek with ground sluices for thirty-four years, will probably put in a giant.

JOSEPHINE COUNTY.

W. G. Wright has started his mill near Grant's Pass.

A. E. Meredith has completed his bridge and pipe line across the Illinois, and will soon start piping.

Operations will begin on the Fay, Taylor and Ryel placers, on Powell's creek.

The 6x7-foot main tunnel at the Waldo (copper), Waldo, T. W. M. Draper general manager, is in 225 feet. An upraise is made from this level. The new smelter is working satisfactorily. D. H. Lawrence is Supt. of latter.

SOUTH DAKOTA.

LAWRENCE COUNTY.

The cyanide plant on Yellow creek, near Deadwood, is treating fifty tons ore per day.

Work is being pushed on the Uncle Sam.

Good ore is coming from the Harrison at Lead.

UTAH.

BEAVER COUNTY.

The Royal Copper M. Co. of Chicago, capital $6,000,000, is incorporated to work property in San Francisco district; R. J. Coleman, general manager.

A 6x14-foot-10-inch triple-compartment, 20-foot shaft has been sunk on the Cactus (copper) of the Royal Copper M. Co., near Frisco. Ore carries gold and silver values.

JUAB COUNTY.

During week ending Nov. 24, the following shipments were made from mines at Tintic:

	Cars.
Centennial Eureka	20
Bullion-Beck	2
Gemini	5
Godiva	4
May Day	1
Grand Central	1
Carissa	3
Mammoth	1
Ajax	4
Swansea	3
Star Consolidated	4
Tesora	12
Showers Consolidated	1
Total	61

The Humbug, Tintic, is shipping ore to Salt Lake smelters.

LINCOLN COUNTY.

Manager Lathrop reports a strike on 100-foot level of the Ophir at Stateline. Work will be pushed.

SALT LAKE COUNTY.

An assessment of 2 cents per share is levied by the Northern Light M. & M. Co., Salt Lake, to continue work through the winter.

A 300-foot flume is going in at the Castro placer, Bingham; the dam is being repaired and things put in shape for work next spring and summer.

The mill at the Butterfield (Queen tunnel) is going in.

At the Red Wing Extension the upper tunnel is in 75 feet; lower tunnel is in 150 feet.

The Nast will soon make a 100-ton shipment.

The Homestake and Eldora groups in Little Cottonwood canyon, near Union, are reported sold to W. F. Snyder for $36,000. Ore assays 40% lead and 9 ounces silver per ton. Work will be pushed during the winter.

SUMMIT COUNTY.

Following are shipments of ore from the Mackintosh sampler for week ending Nov. 24:

	Pounds.
Daly-West	822,000
Silver King	769,000
Anchor Con	166,000
Ontario	95,000
California Con	48,000
Total	1,900,000

Manager J. E. Bamberger of the Daly-West, Park City, is pushing work on the 1400-foot level. One hundred and thirty-five tons ore daily are handled at the mills and over sixty tons ore per day are marketed.

During the year the properties of the Anchor M. Co. at Park City have produced 5,200,000 pounds lead, 155,501 ounces silver and 330 ounces gold, with 3800 pounds copper.

TOOELE COUNTY.

The Con. Mercur G. M. Co.'s transactions for October show a net profit of $47,167.81. During the month 30,243 tons of ore yielded bullion valued at $133,280.27; cost of mining, $1.40 per ton; cost of milling, $1.44; total expense of production, $2.84 per ton; total expenses of operation aggregated $86,112.46.

The new concentrator of the West Argent M. Co., at Stockton, is running; cost, $12,500; capacity, 100 tons per day; manager, F. R. Ball.

The Bingham West Dip Tunnel Co., owning 520 acres land on west slope of the Oquirrh mountains, will drive a tunnel through these mountains to strike the Bingham district 2000 feet below the lowest workings of that camp. They also expect to use the water opened up for power and irrigation purposes.

The Cygnet of Stockton is shipping ore running high in lead, with several ounces silver per ton. Work will continue through the winter.

Manager F. R. Ball of the West Argent, Stockton, will run mill to its full capacity.

The shaft at the Honerine, Stockton, is unwatered and crosscutting is in progress on lower level; Manager Scheu.

UTAH COUNTY.

J. Knight will close down the Black Jack, near Provo, for the winter, and maybe indefinitely, as outlook at present time does not justify further outlay for development.

A recent shipment of four cars ore from the Star Con., Springville, Manager Packard, returned $2328.87. Assay yielded 1.56 ounces gold and 7 ounces silver per ton, giving a net value of $21.84 per ton.

WASHINGTON.

FERRY COUNTY.

The Republic Con. G. M. Co., Republic, will enlarge its plant.

The California M. Co., operating the California group, near Republic, are down 300 feet.

The Republic mill will begin treating about twenty tons ore from the Black Tail, Republic, by Jan. 1, when more men will be put on at that mine, Supt. W. M. Crummer.

The Bodie, on Toroda creek, near Bodie, will be worked during the winter. A new 100-foot shaft is being sunk. One hundred tons ore will be shipped to Midway, B. C., for test. If results are satisfactory, ore will be shipped to that point during the winter. Main tunnel is in 325 feet.

The crosscut tunnel at the Maud West is in over 250 feet.

On the Oxford the crosscut tunnel is in over 125 feet.

The Ruby Fraction, on west bank of Eureka gulch, near North Republic, is reported sold to D. A. Mills, who owns the Oversight adjoining. The two will be consolidated. A steam plant may be put in early next spring.

Two 10-hour shifts are working in the Wauconda tunnel, now in 190 feet. Driving averages 3 feet per day.

The Oronga, Manager Manley, will resume.

General Manager M. R. Straight of the Unga group will push work on tunnel, now in 300 feet.

The south drift on No. 2 level of the San Poil, Republic, is in 720 feet.

Supt. Porter of the Golden Lion—Little Four property—has driven new tunnel in over 80 feet.

Crosscutting is in progress at the Black Tail.

The winze at the Princess Maud is down over 280 feet.

The California and Gold Ledge mines now have telephone connection with Republic.

Crosscutting is in progress on 135-foot level of the Gold Ledge, Republic.

PIERCE COUNTY.

There are twenty-five coke ovens in operation at Fairfax. More will be put in next spring.

The Northern Pacific R. R. Co. has men prospecting for coal between Carbonado and Fairfax.

SNOHOMISH COUNTY.

A 50-foot tunnel will be driven on the Bunker Hill-Sullivan group, Index.

More men will be put on at the Nonpareil, Everett.

The Copper Bell, Gray Bros., has resumed. A new settling pot for handling the matte and slag is going in.

WHITMAN COUNTY.

Kyme & Smith of Moscow will drive a 100-foot tunnel this winter on the Hoodoo Queen, Hoodoo, for the Gold Mountain M. & M. Co.

Taylor Bros. are working two shifts on the Mother Lode. They will put in a new concentrator next spring.

New machinery is going in on the Blue Bird. Work will be continued through the winter.

The Bishop, on Jerome creek, has resumed after a long idleness. Shipments of ore are expected to begin soon.

WYOMING.

ALBANY COUNTY.

A strike of good copper ore is reported made on 80-foot level of the Rambler, 45 miles west of Laramie.

CARBON COUNTY.

Copper is reported found on Green mountain near Grand Encampment. Selected samples gave returns of copper, gold and silver.

FOREIGN.

BRITISH COLUMBIA.

A mill will go in on the Rambler-Cariboo to treat low-grade ore.

Cinnabar is reported found on the west side of Lake Okanogan, opposite Miston, in Keremeos valley.

The Arlington M. Co., Ltd., has done about 5000 feet of work on the Arlington group, near Slocan.

W. H. Jackson is pushing work on the Black Bear, Wide West and Eclipse, Lardeau.

The Paradise, on Toby creek, East Kootenay, has 2000 sacks ore ready for shipment.

A diamond drill will go in on the Deane, J. H. Fink manager.

Work on the Old Abe will resume shortly.

The Kootenay Perry Creek Co. will continue operations through the winter.

The additional furnaces for the Granby

smelter, Grand Forks, will go in in January. They will have a joint capacity of 600 tons, making the total capacity of plant 1200 tons daily. A matte converter will go in at the same time.

KLONDIKE.

Vice-Consul H. T. Roller, in charge of the Dawson consulate during the absence of Consul McCook in Philadelphia for the winter, gives the following summary of gold shipments from Dawson to the outside, by months, for the season of 1900:

May	$ 561,100
June	6,797,200
July	2,459,750
August	1,954,700
September	1,259,440
October (to 17th)	1,358,400
Total	$14,390,590

LOWER CALIFORNIA.

Reports from Ensenada state that sinking for oil will be begun at Cape Colnett, 75 to 100 miles below there; M. Bernstein manager.

MEXICO.

W. C. Bogue, manager Mine & Smelter Supply Co., Salt Lake City, Utah, who has just returned from Mexico, states that near Tachaca Oaxaca, two mills, 100 and 120 stamps, respectively, are in operation.

A strike of copper ore is reported from Cananea.

The new 25-drill compound air compressor at the Grand Central, La Colorado, is running. Power is supplied by a 300 H. P. Corliss engine.

SIBERIA.

The Russian Government has decided to establish at Tomsk, Siberia, special works for the testing of gold-bearing sand and ore similar to institutions of this character in Australia.

TASMANIA.

The North Mount Lyell M. Co. will put in large reduction works.

Personal.

W. A. CLARK is at Jerome, Ariz.

D. W. BRUNTON of Denver, Colo., is in Utah.

R. L. DUNN has returned to California from Alaska.

T. F. WALSH has returned to Colorado from Europe.

R. J. DAYS of Los Angeles, Cal., is in St. Louis, Mo.

S. B. MILNER of Salt Lake, Utah, is in Twin Falls, Idaho.

J. J. WILLIS is appointed Supt. Big Five, Ward, Colo.

S. J. MILLER has returned to Tombstone, Ariz., from Europe.

B. A. JACKSON has returned from the Orient and is at Jackson, Cal.

D. W. BRUNTON has returned to Denver, Colo., from Mercur, Utah.

E. M. TAYLOR is appointed Supt. Signal M. Co., Nevada county, Cal.

M. BIERY is appointed manager Melczer M. Co., Copeta, Sonora, Mexico.

G. KISLINGBURY has returned to San Francisco from Durango, Mexico.

W. H. CUNNINGHAM of the Con. Mercur, Mercur, Utah, is in Chicago.

G. S. PEYTON of Royal Copper M. Co., Frisco, Utah, goes to Chicago, Ill.

J. DEDERICHS has returned to Salt Lake, Utah, from Spokane, Wash.

C. S. BRISTOW is now Supt. Red River Copper Co., Red River, New Mexico.

R. J. CORY, Denver, Colo., manager E. P. Allis Co., is in Salt Lake, Utah.

P. J. DONOHUE of Salt Lake, Utah, has returned there from Polaris, Mont.

G. PAXTON of Red River Copper Co.. Red River, New Mexico, is in Joplin, Mo.

W. B. PHILLIPS of Pittsburg, Pa., has been appointed State Geologist of Texas.

G. D. BLOOD, foreman Marsac mill and refinery, Park City, Utah, is in Berkeley, Cal.

J. A. FLEMING, Pres. Black Warrior Copper Co., Amalgamated, is in Globe, Ariz.

L. C. TRENT of Salt Lake, Utah, goes to Tasmania as manager Mount Lyell M. Co.

E. B. KIRBY, general manager War Eagle, Rossland, B. C., is in Toronto, Canada.

J. H. FOUNTAIN is appointed secretary Southwest Miners' Association, Los Angeles, Cal.

J. O'NEILL, Supt. Anaconda and Never Sweat mines, Butte, Mont., is in Salt Lake City, Utah.

W. H. LEFFINGWELL, M. E., recently returned from Boston, Mass., to Cripple Creek, Colo.

W. C. BOGUE, manager Mine & Smelter Supply Co., Denver, Colo., has returned from Mexico.

MESSRS. HEATHER, JR., CAMPBELL AND NEWTON of Boston, Mass., are in Jamestown, Cal.

J. H. HAMMOND is now consulting engineer Stratton's Independence mine, Cripple Creek, Colo.

F. H. PETTENGILL, vice-president and general manager Clyde M. Co., Cripple Creek, Colo., has resigned.

MESSRS. SMITH, HALL AND LEACH, of the West Argent, Salt Lake, Utah, have returned to Chillicothe, Mo.

A. EKMAN has returned to Oroville, Cal., from Paris, where he had charge of the California mining exhibit.

W. WEST, formerly of Ward pyritic smelter, is now manager of new Home pyritic smelter at Ouray, Colo., vice R. R. Bowles, resigned.

W. M. O'SHAUGHNESSY, consulting hydraulic engineer, has returned to San Francisco after a year's engagement in professional duties in the Hawaiian Islands.

Commercial Paragraphs.

THE Weigele Pipe Works, Denver, Colo., have turned out 13½ miles of pipe the present year for placer and water power work.

THE Link Belt Engineering Co. of Nicetown, Philadelphia, has an office in Pittsburg, Pa., in charge of T. Frank Webster, 1501–1502 Park building.

ON the 23rd prox. the stockholders of the Ludlow–Saylor Wire Co., Fourth and Elm streets, St. Louis, Mo., will consider and vote on the proposition to increase the capital stock of the company from $100,000 to $400,000.

THE Gardner Electric Drill & Machinery Co. will soon occupy a three-story brick building on Blake St., Denver, Colo., for factory and salesroom for the Electric rock drill, which was described and illustrated in this paper in the issue of May 26, 1900.

DAVIS & BYLER, mining engineers, Victor, Colo., have prepared a topographical, wood-carved chart of Cripple Creek district, which will be finished in colors, showing the geological formation and other features, including the railway lines, mines, mills and towns of the district.

ALVIN PHILLIPS, whose ore-testing plant at Denver, Colo., is kept constantly busy, reports that recent tests by concentration and cyanide has determined the erection of milling plants in Idaho and southern California. Mr. Phillips' tests on the Bartlett concentrating table have been specially interesting.

THE Southern Pacific announces rates of $8 and $10.50 per ton on coke from West Virginia and Tennessee to California points. The company also announces a reduction in the rate on iron pipe from Eastern shipping points to California as follows: From Tennessee and Alabama, 75 to 59½ cents per 100 pounds; from New York pier, 75 to 50 cents; from Pueblo, 50 to 37½ cents.

THE Westinghouse Electric & Manufacturing Co. of Pittsburg has the contract for the appliances used in the Missouri River Power Co.'s plant at Canyon Ferry, Montana, for the purpose of transmitting power to Butte. The contract calls for six 1000 H. P. generators, six dynamos of the same capacity, twelve 1200 H. P. transformers, twelve switchboards, and a quantity of other electrical apparatus, all of which is to be delivered within five months. The generators are to be coupled to the six water wheels on the same shaft. One transformer will be used for the step-up from the low to the high tension current, and six for the step-down at Butte. It is expected that the plant which will be installed will furnish 6000 H. P., making the total capacity of the plant 10,000. The contract for the water wheels has not been let.

Recently Declared Mining Dividends.

	Payable.
Gold Coin M. Co., Colorado, $20,000	Nov. 24
Con. M. Co., Colorado, $10,000	Nov. 24
Silver Shield M. & M. Co., Utah, ½c per share	Dec. 1
Osceola Con. M. Co., $3 per share	Dec. 1
Colorado Fuel & Iron Co., Colorado, 8% on preferred stock	Dec. 1
Butte & Boston, Montana, $5 per share	Dec. 10
Acacia G. M. Co., Colorado, 1c per share, $15,000	Dec. 15

Catalogues Received.

The American Copper Mining & Extraction Co., patentees of the Gardiner copper leaching process, have issued from their office at Denver, Colo., an illustrated pamphlet, giving information relative to this process and results of experiments therewith.

List of U. S. Patents for Pacific Coast Inventors.

REPORTED BY DEWEY, STRONG & CO.,
PIONEER PATENT SOLICITORS
FOR PACIFIC COAST.

FOR THE WEEK ENDING NOV. 20, 1900.

662,163.—HOISTING APPARATUS—H. C. Behr, S. F.
662,341.—HAY PRESS—A. Bennett, Puyallup, Wash.
662,053.—SHADE ROLLER BRACKET—H. M. Benson, S. F.
661,945.—WEIGHING MACHINE — J. W. Berry, Tacoma, Wash.
662,252.—FILTER—J. O. Crosscup, S. F.
661,957.—BOX NAILER — I. E. Davis, Coralitos, Cal.
662,060.—LADDER—I. M. Dillman, Oakland, Cal.
662,262.—SHINGLE — C. A. Galvin, Modesto, Cal.
662,273.—OIL CAN—F. B. Hinkelbein, San Jose, Cal.
662,276.—GAS GENERATOR—J. P. Kistler, Tacoma, Wash.
662,004.—TURFING TOOL — H. E. Laurence, Fresno, Cal.
662,005.—COMBINATION TOOL — J. C. Lewis, Tracy, Cal.
662,363.—PHOTO FINDER—Magagnos & Fulton, Alameda, Cal.
662,082.—GAS BURNER—J. G. McAlpine, Jr., Gilroy, Cal.
662,150.—THROAT SHIELD—W. W. McCormick, Santa Rosa, Cal.
662,022.—SLUICE GATE—Prescott & Furber, Winlock, Wash.
662,024.—CARBURETOR—V. J. A. Rey, S. F.
662,137.—CARTRIDGE—H. A. Tellerson, Oakland, Cal.
662,179.—POWER TRANSMITTER—F. S. Weatherly, Los Angeles, Cal.
662,329.—DREDGER—S. A. West, S. F.
662,180.—PUMP — W. Wildman, Sparta, Cal.
33,572.—DESIGN — M. C. Hall, Bakersfield, Cal.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

COMBINATION GUN CARTRIDGE.—No. 662,137. Nov. 20, 1900. H. A. Tellerson, Oakland, Cal., assignor to Winfred Castor of San Francisco. This invention relates to an improved construction for gun cartridges. It consists of a two-part base with means for removably securing the parts together. A paper or eqivalent shell has one end crimped and clamped between the two, and a pin secures the two parts of the base in the interlocked position. One of the parts of the base has a hole with an inclined wall which is engaged by said pin to allow for variations in the thickness of the shell, and to insure the alignment of the parts.

DESIGN FOR A CALENDAR.—No. 30,366. Nov. 20, 1900. M. C. Hall, Bakersfield, Cal. The leading or material feature of this design consists of the representation of a watch with a stem and ring. Arranged within the inner periphery of the watch are a series of small representations of dials having figures indicative of the hours and names of cities in different longitudes around the world, hands on the dials point to the hours, indicating the time in those cities with relation to each other. Interior to these small dials and concentric with the outer rim is a pictorial representation of a globe, showing a part of the world. The main dial is supported upon a rectangular base which is subdivided for the number of days contained in a month. The ends of this base are connected with supporting posts, one of which has upon the top the figure of Time, with scythe and hour-glass, and upon the other the figure of the Goddess of Liberty. The bases of the posts are represented as spanning the Golden Gate, and upon each side are views of the elevations of land between which the waters of the strait flow.

San Francisco Stock Board Sales.

SAN FRANCISCO, Nov. 28, 1900.

600 Andes	05c	200 G. & C.	$1 00
500 Belcher	17c	600 Overman	06c
300 B. & B.	18c	400 Potosi	17c
100 Caledonia	43c	1000 Savage	14c
200 Challenge	22c	400 Silver Hill	43c
1200 Chollar	08c	50 Standard	$3 20
200 C. C. & V.	$1 35	100 Union Con	13c
300 Crown P't	13c	200 Y Jacket	20c

Latest Market Reports.

SAN FRANCISCO, Nov. 28, 1900.

SILVER—Per oz., Troy: London, 29⅝d (standard ounce, 925 fine); New York, bar silver, 64⅛c (1000 fine); San Francisco, 64⅛c; Mexican dollars, 51c.

COPPER.—New York: Lake, 1 to 3 casks, $17.00 cash; carload lots, 16.75; Electrolytic, 1 to 3 casks, 16.75; carload lots, 16.50; Casting, 1 to 3 casks, 16.62½; carload lots, 16.45. San Francisco: 18. Mill copper plates, 20c; bars, 22@23c.

LEAD.—New York, $4.37½; Salt Lake City, $4.00; St. Louis, $4.30; San Francisco $5.00, carload lots; 5½c 1000 to 4000 lbs.; pipe 6¾, sheet 7½, bar 6c; pig, $4.70 @5.10. London, £17 5s per ton.

SPELTER. — New York, $4.35; St. Louis, $4.15; San Francisco, ton lots, 5¾c; 100-lb lots, 6c.

ANTIMONY.—New York, Cookson's, 10½c; Hallett's, 9½c; San Francisco, 1000-lb lots, 12c; 300 to 500 lbs., 13@14c; 100-lb lots, 15@18c.

IRON.—Pittsburg, Bessemer pig, $14.50; gray forge, $14.00; San Francisco, bar, per lb., 2½c in small quantities.

STEEL.—Bessemer billets, Pittsburg, $20.00; open hearth billets, $23.50; San Francisco, bar, 7c to 12c per lb.

TIN.—New York, pig, $28.50; San Francisco, ton lots, 30c; 1000 ℔s., 30½c; 500 ℔s., 30¾c; less, 31c; bar tin, ⅌ ℔, 35c.

QUICKSILVER. — New York, $51.00; large lots: London, £9 2s 6d; San Francisco, local, $48.00 ⅌ flask of 76½ ℔s.; Export, $45.

NICKEL.—New York, 50@60c ⅌ ℔.

MAGNESIUM.—New York, $3.00 ⅌ ℔.; San Francisco, $4.00.

ZINC.—San Francisco, 5¼c; slab, 5¾c; bar, 7c.

BABBITT METAL.— San Francisco, No. 1, 10c.

SOLDER. — Half-and-half, 100-℔. lots, 18.70c; San Francisco, Plumbers', 100-℔. lots, 15.85c.

ASSAY LITHARGE.—San Francisco, 10c ⅌ ℔, small lots.

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 30c to 35c.

BISMUTH.—New York, ⅌ ℔., $1.60 50-℔ lots; San Francisco, $2.50 to $2.75 ℔ lots.

PHOSPHORUS. — F. o. b. New York 50@60c ⅌ ℔.

TUNGSTEN.—New York, ⅌ ℔., 95c; San Francisco, $1.15.

FERRO-TUNGSTEN. — New York, 37%, 35c; San Francisco, 65c (60%).

FERRO-MANGANESE. — Pittsburg, 80%, domestic, $85, large lots.

PLATINUM.— San Francisco, crude, $17 ⅌ oz.; New York, $18.20 per Troy oz

POWDER.—F. o. b. San Francisco: No. 1. 70% nitro-glycerine, per ℔., in carload lots, 15¼c; less than one ton, 17¼c. No. 1*, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1** 50%, carload lots, 11¾c; less than one ton, 13¾c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9½c; less than one ton, 11½c. No. 2** 30% carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9, in lots not less than 1000.

FUSE.—Triple tape, $3.60 per 1000 feet; double tape, $3.00; single tape, $2.65; Hemp, $2.10; Cement No. 2, $3.00; Cement No. 1, $2.65, in lots of 3000 feet and up.

CANDLES.—Granite 6s, 16 oz., 40s., 11¼c ⅌ set; 14 oz., 40s., 10c.

CHEMICALS.—Cyanide of potassium, 98%–99%, jobbing, 32½@33½c ⅌ ℔.; carloads, 30@31c; in 10-℔. tins, 40c; sulphuric acid, 66% B, 2c ⅌ ℔.; soda ash, $1.60 ⅌ 100 ℔s. 58%; hyposulphite of soda, 2¾@3c ⅌ ℔.; blue vitriol, 5½@6c ⅌ ℔.; borax, concentrated, 7@8c ⅌ ℔.; chlorate of potash, 12@13c; roll sulphur, 6c; alum, $1.90@2.00; flour sulphur, French, 2¼@2½c; California refined, 1¾ @ 2c; nitric acid, in carboys, 8c ⅌ ℔.; caustic soda, in drums, 3@4c ⅌ ℔.; Cal. s. soda, bbls., $1.00; sks, 95c ⅌ 100 ℔s.; chloride of lime, spot, $2.50@2.60; nitrate of potash, in kegs, 8c; caustic potash, 10c in 40-℔. tins.

COAL. — San Francisco, coast, yard prices: Wellington, $9; Seattle, $7.00; Coos Bay, $5.50; Southfield, $9.00. Cargo lots, Eastern and foreign: Wallsend, $8.00; Brymbo, $7.50; Pennsylvania, hd., $14.00; Scotch, $8; Cumberland, $12; Cannel, $9.50; Welsh Anthracite, $12.00; Rock Springs, $8.50; Colorado Anthracite, $14.50. Coke, $16 per ton in bulk; $18 in sacks.

OILS.—Linseed, pure, boiled, bbl., 86c; cs., 91c; raw, bbl., 84c; cs., 89c. Deodorized Stove Gasoline, bulk, 14½c; do., cs., 20½c; 86° Gasoline, bulk, 21c; do., cs., 27c; 63° Naphtha or Benzine, deodorized, in bulk, per gal., 13½c; do., in cs., 19½c; Lard Oil, Extra Winter Strained, bbl., 70c; cs., 75c; No. 1 bbl., 50c; cs., 55c; Neatsfoot Oil, coopers' bbls., 60c; extra bbls., 65c; cs., 60c; No. 1 bbl., 52½c; cs., 57½c.

CALIFORNIA STATE

This Paper not to be taken from the Library. ++++

MINING AND SCIENTIFIC PRESS.
AND PACIFIC ELECTRICAL REVIEW.

Whole No. 2107.—VOLUME LXXXI. Number 23. SAN FRANCISCO, SATURDAY, DECEMBER 8, 1900. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

Electric Mine Locomotives.

As in other forms of electric transmission, mine haulage is progressive. The first electric mine locomotive was put in use in 1888, and in the twelve years there is a notable advance in such application. Where mine conditions are such as to admit of mechanical haulage, the electric locomotive presents many features of economical efficiency that commend it to public consideration. The first cost is necessarily high; but, figuring on the matter as an investment proposition where a degree of permanence obtains, the consequent saving in operation and maintenance brings into view its economical features. Among other claims in that regard are brought forward the statements that the use of an electric haulage plant is economical because of freedom from complicated mechanism in the locomotive; small friction loss; power consumed only when doing work, and then in proportion to the work done; absence of heat, smoke, gas and steam; inexpensive line construction; size of locomotive needing no extraordinary enlargement of vertical entry section; locomotive wheel base, admitting of operation on curves of radii as short as 15 feet; light weight of locomotive for given tractive duty and capability of operating on heavy grades; adaptability of the electric power to pumping, hoisting, lighting and other mine duties besides haulage.

On this page appear illustrations of various types of locomotives built by the General Electric Co. Fig. 1 is of their standard mine locomotive, equipped with cab and special draw-bars for surface work. This locomotive, as portrayed herewith, is used by the Minnesota Iron & Steel Co., Minneapolis, Minn.; its weight is 13 tons; draw-bar pull, 4500 pounds; speed, 8 miles per hour. Fig. 2 shows an electric locomotive used by the Bunker Hill & Sullivan M. & C. Co., Kellogg, Idaho. Supt. Barbridge says this locomotive hauled a train of twenty cars, each weighing, when loaded, about 3500 pounds. Its draw-bar pull is 1000 pounds; speed, 6 miles per hour. Fig. 3 is of an industrial locomotive for inter-factory transportation, used by Balfour & Guthrie of San Francisco. Its weight is 4000 pounds; draw-bar pull, 500 pounds; speed, 8 miles per hour.

In the issue of Nov. 25, 1899, was given a description of the electric traction at the Hidden Treasure mine, Placer Co., Cal., with illustrations specially engraved for this paper. Regarding the operation of this locomotive, Harold T. Power, president of the company, says that, when operating by animal traction, not over 180 tons of gravel could on an average be hauled in two shifts of ten hours each; with the electric locomotive an average of 350 tons of material was handled during the same period of time. With animal traction it required 30 minutes to take in the men; the electric locomotive made the trip in 8 minutes. The locomotive runs steadily 20 hours a day, 6 days in the week. The issue referred to has detailed figures comparing electric with animal traction at the last named mine, which are of value to any one interested therein.

FIG. 2.

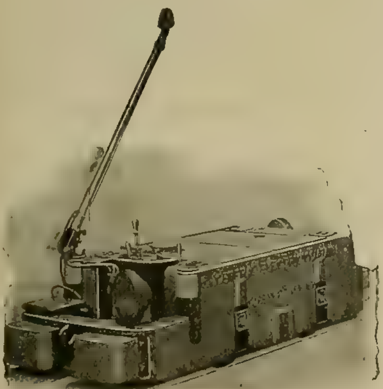
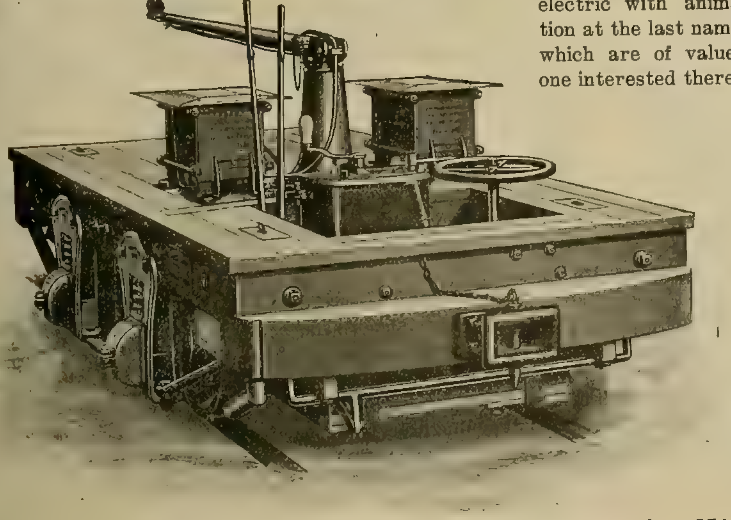
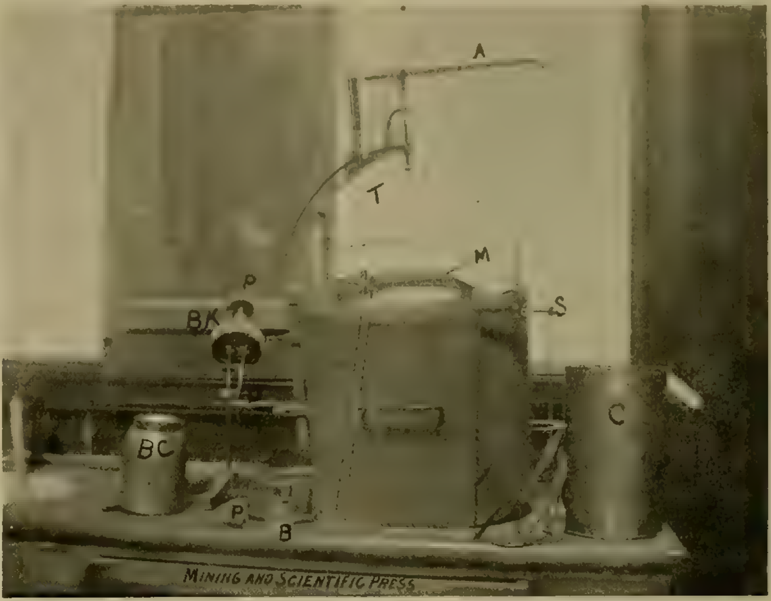
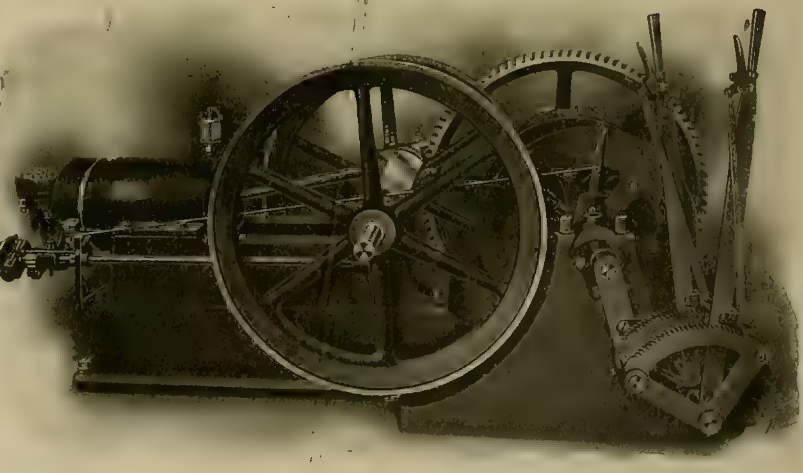


FIG. 3.



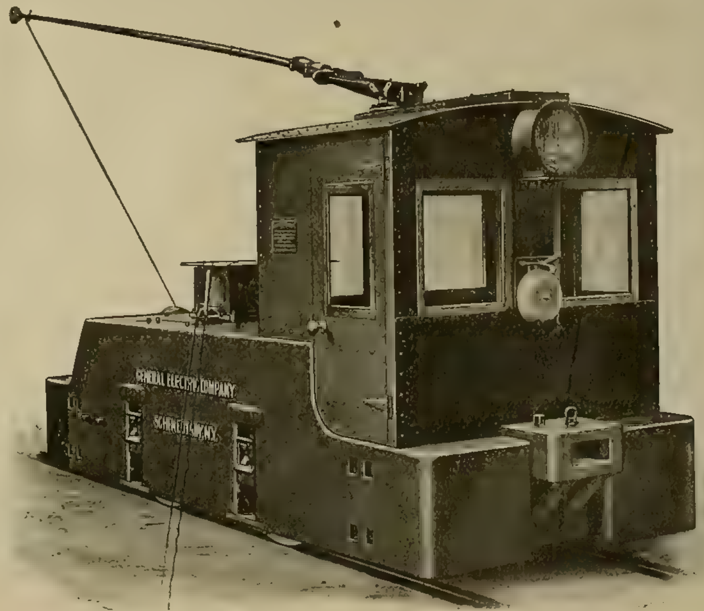


Bomb and Calorimeter. (See page 569.)



Witte Gas and Gasoline Hoist. (See page 570.)

FIG. 1.



Electric Mine Locomotives.

MINING AND SCIENTIFIC PRESS.

ESTABLISHED 1860.

Published Every Saturday at 330 Market St., San Francisco, Cal.

ANNUAL SUBSCRIPTION:

United States, Mexico and Canada..........$3 00
All Other Countries in the Postal Union.......... 4 00

Entered at the S. F. Postoffice as second-class mail matter.

J. F. HALLORAN..........Publisher.

Special Representatives:

EASTERN.
E. H. HAVEN..........150 Nassau St., New York City.
MIDDLE WEST.
CHAS. D. SPALDING..........153 La Salle St., Chicago, Ill.
INTER-MOUNTAIN.
W. A. SCOTT..........43 Jacobson Building, Denver, Colo.
SOUTHERN CALIFORNIA.
W. D. CURTIS..........223 W. Second St., Los Angeles, Cal.

San Francisco, December 8, 1900.

TABLE OF CONTENTS.

ILLUSTRATIONS.—Bomb and Calorimeter; Witte Gas and Gasoline Hoist; Electric Mine Locomotives, 566. A New Throttle Valve, 569. Latest Mining and Metallurgical Patents, 571. New Machine Shop of the Lunkenheimer Co., 572. Steel Head Gear, Elkton Mine, Cripple Creek, Colo., 573.
EDITORIAL.—Electric Mine Locomotives, 566. Proposed Federal Appropriation; Studying Mining Engineering; Miscellaneous, 567.
MINING SUMMARY.—574-575-576-577.
LATEST MARKET REPORTS.—577.
MISCELLANEOUS.—Concentrates, 568. Relative Values of Fuels Used on the Pacific Coast; A New Throttle Valve, 569. Pyritic Smelting in the Black Hills; Factors of Safety; Witte Gas and Gasoline Hoist, 570. Latest Mining and Metallurgical Patents, 571. Use of Hot Blast in Smelting; California Miners' Association Committees; The Lunkenheimer Co, 572. Oil and Gas Yielding Formations of California; An Explosion of Scientific Interest; Steel Head Gear at Cripple Creek, Colo.; Some Diamond Figures; Uses of Vanadium, 573. List of U. S. Patents for Pacific Coast Inventors; Notices of Recent Patents; Personal; Recently Declared Mining Dividends; Commercial Paragraphs, 577.

THE latest addition to the much discussed subject of the origin of the Yosemite valley, Cal., is by H. W. Turner, a fine monograph just issued by the California Academy of Sciences. Mr. Turner's position and experience entitles his views to considerable credence, and in very extended discussion of the subject he inclines to the belief that the Yosemite valley "was formed by river erosion, facilitated by strong jointing."

◆

THE importance of Cripple Creek, Colo., as a gold-producing district is graphically illustrated by this year's gold output therefrom, which, it is now estimated, will aggregate $23,000,000. In the last nine years Cripple Creek has produced nearly $90,000,000 in gold, with a profit to the producers of about one-half that amount, and estimates for next year include a gold output for the ensuing twelve months of $30,000,000.

◆

THE hysterical headlines in the dailies concerning the alleged formation of a "great gold trust" that is going to absorb and control all the principal gold-producing properties in the world are not to be given serious attention. Such a project is impossible from the very nature of things, and none know this better than the very men named as the projectors. Even assuming that the airy scheme were an accomplished fact, it could apply only to the present. Prospectors and miners are daily developing new properties susceptible of great gold output, and the possibilities of such further development are so great as to border on the illimitable.

◆

COPPER stocks are attracting unusual attention. Last week the $75,000,000 capitalization of the Amalgamated Copper Co. was for the first time quoted on the New York Stock Exchange. The Anaconda Mining Co.'s stock was already on its list. The Amalgamated Co. gives little information to the Stock Exchange or any other public or private organization as to its affairs, and though it regularly pays 8% dividends, the general public does not encourage such secrecy by purchase. The result of the noted reticence is that while an 8% or even a 6% dividend-paying stock ordinarily now sells for considerably above par, the stock of the Amalgamated Copper Co. sold last month, after its being placed on the New York Stock Exchange, as low as 94⅝. In general, however, at the present cost of production and selling price, copper is considered in the East as "a good buy." The Old Dominion, of Arizona, is producing 10,000,000 pounds per annum at a cost of seven cents per pound, which is indicative, in a general way, of the present profits in copper mining.

Studying Mining Engineering.

There is a manifest connection between the big salaries paid a few prominent mining engineers and the enormous increase in the number of young men "taking a mining course" at so many mining schools and in so many colleges and universities. The prizes look so big that the attraction is great, and, evidently, a great majority of the young men now studying in "mining colleges" look forward to the time when they, too, will enter upon a successful career as mining engineers at a fine salary.

It is to be sincerely hoped that each deserving student will win such a prize, but there is a difference between getting one's degree in a college and getting a good paying position, or, having such a position, in successfully and satisfactorily holding it to the mutual satisfaction of all concerned. Without decrying the praiseworthy effort, the laudable ambition or the hearty endeavor that impels a bright and capable young fellow to try and fit himself for so responsible a position, it is to be borne in mind that knowledge is not judgment, that learning is distinguishable from experience, that good intent is not proved capacity, and that the graduate from a mining college is only at the threshold of his career. He finds the field fairly filled by able men of experience, and, however gifted or endowed with educated energy, he must first learn something not possible to be learned in college—how to use his head and his hands in practical work; how to get on with others; how to act therein where so much depends upon such action; and that there is considerable work of the hardest and commonest kind that can only be learned by doing it.

Thousands go out of our colleges every year with their heads full and their hands empty; crammed with knowledge, but destitute of the "know how;" the proud possessors of degrees, but without cognizance of the practical requirements of their chosen profession, and then begins the dreary process of unlearning—of unloading the useless lumber—and retaining the few clear, bright ideas that, coupled with the knowledge acquired only by experience, will win them place. Happy those who have the fortunate faculty of forgetting; for it is only in discarding considerable of what they carry out of college that they can ever hope to succeed.

This is not said to daunt the ardor nor deter the effort of any young man who is seeking, through college, to fit himself for the position of mining engineer. Under certain limitations and with certain provisos he is on the right track; but he should realize that, while the college can and will do much for him, the number of those who are likely to attain prominence or profit is necessarily circumscribed, and that once in the field he can only get what he earns, and by his work alone can he demonstrate his value amid difficulties that do not exist in less arduous professions. The field of mining engineering offers just about the same professional rewards that any other lucrative and desirable profession proffers. The young engineer can not step from the college campus to a high position; he must show what he can do, and, as in all other walks of life, the world will pay a man whatever value he sets upon himself just so soon as he demonstrates that he is worth that. He must, however, despise not the day of small things, nor expect to be immediately placed in charge of great enterprises. It is for him to win plumes and then wear them. Happy he if he can learn the truth of this without the set-backs, disappointments and heart-breaks that so often prematurely age and weaken the spirit of the young man who fails to realize that the day he leaves college he is only beginning, and that the best he may expect to carry away from his alma mater is the trained brain. In this lies the great advantage of college education, for it is a great advantage to know what to do. The equally important advantage of knowing how to do it can, however, only be learned by subsequent work.

There is good in study and in college training: it economizes time and cultivates mentality; its influence is for good and its development favors the creative powers. The study of mining engineering or any other form of mining is to be commended when under competent instructors, but the student should remember that one must learn as long as life lasts, and that when the college doors close behind him the best and most valuable part of his education lies before him.

Proposed Federal Appropriation.

Minining and scientific progress was practically considered in the first session of the present Congress by the introduction of a bill in the interests of mining and metallurgy to appropriate yearly to each State and Territory money for the maintenance of schools of mines. Notice was made of the measure at the time of its introduction. It will be remembered that it provided about as follows: That there shall be annually appropriated out of money from the sales of public lands to each State and Territory for the establishment and maintenance of schools or departments of mines and mining in connection with the colleges for the benefit of agriculture and the mechanic arts, now established or which may be hereafter established in accordance with the provisions of an Act of Congress approved July 2, 1862, the sum of $10,000 for the year ending June 30, 1901, and an annual increase of the amount of such appropriation thereafter for five years by an additional sum of $1000 over the preceding year, the annual amount to be paid thereafter to each State and Territory to be $15,000. Such appropriations are to be expended only for geological instruction, mining engineering, metallurgy, research in road-building material and its proper application, and the branches of learning pertaining thereto, including the various branches of physical, natural and economic science and the facilities for such instruction, research and experiment, the idea being "to promote a liberal and practical education and secure the most intelligent use, conservation and development of the mineral resources of the country." In any State or Territory where a school of mines has been established by the Legislature thereof, separate from the colleges or universities hereinbefore named, the appropriation is to be paid to such institution.

The bill further provides: "That a detailed report of the operations conducted by the respective schools or departments of mines, during each year ending the thirtieth day of June, shall be transmitted on or before the first day of the following November to the Governor of the State or Territory in which said college or school is established, and a printed copy of said report shall be sent to each school or department of mines herein provided for, and to the Secretary of the Interior. Said report shall contain a statement of all experiments and work of a practical and scientific nature conducted during the preceding year, which may be considered of special value to the mining and metallurgical industries, together with the condition and progress of such school or department, including general information as to the number of its professors and students, its courses and methods of instruction, its library and general equipment. Bulletins or supplementary reports shall be published by said schools or departments from time to time on subjects of importance to the mining community or to the interests of any particular branch of mining industry or mining districts."

The bill is in direct line with existing requirements; the small amount embraced in the appropriation should be regarded as an investment that would make direct return of an exceedingly profitable nature.

It will take some effort, however, to direct public opinion to the manifest value of the proposition, and from our standpoint the success of the bill does not seem of present promise. The measure will be opposed by those who see in it a menace to their individual interests, and such opposition will be more active than the sleepy indifference of the public to anything of that nature.

◆

THERE is a growing demand for mica consequent upon its use for electrical insulation, and among manufacturers of electrical machinery mica in such small sheets as were formerly unsalable now finds purchasers. Even scrap mica is now being utilized for lubricants. Last year the United States produced 108,570 pounds sheet mica, valued at $70,587, and 1505 tons scrap mica, worth $30,878. This was considerable of a decrease as compared with former years, caused by increased imports, which last year amounted to 256,228 pounds, valued at $1,616,397. During the year 1899 the total importation of mica manufactured was 1,709,839 pounds. The importation of mica is on the increase, and domestic production is on the decrease.

Concentrates.

"CONCENTRATES" knows of no place in this country where tin ore is mined or smelted.

LAST year there was a total production of zinc oxide directly from the ore in the United States of 39,663 tons.

WATER in freezing tends to purify itself, the tendency being to precipitate the solid matter as the water congeals.

A GOVERNMENT EMPLOYE is not exempt from the annual required assessment work on a mining claim that he locates.

THE fluorspar mined near Prescott, Ariz., runs about 35 cents per ton silver, but is used as a flux by the San Francisco smelting firm to which it is shipped.

AT the beginning of the Boer war there were about 13,000 white men employed in mining in the Rand, S. A., whose average salary was about $1600 per year.

UNDER certain conditions and in conformity with certain requirements, "the vein or lode can be followed beyond and beneath the side lines of the location."

"ORE IN SIGHT" is indeterminate. Where three sides of the ore body are visible, it is possible to give measurements of quantity and estimates of values.

THERE have been poets among miners. The great German poet Goethe was a miner, and for many years had charge of all the miners in the duchy of Weimar.

ONE indication of the cessation of hostilities in South Africa is the fact that cipher telegrams may again be sent, they being no longer interdicted, and a code book is once more of some value.

A GOOD anti-friction metal is made of Banca tin 89%, antimony 7.4%, Lake copper 3.6%. The Government bought 20,000 pounds of that alloy last week, delivered at Washington, D. C., at 27½ cents per pound.

FINANCIERS figure that at present there are about 12,500 tons of gold in the world, of which about 7200 tons is monetary gold stock, nearly six times as much gold being in circulation as there was 100 years ago.

THE "electric explosion" noted in the San Francisco daily papers as occurring in a building corner Sansome and California streets, was an explosion of gas. Electricity does some queer things, but never "explodes."

A MAN can not hold a quartz location "by building a reservoir and spending $100 worth of work on the reservoir, but doing no other kind of work on the quartz claim," even though the reservoir be situated on the claim.

EIGHT PERSONS can locate, jointly, 160 acres placer claim; for each twenty acres the equivalent of $500 in work or improvement must be done before the locators can secure patent. One discovery on the whole tract is sufficient.

CRYOLITE is extremely fusible, melting in a candle flame; it is used in the manufacture of aluminum and sodium. It is found in small quantities in Colorado. Its chief source of supply is from Greenland, where it is found in large deposits.

SQUARED TIMBERS 12 to 18 inches are frequently used for mine timbering, and in the Cœur d'Alenes are thoroughly coated with lime when put in, which, adding to the light of the station, aids in preserving the timber, and as a slight fire preventive.

IF an inventor forgets or abandons his invention after a reduction to practice in private, and before a public use, his competitor may claim the patent. If he forgets or abandons it after a public use, his competitor can take no patent, but the forfeiture will inure to the benefit of the public.

THE watt is the unit by which electrical energy is measured. It is calculated as being equal to the current of one ampere flowing at a pressure of one volt, i. e., a current of ten amperes with a pressure of 100 volts represents 1000 watts. A horse power is understood to be the equivalent of 746 watts.

IN figuring on electrical transmission and thus utilizing water power, where the question comes up of relative cost, it is to be remembered that in the case of building a dam and construction and maintenance of a reservoir, is involved a fixed investment, and one that is not ordinarily susceptible of being turned into money.

IT is now common in chlorination work to neutralize the free chlorine in the leach liquors by ferrous sulphate instead of by use of SO_2, about seventy-five pounds of the sulphate being added to thirty tons of the solution. The ferrous sulphate is obtained as a by-product from the generation of the hydrogen sulphide there used as a precipitant for the gold.

THERE is nothing electric about "galvanized" wire. The process of manufacture is purely mechanical throughout. The wire, after annealing, is cleaned in dilute hydrochloric acid, then run through a trough containing a slightly stronger bath of the same acid, into molten zinc, then rewound, the superfluous zinc being wiped off as the wire leaves the bath, by means of asbestos or sand.

MOLYBDENITE, concentrated, is worth about $200 per ton. Molybdenum is quoted at $1.45 per pound in New York City. It is not used on the Pacific coast. The Illinois Steel Co., Chicago, or the Bethlehem Steel Co., Bethlehem, Pa., could furnish information as to probable purchase of either the molybdenum sulphide or the metal itself. It is commercially used as a deoxidizer in steel manufacture.

FOR shingling 4-penny cut nails are considered superior to 3-penny wire nails. The latter are the same size all through, and they rust out near the head by continual exposure, while the former has twice the amount of material near the head than at the point, and will last much longer. Iron nails are considered preferable to those made of steel.

A CHANGE in the output of a mine is not unusual. In the Comstock, Nevada, the ore was almost exclusively silver bearing at first, but depth yielded bullion that was 54% silver and 46% gold; the Anaconda was originally a silver mine, but with depth changed to copper; in many cases in Colorado silver-lead ore has changed with depth in gold ore assaying in some cases twelve ounces to the ton.

IT is against the business policy of this paper to take machinery or supplies of any kind in payment for advertisements therein. It would be manifestly unfair to our advertising patrons to do so, because the only use the paper would have for such material would be to sell it, and that would immediately put the paper in the position of being a competitor of the men who advertise herein; hence such proffers are invariably declined.

ANY company can change its principal place of business by holding a special stockholders' meeting to amend its by-laws for that purpose. The principal office must be in the State in which the company is incorporated, but they can have as many other offices as the board of directors deem advisable. The company can do business in any county in this State by filing a certified copy of their articles of incorporation with the county recorder where they desire to operate.

AN assay from a specimen piece of ore, however accurate, is no index of the value of the ore body from which it came. The assayer can only give the value of the sample furnished him. To afford any fair idea of the value of the mine the sample must be of the average of the ore and not a picked specimen; and a "mill run" of ten tons can, with a little further effort, be simply an aggregate of selected ore much richer than the average ore from the mine would furnish.

WITHIN the last decade sulphuric acid has been commercially produced by passing a mixture of air and sulphur dioxide over finely divided platinum heated to 400° C. Sulphur trioxide is thus formed as a vapor, which is dissolved in water, thereby forming sulphuric acid. Special precautions are taken to keep the heat below 800° C., at which temperature the sulphur trioxide is decomposed into sulphur dioxide and oxygen. On account of its simplicity and cheapness, this method seems likely to replace the older and more cumbersome process.

READERS of this paper doubtless notice that through the years appear fine engravings of mining scenes from every part of the earth where mining is carried on. For the photographs from which these engravings are made we are largely indebted to the thoughtful kindness of so many of our friends who, traveling about, send pictures of note from where they are sojourning for a season. We would be pleased to receive photographs of mining scenes for such reproduction from our readers everywhere, and would gladly give due credit for such graphic remembrance.

WORK on the Sutro, Nevada, tunnel began October 19, 1869. Connection was made with the Savage shaft July 8, 1878. The distance from the mouth of the tunnel to the Comstock vein is 20,016 feet. The tunnel was bored by "day's work," $5 per day being the lowest wages paid workmen. The "system or plan by which the owners were remunerated for the expense" never fully materialized. The plan was to secure sufficient in royalty for the use of the tunnel by Comstock mine owners to produce profit. But by the time the tunnel reached the Comstock the bonanza days were about over.

THE two names muscovite and sericite practically signify the same mineral, though sericite is employed for the fine-grained or fibrous and tufted modifications resulting from the replacement of other minerals. Sericite is probably the most universal and abundant of all minerals forming in altered rocks near fissures. Only a few classes of ore deposits—namely, those in limestone and those in recent volcanic rocks, involving propylitic alteration—are comparatively free from it. A vast proportion of so-called "talc," "clay" and "kaolin" is really sericite. Sericite forms from quartz in many rocks, though this action is less intense than in the case of the silicates.

AS TO the question, "What is steel?" "All metal produced from iron or its ores, which is cast and malleable, of whatever description or form, without regard to the percentage of carbon contained therein, whether produced by cementation or converted, cast or made from iron or its ores, by the crucible, Bessemer, Clapp-Griffiths, pneumatic, Thomas Gilchrist, basic, Siemens-Martin or open-hearth process, or by the equivalent of either, or by a combination of two or more of the processes, or their equivalents, or by any fusion or other process which produces from iron or its ores a metal either granular or fibrous in structure, which is cast and malleable, excepting what is known as malleable iron castings, shall be classed and denominated as steel." Steel is an artificial compound of pure iron and carbon. The iron gives the strength and the amount of carbon regulates the hardness, toughness and ductility of the compound, so that the compound is kept low if a soft and ductile metal is desired for use in boiler plates, hoops, sheets or wire. It is carried somewhat higher for rails and decidedly higher for tool steel, cutlery and drills.

IN any given conditions minerals tend to assume the forms most stable under those conditions. Since the conditions prevailing during vein formation are very different from those prevailing afterwards, it may be inferred that the products of the first process might easily be changed. Such is, indeed, the case, as one finds many altered rocks which have evidently undergone more than one change. Especially near the surface, under the influence of oxidizing waters, the minerals formed in the rocks along veins are apt to suffer great changes. Examples are frequent, showing that the minerals which filled the open spaces along a vein have been completely dissolved and partly or wholly replaced by others. This is particularly true of fillings of calcite or baryte. Instances are known in which large masses of these minerals have been completely dissolved and replaced by quartz, as in the case of those of the De Lamar mine, Owyhee county, Idaho.

A PLANT to work the Hoepfner wet process for the extraction of copper at Papenburg, Germany, has a daily capacity of a metric ton of refined copper. The ore is first crushed in ball mills and leached with cupric chloride solutions. The solution dissolves copper, lead, nickel and silver, the cupric salt being reduced to the cuprous state. After purification and being freed from silver, the solution is allowed to flow to a compartment with carbon anodes and copper cathodes. Chlorine is liberated at the anodes, regenerating the cupric solution, which is returned to a fresh charge of ore. It is claimed that 91% of the contained copper was obtained after four hours' treatment of Rio Tinto ore containing 3.37% copper, and only 3% of the iron content dissolved. By longer contact 98.5% of the copper was extracted, with only 4% of the iron taken up. It is claimed, moreover, that 1 H. P. in twenty-four hours will produce fifty-four kilograms of copper, as against fifteen kilograms by the sulphate process.

THE total bullion product of the Con. Cal. & Va. mine, on the Comstock, Nevada, up to Oct. 1, 1896, according to the official statement of President Fish, was as follows: Gold $61,780,474.86, silver $69,856,832.96, total $131,637,307.82. Dividends: California $31,320,000, Consolidated Virginia $42,930,000, Con. Cal. & Va. $3,898,000, total $78,148,000. The Savage-Norcross-Chollar joint shaft, known as the Combination, is the deepest vertical shaft on the lode, having a depth of 3375 feet from the collar of the shaft to the bottom of the sump. This shaft has five compartments, requiring an excavation 40 feet in length by 10 feet in breadth to admit of timbering. The lowest workings in the Sierra Nevada, Union and Mexican joint winze reached a depth of 3200 feet below the surface. The Yellow Jacket new shaft had a depth of nearly 3000 feet, the Forman 2800. The Crown Point and Belcher lowest workings were at a depth of nearly 3000 feet below the surface. The Best & Belcher and Gould & Curry joint shaft, known as the Osbiston, had a depth of 2800 feet.

IF two or more own a mining claim in common, each co-owner, however great or small his share may be, has a right to go to work anywhere on the claim that he wishes to, so long as he does not interfere with any of his co-owners who may have gone to work before him. No agreement or understanding with his co-owners is necessary. If one (or more) of the co-owners in a claim commences operations on the claim, without any agreement with the other co-owners, he can take out ore and market it and can not be prevented except by process of law. If the proceeds of the ore exceeds all his expenses of mining and marketing it, he must divide the net profits with his co-owners, pro rata to their respective interests in the claims. If, on the other hand, he fails to realize enough to pay expenses, he can not hold his co-owners for any part of the loss. In case he refuses to give an account of his operations to his co-owners, they can sue for an accounting, and, if they so desire, can couple with the suit an action for the ejectment of the co-owner who is working the mine, and petition for a receiver.

IN Souter vs. Maguire (78 Cal., 543), it was held that where the locator of a mining claim marked the corners of the end lines, placed a stake or blazed a tree at each corner of the claim, and in places brushed out the lines, so that a person could get through, and placed a notice in the center of the claim defining the boundaries, that it was sufficient to justify a finding that he had marked off the boundaries as required by the Act of Congress. In the absence of State legislation, or local regulation, what constitutes a sufficient marking is a question to be determined by the jury according to the circumstances in each particular case. The Land Department of the United States (L. O. Regs., par. 15) recommends, and in many localities the custom prevails of driving stakes, building rock mounds, or blazing and marking trees, or brushing out along the end and side lines of the claim, and, in addition thereto, posting a notice in a conspicuous place on the claim, and sometimes marking the end lines of the ledge. The law does not require this character of marking; but inasmuch as it has been held by the highest courts to be a sufficient marking, it has been adopted by miners. Whether the boundaries of a claim are distinctly marked on the ground is in all cases a question of fact, and not of law. All that the law requires is that the location must be distinctly marked on the ground, so that its boundaries can be readily traced. This requirement is an imperative and indispensable condition precedent of a valid location.

Relative Values of Fuels Used on the Pacific Coast.

From Determinations Made by IRVING C. ALLEN, M. S., University of California.

The question of the relative values of fuels for producing heat and for convenience and desirability for use, in proportion to cost, is one of importance.

In addition to the article published in our issues of Sept. 15 and 22, on the use of "California Crude Petroleum as a Fuel," by Ernest H. Denicke, College of Mining, University of California, we have the results of some elaborate and exhaustive tests of coals and other fuels handled at San Francisco, which have been made by Irving C. Allen, M. S., College of Chemistry, University of California. This article is taken from a thesis, written by Mr. Allen, in which he gives at length his method of making these determinations, both mechanical and chemical, with descriptions of the apparatus used.

These tests, which include the leading coals handled at San Francisco, showing their exact comparative values for heat producing, and their chemical analysis, are the results of many months of careful, painstaking labor made by Mr. Allen as Assistant State Analyst, under the direction of Prof. W. B. Rising, Dean of the College of Chemistry. (Mr. Allen is now Government Chemist at Manila.)

We wish to call especial attention to his description and manner of using the Berthelot combustion bomb and accessories, an elaborate apparatus manufactured in Paris for determining fuel values, which description we copy in full from his thesis. The value of the calorie is stated to be "the quantity of heat required to raise the temperature of one gram of water through 1° Centrigrade."

The bomb used in these determinations was made by M. L. Golaz, Paris, and consists essentially of a cylinder of the best tool steel, 10 cm. external diameter at the base and reduced 8 cm. from the base to an external diameter of 7 cm. This cylindrical shell is 1 cm. in thickness and is nickel plated outside and porcelain lined within, and is of 586 c. c. capacity. On to this screws a cap with a hexagonal top, made to tighten with a large wrench, and is made tight with a lead washer and an iron shoulder. Through the center of the cap passes a conical-seated screwcock of fine nickel, made to admit oxygen. The body of the bomb is 16 cm. high, with the screwcock projecting 11 cm. above. Electrical communication is made with the interior of the bomb by well-insulated platinum wires passing through the cap. One of these wires is bent into a ring at its lower end and supports the small platinum dish containing the sample. One end of a small iron wire, used to ignite the coal, is wound tightly around each of these wires and completes the circuit within the bomb.

The calorimeter itself consists of a brass cylinder or cap 14.5 cm. in diameter and 23 cm. high, and contains 2300 grams of water, into which is immersed the bomb. This is protected from external thermal influences by an air jacket 1.5 cm. thick, a water jacket 7 cm. thick; and over the whole is a felt wrapping 1 cm. thick. The water in the inner cup is thoroughly stirred by a coiled agitator, worked by a string in the hands of the observer.

All observations were made at a distance of about 8 feet from the calorimeter, with the aid of a good telescope, in the following manner: About one gram of the sample is accurately weighed into the platinum cup and the cup placed in the ring of the binding post. A length of fine iron wire (No. 35) 7 cm. long, is made to loop under the surface of the sample in the cup, and each end is wound three times tightly about one of the binding posts, passing through the cup of the bomb. If the iron wire be much longer than 7 cm., beads of burning iron will drop during the combustion into the cup and fuse holes through the bottom. If the wire be not firmly wrapped about the binding posts, the current passing through the wire may not be sufficient to cause fusion, and the sample may not be ignited, and this necessitates opening the bomb and rewrapping the wire—a troublesome operation after the apparatus is set up. To make the fusion of the wire, an ordinary lighting circuit enters the laboratory, and from this is shunted through the bomb a small current of 4.6 amperes and of about one volt, of just about sufficient strength to cause fusion of the wire. In this shunt current there is a spring key, and by snapping this key a spark is struck, when all connections are properly made. If there be no spark, there is a faulty connection in the circuit, and it may be looked for either outside or inside the bomb and corrected. This spark is not of sufficient duration to cause fusion of the iron wire, and shows before any readings are made that the apparatus is properly adjusted.

All ragged edges of the lead washer are carefully cut away, for splinters of lead may cause leaks when the bomb is charged, and the screw threads are slightly vaselined, exposing no vaseline inside the bomb, and the cap screwed on. The bomb is gripped in a clamp fixed to the table and the cap tightened. Connection is made with the oxygen cylinders by means of a strong copper tube and oxygen run in until the manometer indicates a pressure of 25 atmospheres. (These cylinders are of heavy iron, of 6 liters capacity, and are charged with a pressure of 1100 pounds. When the pressure of any one cylinder falls below 25 atmospheres, the connections may be changed to a cylinder of high pressure and the bomb charged up to 25 atmospheres, thus utilizing the oxygen in the cylinders until the pressure falls as low as two or three atmospheres.)

The screwcock on the top of the bomb is closed and the bomb removed and placed in the inner cup of the calorimeter, into which 2200 grams of water have been accurately weighed. The thermometer—which reads to thousandths of a degree Centrigrade—and stirrer are adjusted and the stirrer run for five minutes before any readings are made. After five minutes a reading is taken at the end of each minute until a series of five concordant readings are obtained, and the initial temperature, i. e., the temperature of the calorimeter bath before the ignition is made, is ascertained. The shunt circuit is completed for five seconds and the sample is ignited by the fusion of the iron wire. After the lapse of about ten seconds the temperature will rise rapidly for about four minutes and while during this time no readings of the thermometer are possible, the time must be recorded, and when the temperature begins to fall regularly a series of readings must be made—one each minute for from ten to fifteen minutes. The average rate of cooling or radiation after ignition is ascertained. Assuming that this radiation represents the cooling from the instant of ignition—which is not absolutely true, as the radiation from the calorimeter bath immediately after ignition is necessarily less than when the temperature of the bath has risen 3° or 4°; the temperature is calculated at the instant of ignition. This temperature, corrected for radiation, is the temperature to which the calorimeter would rise if subjected to no external thermal influences. As there were 2200 grams of water in the calorimeter bath, and the water equivalent "E" of the calorimeter is ascertained to be 521 calories, the increase of temperature over the initial temperature multiplied by 2721 indicates the calories liberated by the combustion of fuel and iron wire.* Deducting the calories liberated by the weight of iron wire used, the calories liberated by the sample of coal is ascertained.

The bomb and calorimeter are illustrated on the front page. The plate represents the bomb and calorimeter disconnected; BC = bomb cylinder; BK — bomb cap; D = combustion dish; B = base for cylinder; P = binding posts; S = stirrer; A = agitator; C = calorimeter cup; M = mirror; T = thermometer.

TABLE I — ANALYSES OF COAL.

NAME OF FUEL.	LOCATION OF MINE.	Calories, per gram.	PROXIMATE ANALYSIS.				ANALYSIS OF ASH.				Nitrogen	Sulphur	Chlorine
			Moisture	Volatile Combustible Matter.	Coke	Ash	Silica	Iron	Lime	Magnesia			
Cardiff	Albion Mine, Cardiff, Wales.	8746	.49	16.73	80.04	2.73	2.25	.30	trace.	.....	1.32	1.57	.....
Welsh Anthracite	Wales	8522	1.45	6.65	90.23	1.66	1.41	.19	trace.	.....	1.11	.55	.....
Cumberland	Maryland	8521	.79	15.60	79.36	4.23	3.75	.20	.04	.....	1.73	.82	.....
Anthracite		8379	1.55	7.00	88.85	2.58	1.57	.40	.10	.06	1.01	.35	.47
Wellington, Genuine	Departure Bay, V. I., B. C.	8144	2.37	35.10	52.48	10.04	5.33	.91	2.48	.15	1.01	.56	.....
Wallsend	Newcastle, Australia	7945	2.30	32.02	59.88	5.79	4.13	.76	.40	.09	1.74	.....	.....
Helton	Newcastle, Australia	7755	1.59	35.34	56.18	6.88	5.98	.39	.19	.....	1.74	.49	.....
Wallsend, Sydney	Australia	7687	1.61	31.49	60.67	6.22	5.34	.60	.08	trace.	1.49	.45	.....
Kemmerer	Rocky Mts., Wyoming	7624	4.30	39.06	53.58	3.06	1.17	.51	.54	.12	1.05	.51	.....
Dewey Steam		7569	3.26	40.26	52.01	4.46	1.80	1.39	.79	.08	1.60	1.09	.....
Comax	Comax, V. I., B. C.	7563	1.50	28.45	59.55	10.49	4.75	1.03	2.86	.03	.90	1.11	.....
Anthracite, Penn	Pennsylvania	7417	2.86	3.82	82.92	10.40	.....	.....	.....	.....	.71	.53	.....
Franklin	Washington, U. S.	7370	4.76	41.09	49.99	4.15	2.02	.66	.53	.06	.87	.70	.....
Scotch Splint	Glasgow, Scotland	7327	7.20	32.75	56.97	3.07	2.46	.28	.09	.01	1.33	.52	1.58
Castle Gate		7303	2.70	36.59	52 07	8.63	5.85	1.00	.80	.18	1.12	.74	.....
Roslyn	Washington, U. S.	7238	2.06	36.10	50.48	11.36	6.96	1.20	1.06	.05	1.04	.55	.....
Wellington Screenings.	Departure Bay, V. I., B. C.	7219	2.73	34.60	51.90	10.76	5.53	1.22	2.72	.05	1.09	.55	.....
Cannel		7215	3.09	37.42	47.46	12.03	10.56	.67	.34	trace.	.97	.73	.....
Wellington, Southfield.	Nanaimo, B. C.	7186	1.70	33.95	53.19	11.14	4.83	1.70	2.44	.23	.99	1.51	.....
Wellington	Vancouver Island, B. C.	7055	2.06	36.28	51.81	9.82	4.60	1.00	2.19	.12	.91	.50	.....
Rock Springs		7006	7.03	36.89	52.70	3.36	1.71	.83	.10	.....	1.10	.85	.....
Leary	Washington, U. S.	6700	6.29	36.53	47.42	9.74	9.00	.40	.05	.02	1.58	.49	.....
Newcastle		6600	10.10	38.25	45.49	6.15	4.18	.73	.50	.07	.98	1.08	.....
Seattle	Newcastle, Washington, U.S.	6406	11.51	40.58	43.25	4.65	2.54	.80	.47	.07	1.05	.32	.....
Bryant		5779	13.06	36.95	42.24	7.74	5.56	1.01	.63	.05	.96	.59	.....
Coos Bay	Newport, Coos Bay, Oregon.	5452	16.91	39.85	35.04	8.19	3.52	1.39	1.16	.13	1.03	.....	.....
Tesla	Tesla, California	5225	17.58	39.20	32.33	10.89	4.07	.95	2.49	.07	.59	2.89	.....
Cannel	Newcastle-on-Tyne, England	5110	2.04	39.21	40.15	18.59	16.92	1.02	2.11	.....	1.05	.90	.....
Franklin		4784	2.35	28.05	34.76	34.84	25.70	1.53	3.62	.09	.60	.....	.....
Bryant	Washington, U. S.	4394	13.85	42.21	37.09	6.87	5.09	.85	.53	.07	1.08	.39	.....

TABLE II — MISCELLANEOUS.

Tesla Briquettes (Contain 26.21% oil.)		5715	6.84	34.48	36.92	20.75	12.55	3.40	1.43	.27	1.07	2.68	.....
Bituminous Earth (Contains 2.74% oil.)		1829	20.63	23.62	9.21	46.53	30.12	6.16	5.23	.13	.80	2.35	.....

TABLE III — COKE.

English Gas		7397	2.12	2.10	87.77	8.09	6.57	.57	.43	.06	1.27	1.04	.....
Pelton Main		7332	.89	1.49	87.47	10.14	7.27	.81	.66	.14	.88	1.13	.....
German		7039	1.24	1.39	85.06	12.30	9.41	.75	.74	.12	1.12	1.15	.....

TABLE IV — GRAPE PULP.

"Sweet" Pulp	U. S. Agr. Exp. Station	5226	5.33	62.80	27.81	4.05	.04	.23	.....	.56	2.21	.15	.....
Unpressed Fermented.	U. S. Agr. Exp. Station	4926	6.12	64.85	23.64	5.38	.33	.56	.01	.39	1.71	.16	.....
Unfermented	U. S. Agr. Exp. Station	3993	8.32	63.26	23.00	5.41	.33	.91	.11	.12	1.74	.12	.....

---

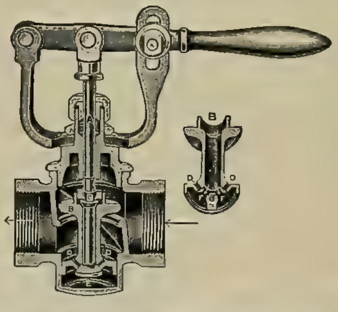
* According to Berthelot, 1 gm. of pure iron wire, burning to Fe_2O_3 liberates 1576 8 calories.

◆

A New Throttle Valve.

The Pendry balanced throttle valve, shown in section in the accompanying cut, is considered by the makers well adapted for use on hoisting engines, marine engines, steam shovels and on all quick acting engines, as by means of it the full boiler pressure can be instantly admitted to the cylinders and as instantly shut off. In addition to its quick opening feature, it is also a perfectly balanced valve, and so can be easily operated, no matter how great the steam pressure being used.

Its operation is as follows: The stem A forms two seats with the main valve B—one at its upper and one at its lower end. The first slight movement of the handle will raise the stem A off its upper seat. The steam passes in through this opening, down through the body of the valve B in the space around the stem and into the balancing chamber E through the openings marked F on the small sectional view of the valve body to the right. In this way the full boiler pressure is admitted into the chamber E, balancing the valve; and, as the same pressure is below as above it, it is very easily operated. While this valve is primarily a quick opening one, it can be opened as slowly and as gradually as a screw stem valve, and will stay open at any point one may desire to set it. This feature makes it adapted for use on all types of steam engines. The question of leakage can also be prevented in this valve, as it has but one seat, and this can be ground the same as that of a globe valve. A circular giving full description may be had by addressing the manufacturers—The Detroit Lubricator Co., Detroit, Mich.



Pyritic Smelting in the Black Hills.*

NUMBER IV.—CONCLUDED.

In the replacing of lime with magnesia, the formation temperature rises rapidly until one-eighth of the lime has been replaced with magnesia; then it falls until one-fourth has been replaced; then rises until one-half has been replaced, and suddenly falls until five-eighths have been replaced, and then rises rapidly until the whole of the lime is replaced, where it reaches a formation temperature too high for metallurgical work.

The curve, after the addition of magnesia, while it falls at two points rather low, at no time reaches the line of the basal or normal lime-iron silicate.

That the same or a similar curve would be obtained if a different percentage of silicate were used—as, for instance, our Deadwood slags—is probable; but the use of magnesian limestone for our slags was preferred to the pure limestone. Nothing like a scientific attempt was ever made to determine the formation point of our slags, hence I can not say that they were less fusible than they would have been with all lime and no magnesia. They did seem more liquid, and certainly less magnesian limestone was required for the same work. This was due, of course, to the lower combining weight of magnesia. One part by weight of silica to form a bi-silicate slag requires 0.93 parts of lime, but only 0.66 parts of magnesia.

Again, the Hofman curves show that the formation temperature falls when lime is replaced by alumina. It falls below the line of his basal silicate until as much as three-fourths of the lime has been replaced by alumina. The slags, however, were very viscid. Now, if magnesia raises the formation point above the normal, and alumina lowers it, the net results might be, in our slags, not only to cancel each other's effects, but to give a more fluid slag, owing to the multiplication of bases, which in a general way is known to have that effect.

In pyritic smelting the slags must possess distinct characteristics—even if accomplished at the sacrifice of other points. First—They must be of low specific gravity, owing to the low specific gravity of the matte, that a perfect separation may be had by gravity. The high silica, lime, alumina and magnesia, and low iron, tend to bring this about. Second—In order to have time for the matte to settle out they must not chill it too quickly. It is desirable, therefore, to form a slag which will remain fluid as long as possible. The low formation points of the high silica slags tend, I think, to aid this.

Before the appearance of Prof. Hofman's paper the peculiarities of slags were known only in a general way; and, speaking for myself, I knew more from the work of Percy and Smith than from any other sources. Percy did not, however, do more than to make mixtures and melt them in crucibles and note the results. In determining what silicates I could make at Deadwood I simply followed the Percy–Smith methods; but by the aid of Prof. Hofman's paper it is now possible for the first time to predict what effects certain elements will have. In new work that I am doing for a matte smelting plant at Buena Vista, Colo., and another for Cripple Creek ores, I have found this paper of great value.

TABLE III.—BALLING'S TABLES FROM "COMPENDIUM DER METALLURGISCHEN CHEMIE."

One part by weight of silica requires	Parts by weight of bases	One part by weight of bases requires	Parts by weight of silica
For singulo-silicates:		For singulo-silicates:	
Lime	1.86	Lime	0.535
Magnesia	1.33	Magnesia	0.750
Alumina	1.14	Alumina	0.873
Ferrous oxide	2 40	Ferrous oxide	0.416
Manganous oxide	2.36	Manganous oxide	0.422
For bi-silicates:		For bi-silicates:	
Lime	0.93	Lime	1.070
Magnesia	0.66	Magnesia	1.500
Alumina	0.57	Alumina	1 747
Ferrous oxide	1.20	Ferrous oxide	0.883
Manganous oxide	1.18	Manganous oxide	0.845
For sesqui-silicates:		For sesqui-silicates:	
Lime	1.24	Lime	0.803
Magnesia	0.88	Magnesia	1 126
Alumina	0.76	Alumina	1.310
Ferrous oxide	1.60	Ferrous oxide	0.626
Manganous oxide	1.57	Manganous oxide	0.633

In our slag calculations we saved time by the continual use of Balling's well-known tables. The problem in our sort of smelting is very simple. We determined by means of the second table how much silica was fluxed by the iron, lime, etc., contained in the ores, subtracted it from the total amount to be fluxed, and then, by means of the first table, sought how much limestone must be added to take care of the remaining silica. Of course, a chemist can do all this without the aid of tables, and, moreover, since the publication of Robert Austin's work and of Hofman's "Lead," these tables are easily obtainable. That they may be still more easily had I give them here, feeling that their publication by the Institute will be appreciated.

If any one doing this kind of smelting will keep his slags between $4RO, 3SiO_2$ and RO, SiO_2, his troubles will be few, provided he has proper bases—i. e., lime and iron, etc. If there is a trade secret about matte smelting for gold and silver, it is this only. The Balling tables will enable the most ignorant to observe these limits. The "typical" slags of Iles, Eilers, Schneider, Raht, Hahn, Page and Livingston may be left as guides for the lead smelters, who have need of them by reason of a widely different problem. To the matte smelter they are not only useless, but confusing, and, I believe, often the cause of failure. With the iron matte low in copper, it is immaterial whether a little more or less iron goes into the slag. The resulting matte will carry the gold and silver in any case. The smelter in this line is not concerned with problems relating to the scorification of copper and lead.

REFINING AND DISPOSITION OF THE MATTE.—With iron matte, or matte very low in copper, there exists usually no problem, for it can be sold to the lead smelters. With high percentages of copper in the matte, however, there is a difficulty. It carries usually too much gold for the ordinary copper refineries, and too much copper for the lead refineries.

At one time, about 1892–93, we had a difficulty in disposing of our matte. We erected a lead furnace, bought lead ores, and crushed and added the matte raw to the lead charge. I found that the matte gave up nearly the whole of its gold to the lead. It still contained much silver. This matte was very different from the "first matte," and for want of a better name we called it after the Germans, "herd rohstein" (hearth matte), and added it to the matte smelting charge, but, owing to its containing lead, this treatment had not much success, as the lead was lost. The resulting bullion in the lead process—very high in gold—was sold to the lead smelters. Fearing that they might decline to buy this, also, we erected one very large cupel, and two smaller ones, all of the English type, intending to cupel the bullion and add the resulting litharge to the lead process. The whole process was borrowed from pyritic smelting as it is practiced in Kongsberg and in Russian Siberia, save that I used an ordinary American lead smelting furnace, and English cupels. The process, except as to the loss of lead in the matte furnace, was promising, and, in the favorite language of the patent right man, "continuous." The "first matte" went into the lead furnace, the second or hearth matte back into the matte furnace. The lead bullion went to the cupels, and the litharge back to the lead furnace. I do not know how this experiment would have ended, for our difficulties with the lead smelters were adjusted and our relations with them ever afterwards remained of the most pleasant character.

The idea of refining, however, continued with me, and in connection with Arthur Howe Carpenter I made many experiments, sometimes original, but more often after the lines laid down by the old metallurgists, who seemed to have covered, in theory at least, about everything. The most satisfactory process, and the one I should have followed had I remained at the works, was that laid down by Jars (I think in 1784) and quoted by Percy in the first edition of his "Metallurgy." Afterwards it was patented by the Vivians and others, and forms the first step, at least, of the Argo process. It will be remembered that our process was mainly for gold, and that copper matte so high in gold was not desired by electrolytic copper refiners. Any process that would take out the gold and other "impurities" would fit it for their process. The first step is the well known copper-bottom process described for us by Dr. Pearce in his presidential address. I proposed not to try to separate the silver from the matte, but to proceed at once to the copper-bottom process, which I thought might be performed either by the French "selecteur" method or as is now done at Argo.

The resulting product—high-grade copper matte—having given up nearly all of its gold and much of its silver, could be blown up to blister copper and sold directly to the refiners. The copper bottoms I granulated, oxidized and cast back into matte and effected a second "selecting," similar in all respects to the first.

This selecting process is not wholly successful unless the copper matte is impure, a certain percentage of lead being necessary. This lead is, of course, concentrated in the first bottom or "selecting," so that this carries a very large percentage of lead. In the second selecting this is so increased that the resulting bottom may be at once cupelled—often requiring little or no additional lead. In fact, the first bottom can be directly cupelled, with the addition of lead, if so desired, the coppery litharge being, as shown by Samuelson, even more fusible than the purer litharge of the ordinary methods. In practice six parts of lead to one of copper give very satisfactory results. The coppery litharge forms a product which can be treated by the lead smelter, who has but to add to it his ore charge—the lead going to the bullion and the copper to the matte.

It is unnecessary actually to repeat the selecting process in all its details upon the first bottoms as above described. Equally good results, with much less trouble, can be had by simply returning the first bottoms, or "plates," to a reverberatory furnace, with additional sulphide material, and running them over and over until they are sufficiently reduced in size for final treatment by cupellation with metallic lead. The resulting coppery litharge is easily reduced to metallic lead and matte by treatment in a small reverberatory or "softening" furnace, with galena or iron pyrite. The lead may be used over and the matte is returned to the ore smelting.

---

*F. R. Carpenter, August Meeting, 1900, Transactions A. I. M. E.

Factors of Safety.

TO THE EDITOR:—In the enclosed clipping the statement is incorrect, and might get some engineer or boiler owner into serious trouble if followed:

> In the case of a boiler 72 inches diameter, double-riveted lap seam, $\frac{11}{16}$-inch rivets spaced 3 inches between center, thickness of plate $\frac{9}{16}$ inch, of 60,000 pounds tensile strength, the safety valve should be set to relieve the boiler at 130 pounds.

First, the United States factor for safety on steam boilers is $4\frac{2}{10}$ for punched holes and $3\frac{5}{10}$ for drilled holes. Philadelphia city law, also the English, French and Russian laws, require a safety of 5, whereas in the example given the safety factor under 130 pounds steam pressure would be $2\frac{37}{100}$, or just a little more than twice the steam pressure carried.

Second, the size of rivets given ($\frac{11}{16}''$), $\frac{3}{4}''$ holes, is entirely too small for $\frac{9}{16}''$ boiler plate. They should be $\frac{15}{16}''$ rivets driven in 1°″ rivet holes pitched about $2\frac{3}{4}''$, centers, to get a fair joint.

The average shearing resistance of good iron rivets in a lap joint (single shear) is 38,000 pounds per square inch of section.

Taking the example as given, it would work out as follows: Boiler 72″ diameter, $\frac{9}{16}''$ plate, 60,000 pounds T. S., $\frac{11}{16}''$ rivets, $\frac{3}{4}''$ rivet holes, 3″ pitch. $\frac{9}{16}''\times3''\times60{,}000$ T. S. $=101{,}250=$ solid plate. $3''-.75=2.25\times60{,}000=75{,}537$ net section. (Rivet hole $=\frac{3}{4}''$) $.75\times.75\times.7854=4417$°″ $\times\,38{,}000=16{,}784$ pounds shearing resistance of one rivet. Two rivets $=16{,}784\times2=33{,}568$ pounds. The rivets are the weakest; therefore the strength of the rivets divided by the strength of the solid plate $=33{,}568\div101{,}280=33\frac{1}{10}\%$ as the efficiency, or percentage of the joint to the strength of the solid plate. (It should be 70%.)

Then, $.5625\times60{,}000$ T. S. $\div\,36''$(radius) $=937\frac{1}{2}$ pounds as the bursting pressure of the solid plate. Then, $937\frac{5}{10}\times33\frac{1}{10}=310$ pounds as the bursting pressure of the seam. Then, $310\div4\frac{2}{10}$ as the safety factor required by United States law for punched holes $=73\frac{8}{10}$ pounds as the safe working pressure; if the rivet holes were drilled, then $310\div3\frac{5}{10}=88\frac{6}{10}$ pounds as the safe working pressure.

If the joint had been properly proportioned, then the safe pressure for drilled holes, according to the United States law, would be $937.5\times70\%=686$ as the bursting pressure of the seam; then, $686\div3\frac{5}{10}=193$ pounds as the safe working pressure.

J. B. WARNER,
Chief Inspector, San Francisco.

Witte Gas and Gasoline Hoist.

The latest improved Witte gas and gasoline hoist, illustrated on the front page, is designed to use any grade of gas or liquid fuel capable of generating heat, but fuel which leaves no sediment. The hoister bed has bolted to it the engine and all the working parts, levers included, only one foundation being necessary. A loose drum is bushed with phosphor bronze; bearings have large spring grease cups to properly lubricate them. The gears, being on the outside of the hoister bed, can be changed to any ratio capable of speed required for different classes of work. The hoist is so constructed that different size drums may be furnished for the different classes of work. The hand levers are so arranged that the tripping device may operate with the palm of the hand or fingers by changing a pin. There are six key seats for the adjustment of the power thrust screw, and the speeder attachment, being on the inner side of the flywheel, permits easy starting. The engine is dowel-pinned onto the hoister bed to prevent movement. The two flywheels of the engine are close up to their main bearings, to prevent springing of the crank shaft. Full instructions and drawings accompany each machine, to enable any one to set it up. The Witte Iron Works, Kansas City, Mo., furnish a guarantee for five years, covering any defective workmanship or material. They are represented in San Francisco by the Tracy Engineering Co.

THE Wetherill patents for concentrating weakly magnetic materials have been contested in Germany, and, after an exhaustive examination of the grounds of contest, the examiners have fully sustained the validity of the Wetherill patents.

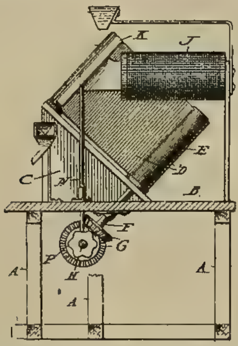
THE Master Mechanics' Club of Cripple Creek district, Colo., has been organized, meetings being held weekly, at which papers of interest to the profession are read by members, and social relations cultivated.

Mining and Metallurgical Patents.

Patents Issued November 27, 1900.

Specially Reported for the MINING AND SCIENTIFIC PRESS.

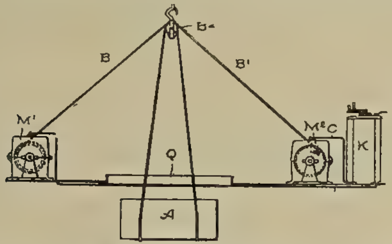
APPARATUS FOR SEPARATING GOLD FROM MAGNETIC SANDS.—No. 662,409; E. Gates, Chevy Chase, Md.



Apparatus for separating gold from magnetic sand, pole piece provided with wavy or zigzag grooves containing filling of diamagnetic material, means for energizing magnet just sufficiently to cause sand to lose its otherwise amorphous arrangement and to assume arrangement of frond-like structure, apron extending across magnetic field over which material is fed, means for causing apron to travel in direction transverse to feed of material, means for imparting succession of slight vibrations to apron, means consisting of plate underlying apron, and rod and cam for jigging plate.

◆

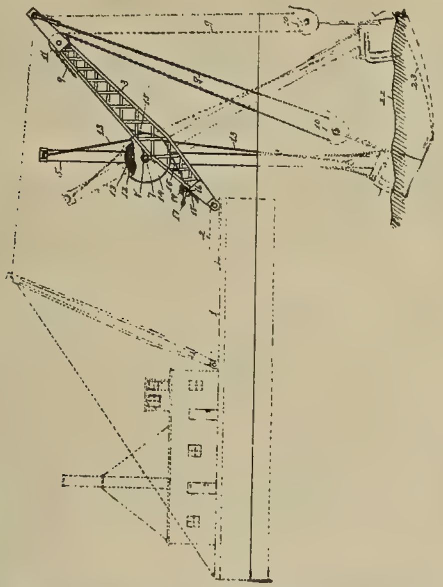
CONTROLLER FOR ELECTRIC MOTORS.—No. 662,450; J. B. Linn and M. W. Day, Schenectady, New York, assignors to General Electric Co., of New York.



Combination in controlling device for electric motors, two independent controlling switches, reversing switch, independent means for operating switches, interlocking device for effecting, when desired, simultaneous operation of controlling switches, second interlocking device for preventing operation of reversing switch when either of controlling switches is in operative position, and for preventing operation of either of controlling switches when reversing switch is open.

◆

DREDGER.—No. 662,462; R. R. Osgood, Lansingburg, N. Y.



In an excavator, combination with trunnion-supported sleeve; of dipper handle reciprocatory therein, means for swinging dipper handle; drum rotatively supported concentric with but independently of sleeve; cables oppositely wound upon drum and connected with dipper handle near its opposite ends; means for controlling rotary movements of drum.

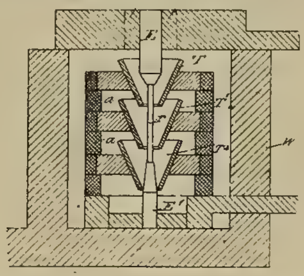
◆

PROCESS OF HARDENING IRON OR STEEL.—No. 662,502; L. Schiecke, Magdeburg, Germany; assignor to O. Gentsch, same place.

Process for hardening steel and iron, consisting in heating of piece to be hardened within coating composed of pounded charcoal, corn flour, slaked lime and neat's-foot oil; cooling red hot piece in water with addition of sal-ammoniac and layer of oil to exclude air; sinking piece into mud of argillaceous substances contained at bottom of vessel until cooling is complete.

◆

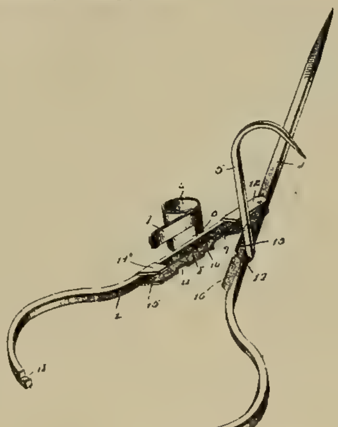
ELECTRIC SMELTING FURNACE.—No. 662,537; H. Koller, Nuremberg, Germany.



An electric furnace having vertically disposed current-feed electrodes, vertical series of superposed disconnected hopper-shaped electrodes arranged between feed electrodes and means for insulating them one from other and from current electrodes, lower smaller end of one hopper extending into top larger mouth of hopper below it.

◆

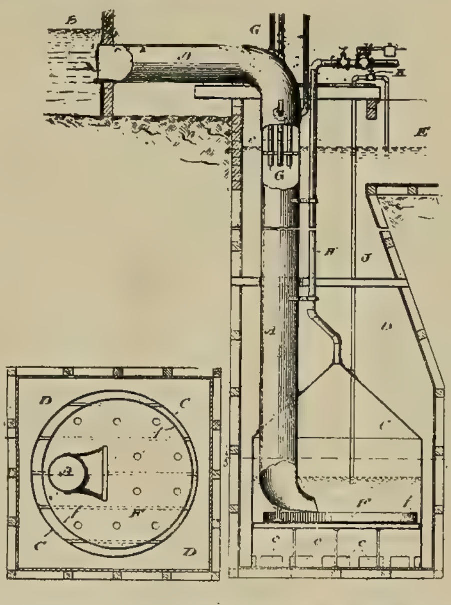
MINER'S CANDLESTICK.—No. 662,565; A. Howard and J. Howard, Ouray, Colo.



A miner's candlestick, comprising piercing member having cutter, coacting member pivoted thereto having lateral under flange, lateral top flange at one end, and lateral top flange opposite one portion of cutter, former member having portion of its cutting blade adapted to engage with under flange, a portion having its cutting edge adapted to enter between opposite top flange and under flange.

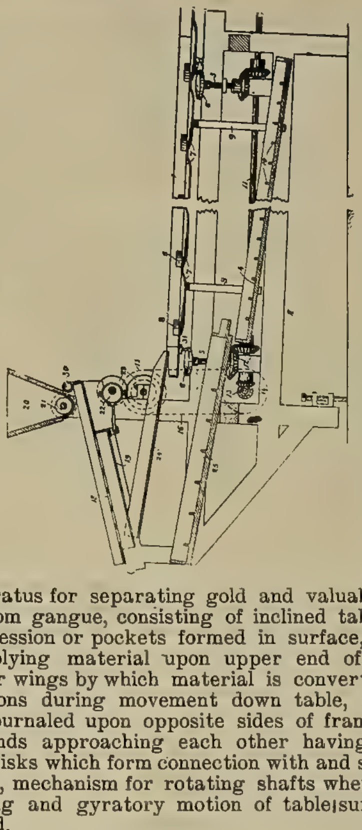
◆

HYDRAULIC AIR COMPRESSOR.—No. 662,884; F. C. Starke, Milwaukee, Wis.



In hydraulic air compressor, combination of descending water conduit or pipe having water intake opening and air inlets at upper end and laterally directed and horizontally extended discharge opening at lower end of conduit or pipe projects and opens, ascending water conduit leading out of lower part of chamber and having discharge opening below water intake opening at upper end of descending conduit, horizontally disposed spreading table located in chamber between outlet and discharge opening of descending conduit, air-delivery pipe leading out of upper part of chamber.

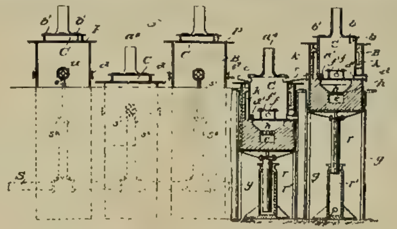
SEPARATOR AND AMALGAMATOR.—No. 662,685; J. P. Clarke, Alameda, Cal.



Apparatus for separating gold and valuable material from gangue, consisting of inclined table having depression or pockets formed in surface, means for supplying material upon upper end of table, guides or wings by which material is converted into depressions during movement down table, inclined shafts journaled upon opposite sides of frame with upper ends approaching each other having crank pins or disks which form connection with and support for table, mechanism for rotating shafts whereby an oscillating and gyratory motion of table surface is produced.

◆

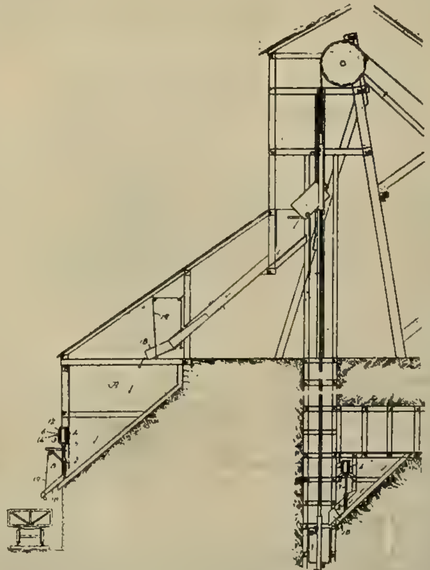
APPARATUS FOR REFINING AND DESILVERIZING LEAD.—No. 662,836; S. Tredinnick, Butte, Mont.; assignor of one-fourth to A. Wetzstein, same place.



Apparatus for refining and desilverizing lead, comprising series of kettles, means for connecting kettles for effecting discharge of contents of one into another, hydraulic cylinders on which kettles are mounted, fluid tank, pump, connections between tank and pump and pump and cylinders to supply fluid to raise cylinders, and connections for exhausting fluid from cylinders back to tank.

◆

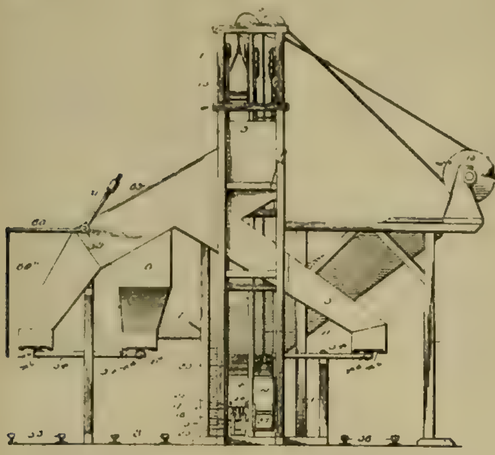
CHUTE CLOSURE.—No. 662,672; J. S. Hickey, Anaconda, Mont.



Combination of bin for ore or coal, discharge chute connected with bin, cut-off gate disposed transversely in chute and movable in right line therein, gate and bottom of chute being arranged at an acute angle with relation to each other and converging in direction of lower line of force represented by moving mass descending chute, discharge portion of chute extending beyond gate, motor connected to gate and adapted to force same through mass of material and thereby close chute, hinged, counterweighted apron at discharge end of chute.

◆

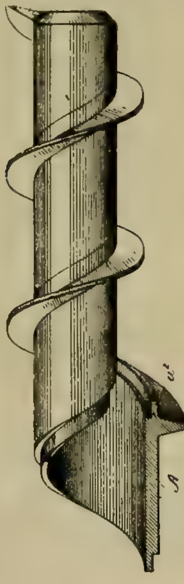
MINING ELEVATOR.—No. 662,731; R. Lee, Sherrard, Ill.



In an elevator, series of chutes, with feeding-hopper, one chute having its receiving end adapted to be closed by slide or door, a counterbalancing lever, having axial rod or fulcrum provided with flexing or jointed arms connected by door or slide.

◆

COAL DRILL.—No. 662,646; M. Hardsogg, Ottumwa, Iowa.



Drill made from strip of metal cut away on interior face to form shouldered overlap and cut away on exterior edge to form shouldered underlap and provided on exterior face with continuous longitudinal triangular shaped rib, for winding of strip on itself to bring shouldered laps into engagement and form hollow body having continuous smooth interior for drill and to cause rib to form continuous elevating spiral on exterior face of body and permitting sharpening of drill by grinding rib.

The Lunkenheimer Co.

THE LUNKENHEIMER COMPANY.

The new machine shop building which the Lunkenheimer Co. has just completed, Fairmount, Cincinnati, O., is 90 by 172 feet long, two stories and basement, built on the usual machine-shop gallery style of construction. There is a traveling crane 30 feet wide which runs the full length of the building, leaving galleries on the second floor, on both sides, 30 feet wide. The construction is steel throughout and designed to safely carry a load of 300 pounds per square foot. This building was erected for the purpose of taking care of three important departments of the company, viz., iron valve, injector and safety valve. By the erection of this new building the manufacturing facilities have been increased about 25% and employment is given to 100 men, in addition to the force already operated, bringing the total force up to 500 hands, all of whom are engaged in the production of high-grade brass and iron goods and engineering appliances.

Use of Hot Blast in Smelting.

TO THE EDITOR:—As to the use of the hot blast in smelting, one of the first and most important items to consider when heating the air blast is that it in no way interferes with the regular working of the blower, as the blast passes through the blower cold as in the ordinary way, so that all calculations as to the amount of blast required and used can be based on the regular volume handled by the blower, the same as when using cold blast, and it is customary to calculate the amount of blast furnished by the tables sent out by the manufacturers of the different blowers. In this way the amount of free oxygen sent into the blast furnace, whether heated or cold, can be calculated provided there would be no obstruction to the free passage of the air through the heating apparatus. It is therefore necessary that the area of the heating box shall be sufficiently larger than the inlet where the cold blast enters that no back pressure is created, and the outlet of this heating box shall be made with nearly double the capacity of the inlet on account of the increased volume of blast occasioned by the heating process.

The first heat required is for heating the air blast up to the temperature when the oxygen will combine with either the carbon of the coke or the sulphur contained in pyrites; then the necessary heat for melting ores and fluxes so that they will combine to form the proper silicates for fluid and clean slag is produced by the oxidizing of the fuel added to the charge by the free oxygen contained in the blast. If a cold blast is used, all the free oxygen going in with it is required to oxidize the extra fuel required to heat the blast, thus leaving none for the sulphur. If more cold blast is used, so as to get still more free oxygen, it drives the heat still farther away from the tuyer openings into the furnace and reduces the smelting area of the furnace in that proportion, driving the heat higher up in the furnace, burning the fuel and smelting the ore so near the top of the furnace that any metals volatilized have no chance to get caught by filtering up through the cool layers of ore charges on the top, and keeps the fuel burning so high above the tuyers that it leaves very little for the blast to encounter as it enters unless a very large quantity has been used.

When the cold blast enters the furnace from the tuyer openings, and encounters the hot material without fuel mixed with it to generate the heat, a crusted furnace soon becomes a consequence starting at the tuyer nozzle and reducing the capacity of the furnace until it closes it. This is the result when either too much cold blast is used or too little fuel is used with the cold blast. By the use of the hot blast this trouble is greatly decreased, and the hotter the blast is the better it is, up to a point where all the remaining heat necessary for smelting can be produced by the combination of the oxygen in the blast with easily oxidized elements in the ore, such as sulphur, arsenic, etc., etc. When these elements are not in sufficient quantity to produce by oxidation the balance of the heat without making too high a concentration, i. e., not having enough sulphur to make matte for the regular clean working of the furnace, then sufficient fuel should be used in order to save the necessary sulphur for making a proper grade of matte, so that with a hot blast, a cool top, and careful feeding, a more uniform grade of matte is made than has ever been possible to make by the use of the cold blast. At the same time there is less loss of precious metals by volatilization.

The advantages of a hot blast over a cold blast are in the improved chemical conditions, economy of fuel, and the greater capacity of the furnace. Where the blast is heated without any expense, every degree of heat so obtained is a saving of that percentage of coke needed for fuel in the working of the furnace. As a matter of fact, the saving goes beyond that point because of the fact that the cold blast chills the charge at the point of contact in the furnace from each one of the tuyers, thus reducing the activity of the coke furnished and imposing an increased demand on its utility.

This chilling action reduces the capacity of the furnace in proportion to the area occupied by the chilled portions, and as near the nozzle of each tuyer will be found a large surface of the charge chilled below the fusing point by the action of the cold blast, which by the use of the hot blast would be kept active, this proportion cuts a material figure, so that the use of the hot blast in that direction alone is a decided advantage. As a matter of fact, it has been found in the practical working of furnaces on a large scale that it is advantageous to heat the blast by separate ovens running at a heavy expense for fuel where the expense for fuel in operating the ovens for heating the air was more than double the saving of the fuel in the furnace charge. It was found that the increased capacity of the furnace and the improved chemical conditions which result in bringing about a more thorough fusion of the ore more than compensate for the extra cost of the fuel to heat the air. This fact having been demonstrated on a large scale by successful smelting companies, one can see how much advantage it will be in the cost of operating any furnace where the air can be heated automatically without any cost; and, realizing the field for the improvement in that direction, several inventions have been brought out to accomplish that end. Most of those I have seen utilized the heat escaping from the fumes of the furnace by means of coils of pipe at some distance above the feed floor of the furnace. Where a furnace is properly fed and properly operated so as to prevent volatilization of the precious metals, there should be very little heat above the feed floor, so that to utilize the invention it is necessary to keep a strong blast running through the entire charge of the furnace, igniting the free atoms of sulphur and the coke on the top of the charge, thus causing a heavy loss by volatilization where the ore contains any tellurides, lead or other volatile substances, and thus destroying a great portion of the fuel heat before the charge reaches the oxidizing portion of the furnace. In other cases, attempts have been made to use the waste heat escaping from the slag, but in doing so they have been taken in such a way that the fumes from the slag were driven back into the furnace again; thus furnishing an impure blast with a great portion of the free oxygen already removed. The object of my researches has been to secure a hot blast which would furnish the air heated to a sufficient degree of heat to prevent chilling, at the same time increasing the capacity of the furnace and minimizing the use of fuel, and to accomplish this without any additional cost for operation. This I have been able to do by what is known as the Bretherton hot blast apparatus, and in constructing this apparatus I have kept in mind the principal features required for its successful operation, doing away with the back pressure on the blower so that the volume of air would not be minimized, taking the heat from the escaping heat of the hot slag by building an oven around the fore-hearth, the oven having flues passing through it for the escaping fumes of the slag, similar to the flues of a boiler, and have augmented the heat acquired in that manner somewhat by using a set of air jackets above the water jackets around the furnace, the air having a continuous passage from blower to tuyers. In this way I have been able to keep the top of the furnace cool so as to prevent volatilization.

Denver, Colo. S. E. BRETHERTON.

California Miners' Association Committees.

The following are the committees of the California Miners' Association for the ensuing year:

Executive Committee at Large:—J. H. Neff, W. C. Ralston, T. L. Ford, A. D. Foote, E. Coleman, C. H. Lindley, C. G. Yale, W. W. Montague, J. J. Crawford, B. N. Shoecraft, M. E. Dittmar, L. Glass, L. P. Crane, C. T. Deane, D. McClure Jr., G. E. Dow, J. W. C. Maxwell, C. M. Belshaw, E. A. Belcher, W. P. Hammon, J. F. Halloran, J. McMurry. W. S. Keyes, W. H. McClintock, W. G. Dodd, D. T. Cole, H. T. Power.

County Executive Committees:—Alameda: F. A. Leach, S. B. Christy; Amador: J. F. Parks, R. Tregloan; Butte: O. P. Ormsby, F. W. Griffin; Calaveras: F. F. Thomas, A. J. McSorley: El Dorado: W. A. Winsboro, C. H. Weatherwax; Fresno: A. R. Briggs, W. H. McKenzie; Inyo: J. J. Gunn, J. E. Meroney; Kern: B. T. Price, T. B. Treadwell; Mariposa: A. H. Ward, N. C. Ray; Mono: R. T. Pierce, J. S. Kain; Northern California: C. C. Bush, C. D. Galvin, E. B. Edson; Nevada, J. S. McBride, W. F. Englebright; Placer: F. Chappellet, I. H. Parker; Plumas: A. B. White, S. W. Cheyney; Sierra: F. S. Moody, F. R. Wehe; Shasta: L. T. Wright, F. Hurst; Solano: A. C. Holly, A. Tregidgo; Santa Clara: T. Derby, E. W. Carson; San Francisco: J. O. Harron, L. W. Harris; Sacramento: J. H. Batcher, A. W. Hinkson; Sonoma: A. Abbey, C. A. Grimmer; Southern California: H. Z. Osborne, C. A. Burcham, D. Murphy; Tuolumne: W. R. Gillis, O. F. Greely; Yuba: W. B. Meek, J. E. Durfee.

Committee on Finance:—A. Carrigan, J. Sloss, W. G. Dodd.

Committee on Legislation:—J. F. Davis, C. H. Lindley, W. B. Lardner, J. R. Tyrrell, W. C. Ralston, F. L. Stewart, F. S. Moody, A. E. Muenter.

Committee on Lands:—J. M. Wright, C. G. Yale, M. B. Kerr, H. E. Pickett, B. S. Rector.

Committee on Department of Mines and Mining.—W. C. Ralston, Irving M. Scott, J. F. Halloran, C. G. Yale, W. S. Keyes.

Committee on Dams:—A. Caminetti, J. Spaulding, F. Searles, J. S. McBride, M. B. Kerr, A. C. Hinkson, J. O'Brien, W. B. Meek.

Oil and Gas Yielding Formations of California.

NUMBER III.

The following is a continuation of the advance sheets of the official report on the oil formations of California, written by W. H. Watts, and shortly to be issued by the State:

The asphaltum deposits at Asphalto are found under two conditions: (1) as superficial deposits of impure asphaltum, and (2) as veins of asphaltum in the Middle Miocene formations. The superficial deposits of asphaltum have been formed by exudations of heavy oil. They originally covered a good many acres and were from 1 foot to 12 feet thick. This asphaltum varies greatly in quality. Some of it is brownish in color and resembles ironite. It is frequently dry and powdery and more or less mixed with earth. The best asphaltum in these superficial beds lies near the surface. In some places it forms a stratum varying in thickness from a few inches to 2 feet or more. This stratum consists principally of a dull black, compact asphaltum, but some of it possesses a pitch-like luster, and here and there it is rendered viscous by fluid petroleum. Beneath the upper stratum the asphaltum is frequently impure and rotten and interbedded with drift. Attempts to mine and refine this asphaltum have proved unprofitable.

The principal asphaltum mines are 1½ miles southeast of McKittrick. In these mines the asphaltum occurs as irregular veins and intrusive masses in the Middle Miocene rocks. These veins are from a few inches to 5 feet or more in thickness. In one of the workings that the writer examined in 1894 the foot wall is light-colored clay and the hanging wall soft sandstone.

In a cut made by miners who were prospecting for petroleum in the N.E. ¼ of S. 34, T. 30 S., R. 22 E., M.D.M., several strata of impure asphaltum 1 inch to 1 foot in thickness were cut through. The asphaltum was found to be interbedded with thin strata of light-colored clay, sand and pebbles. One of the uppermost strata, which is composed of dark-colored sand, is fossiliferous and contains fresh water shells.

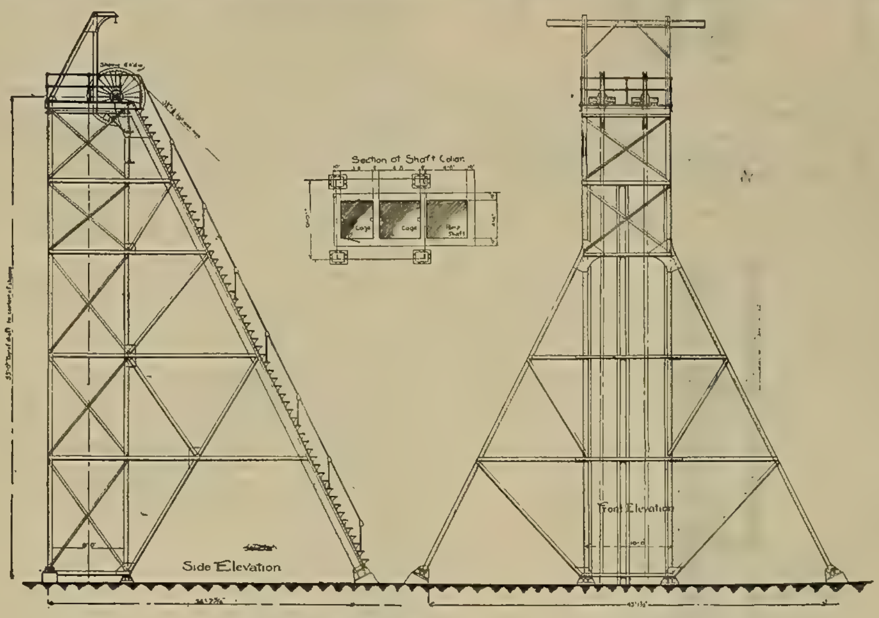
In the Coalinga district oil mining has been carried on in two fields, in the Oil City field, which lies to the north of the north fork of Los Gatos creek, and in the Alcalde field, which lies between Alcalde creek and the north fork of Los Gatos creek. The most important of these fields is the Oil City field, about 9 miles north of the Coalinga railroad depot, on the Southern Pacific Railroad. The lowermost formation consists of hard sandstone containing numerous concretions. This sandstone is overlaid by dark-colored shales and sandstone containing Eocene fossils. Some of the strata of sandstone interbedded with dark-colored shales yield an oil of low specific gravity, and have proved very productive. The shales and concretionary sandstone on which they rest are of Eocene (Tejon) age. Resting nonconformably on the Eocene rocks is a light-colored siliceous shale, hereinbefore mentioned as belonging to the Lower Neocene series. Seepages of heavy, tar-like oil issue from this shale, and in some places form beds of asphaltum. In some of the wells in this vicinity an oil of 18° B., apparently from oil sand in this formation, has been obtained. The light-colored shale is very much contorted and the exposed rocks for the most part stand at a greater angle than do the underlying or overlying rocks. Resting nonconformably on the light-colored shales is a series of sandstone and shales—sandstone predominating—which contains numerous fossils and represents the Middle Neocene formation. In most places it dips to the east of south at an angle of less than 25°. In this formation immediately overlying the siliceous shales are strata of oil sand, beds of gypsum, which at one time were mined, and diatomaceous rocks impregnated with petroleum, the last named resembling the diatomaceous rocks seen at McKittrick, in Kern county. The upper portion of the Middle Neocene formations in this locality is characterized by a soft bluish sandstone and fine conglomerate containing fossils of the Middle Neocene age. The soft bluish sandstone dips east of north at an angle of 10° to 15°.

(TO BE CONTINUED.)

An Explosion of Scientific Interest.

A singular though not unprecedented accident took place at the Mammoth mine, in Utah, recently, illustrating applied thermo-dynamics in an interesting but fatal manner, causing the death of one and the severe injury of another of the engineers of the mine, says Prof. R. H. Thurston in Science. The cylinder of an air compressor exploded while in operation in regular work, and with such violence as gave evidence of more than the action of the normal air pressure in its production. The back cylinder head and the cylinder itself were shattered. The violence of the explosion was terrific. The two men were thrown across the room and badly mangled and one instantly killed. Fragments of metal and flesh were found outside the building and a long distance away. The air pressure, at delivery from the compressor, was but eighty pounds per square inch. The cause of the explosion is presumed to have been the compression of the vapors of petroleum given off by oil used for lubrication in too large quantity and of too light a quality. Mingled with air in the right proportion for combustion, the mixture of air and vapor was heated by thermo-dynamic action of compression, approximately adiabatic up to the temperature of ignition, and the explosion followed. This action is precisely that relied upon in the Diesel gas engine, recently attracting so much attention, for the ignition of its charge independently of gas torch or electric spark. The phenomenon has long been known to the engineering profession, although instances of this kind of accident are rare. The use of effective methods of cooling the compressor cylinder and the employment of lubricating oils of high flashing point constitute the preventives.

Steel Head Gear at Cripple Creek, Colo.



Steel Head Gear, Elkton Mine, Cripple Creek, Colo.

The second steel gallows-frame to be put up in Cripple Creek district has just been completed at the Elkton mine. It was furnished through the Hendrie & Bolthoff Manufacturing & Supply Co. of Denver. The frame stands 55 feet from the collar of the shaft to the sheaves. The upright pieces are of lighter weight than is usually seen; but the back braces, extending from the sheaves toward the hoisting engine, are unusually heavy, as in them greater strength it required. These and the side braces, as well as the uprights, are anchored in solid piers of rock and concrete. The two sheaves are each 6 feet diameter, grooved for flat cable rope. The hoisting engine, a first-motion duplex, which has already been described, is ready for business. Two double-decked cages will be operated in the three-compartment, 800-foot shaft, the cage guides being 4x6 inches in size. In this shaft was performed the difficult work of cutting out a third compartment from the 400-foot level to the surface after the shaft had been made three compartment from the 400 to the 800-foot level. Supt. Camps expresses satisfaction at being through with the job. The next improvement at this shaft will be to put in electric bell and station signals.

The waste is taken out on the lower floor, while all cars of ore are delivered at the top floor, 25 feet above the collar of the shaft, and taken thence to the ore bins. The latter are eight in number, each 12x30 feet in size. The ore building, 30x100 feet, is supported by a heavy retaining wall, and it is believed it will not settle. The ore bins and chutes are all steel-lined. In dumping the ore at the top floor it falls upon heavy grizzlies, below each of which is a coarse screen, by means of which the ore is partially graded.

The Elkton, Tornado, Raven and Thompson, all the property of the Elkton Con. M. Co., will from now on hoist about 1200 to 1400 tons per month.

Elkton, Dec. 1. WASCOTT.

Some Diamond Figures.

Not every one has the facilities for measuring and weighing a cubic foot—or even a cubic inch—of diamonds. The figures given below, which were furnished by an official of the De Beers Consolidated Co., will have much curious interest. The first measurement taken was of diamonds sufficient to fill a space of 75 cubic inches, the time being July of the present year. The diamonds were what a coal operator would call "run-of-mine"—that is, they were of all sizes, mixed together just as received from the works where they were separated from the blue ground matrix, but had been cleared by boiling in acid. Three measurements were made, the first giving 14,617 carats, the second 14,666 carats, and the third 14,860 carats, the average being 14,713 carats.

According to these measurements 1,000,000 carats of diamonds of average size would make:

	Cu. inches.	Cu. feet.	Cu. meters.
First............	5,131	2.97	0.0841
Second..........	5,114	2.96	0.0838
Third............	5,045	2.96	0.0827
Average......	5,097	2.96	0.0835

Conversely, taking the average, a cubic foot of diamonds would weigh 336,700 carats, and a cubic meter 11,976,000 carats. Assuming them to run about the De Beers average, a cubic foot would be worth about $2,215,500 and a cubic meter $78,802,000.

During the eleven years ending June 30, 1899, the mines of the De Beers Co. produced, in round figures, 25,098,000 loads of "blue ground"—the diamond-yielding ground—averaging 16 cubic feet each. This is equivalent to 18,851,000 metric tons. The diamonds saved from the blue ground were 24,476,000 carats, including all sizes, and the amount realized for the stones was $161,152,303. This is an average return of $6.58 per carat. The average recovery was 1.3 carats per metric ton, and the average yield was $8.55 per ton of blue ground.

The blue ground extracted during the eleven years would make a cube with sides 740 feet or 226 meters long, while the diamonds recovered would be represented by a cube with sides 50 inches, or 1.27 meters, long. The ratio in size of the diamond cube to the blue ground from which it was taken would be about 1:178 in the length of one side of the cubes, or 1:6,000,000 in total bulk.

Uses of Vanadium.

Vanadium is used in the manufacture of aniline black, which is formed when vanadic acid or a vanadate is heated with aniline chloride, with reduction to $V_2 O_4$. The latter oxide may again be made active by oxidation with potassium chlorate, so that the reaction may be often repeated without any fresh addition of vanadium. This method is useful for staining wood black, as well as in producing an indelible black writing ink. When applied to pottery and fired at a high red heat, the oxides give a fine gold color with a greenish tinge.

Alloys of vanadium and other metals have been obtained in considerable variety by first using aluminum. A cast bar of 1% vanadium had a tensile strength of 11 tons, an elongation of 7%; aluminum bronze, with 8 parts aluminum and 1 part vanadium, gave 45 tons tensile strength and 12½% elongation.

Ordinary malleable iron of about 24½ tons tenacity and 19% elongation was changed by the addition of .5% vanadium to 39 tons and 12% elongation in the forged bar and 33.7 tons and 32% elongation annealed. This has called attention to the remarkable malleability and ductility of the alloy. A mild steel of 30 tons tenacity and 17% elongation, with 1% vanadium, gave 61 tons tenacity and 14% elongation, and, when annealed, 45 tons and 20%; and, although very soft when annealed, these alloys become very hard by tempering.

At present there are no steel manufacturers using the oxide in quantity, as the demand for vanadic acid as a mordant in dyeing takes the entire supply from the slags of the Creusot Steel Works in France—165,000 pounds per annum. A large supply should admit of the use of vanadium in the manufacture of steel for armor plate, forgings for ordnance and naval machinery, projectiles, tools, rolls, calendars, etc., and various bronzes.

MINING SUMMARY.

ALASKA.

At the Sea Level, at Ketchikan, Supt. E. C. Morse, 24-inch steel water pipe will be laid from Gokatcheen Falls to the line for power purposes. A new compressor, drills, hoist, and a 30-stamp mill (with equipments for another ten stamps), will go in also.

A find of rich placers is reported made in Cook Inlet district. Operations are closed down for the winter.

ARIZONA.

COCHISE COUNTY.

Good ore is reported opened up on the property of I. B. Stone in the Dragoons. ——It is expected that shipments of ore from the Copper Crown to El Paso will soon be made.——The Val Verde C. M. Co., Ltd., of Val Verde has applied for patent to 82.5 acres of land near there. ——At Pearce the new Mammoth stamp mill is about ready to start up. A new double-compartment shaft is being sunk to below water level and pumping machinery will be put in.——The 7x5-foot tunnel on the Dos Cabezos (copper), 12 miles southeast of Willcox, is in 140 feet. A 10-foot body of 25% ore was opened up recently. A lower tunnel is run on the 275-foot level.

GILA COUNTY.

It is reported that the London Globe Exploration Co. may bond the Lawrence & Glissau property and other claims near Dripping Springs. A strike was recently made on the Lawrence & Glissau.

GRAHAM COUNTY.

The Medler M. Co. is putting in a 100-ton concentrating plant and a 50-ton smelter 3 miles below Clifton. The concentrator will treat the company's ores, but the smelter will also be open for custom work.——Oil is reported found at a depth of 690 feet on property near Cienega, 8 miles south of Safford.

MARICOPA COUNTY.

A ledge of wolframite is reported found near New River, north of Phœnix.

MOJAVE COUNTY.

The Bonanza King, at Providence mountain, is reported sold to a Philadelphia company for $25,000. Work will be pushed by the new owners.——A road to Hackberry from the Grand Gulch copper mines will be built.——H. O. Mackay will begin operations on the C. O. D. at Kingman.——Bohne & Kempf are shipping ore from the Mint.——The shaft on the Gold Road is down 65 feet.——Russell & Ziemer have men working on the Man, Todd basin.——It is thought that a matte furnace will be put in on the Oro Plata.——J. Uncapher is working the Queen Bee at Mineral Park.——Supt. Hastings of the Ramrod group, at Klondike, has sunk the shaft 300 feet.

PIMA COUNTY.

The Liberty, Tucson, is shipping ore to El Paso; Supt. Wemple.——The Milwaukee & Arizona M. Co., the Chief M. & D. Co. and the Casa Grande M. Co., Quijotoa, are pushing work on their properties near there.

PINAL COUNTY.

The St. Louis Gold Recovery Co. at Mammoth has resumed operations.——The new shaft on the Sunset group, in Casa Grande district, near Florence, is down 100 feet. A good body of iron ore is opened up at this depth. Sinking will be continued, as there are indications of copper ore underlying the iron.——Bley & Adams are driving a tunnel on their claim near Riverside to cut the ledge at a depth of 100 feet.——Supt. H. Parry is pushing work on the crosscut from the bottom of the shaft on the Iron Duke of the Milwaukee & Arizona P. & M. Co. at Mineral Creek. The shaft is down 110 feet and the crosscut is in 166 feet. He is also pushing work on the company's lead property near Casa Grande. A carload of ore was recently shipped to El Paso. It is said that he will recommend the erection of a lead smelter on the property.——Development (sinking, drifting, etc.) on the Shannon, Florence, is progressing at the rate of 100 feet per month.——J. W. Osborne is developing claims in the Castle Creek district.

YAVAPAI COUNTY.

The White Horse group, near Walker, is reported sold to Hayes & McBride of New York for $25,000.——Near Huron the Mineral Copper Hill Copper Co. of Glasgow, Scotland, Manager Comstock, is pushing work on a group of claims (copper and gold). The ore runs from $2 to $100 per ton; W. Bashford Supt.——The deepest workings on the United Verde copper mines, Jerome, are 700 feet. A depth of 2000 feet was recently attained with a diamond drill, and the bore showed a continuation of the ore body to that depth.

CALIFORNIA.

AMADOR COUNTY.

Work on the Keystone, Amador City, is being pushed.

At the Mutual, Sutter Creek, drifting on the west crosscut is in progress.——It is said that the Ivanhoe, Plymouth, will resume under new management.——The new machinery is in on the Kirkwood, near Jackson, and operations will begin soon. ——The Keystone has been in active operation nearly half a century.

BUTTE COUNTY.

(Special Correspondence).—The new 15-stamp mill on Bloomer hill, erected by Wm. Stephens of Redding under contract with the Joshua Hendy Machine Works, was started up on the 1st. It is calculated to crush five tons to the stamp. The power is water under 700-foot head. An 18-inch motor placed on top of ore bin will drive the rock breaker, the water from it to be carried into a tank and used for batteries. A 7-foot Pelton wheel will drive the batteries. In the water wheel, line shaft and pulleys provision is made to drive forty stamps. The mortar blocks, mud and line sills are in place for ten additional stamps, which, when completed, will make twenty-five in all. Adjoining the mill on the south is a new 3-drill compressor and a 6-foot water wheel to drive it.

Bloomer Hill, Berry Creek P. O., Dec. 3.

CALAVERAS COUNTY.

The Eudora, Mokelumne Hill, is reported sold to W. A. Graves, of San Francisco.——Ore from the winze in upper tunnel of the Riverside, at depth of 24 feet, is said to assay $200 per ton.——L. C. Clark, of San Francisco, has bonded the Deep Gulch (quartz), in Chili gulch, for two years for $3000, it is said.

A strike is reported made at a depth of 40 feet on Central hill, near San Andreas. ——On the Lloyd (gravel), on Central hill, bonded to Mr. Palmer of Oakland, a 210-foot shaft is sunk. Twelve men are working on eight-hour shifts. A new pump is in and working successfully.——Manager Hussey is pushing work on the Lucky Boy, on Deep creek, near Valley Springs. ——Supt. A. Pugh of the Farrington G. M. Co. is pushing work on the Lone Star. ——The bond on the Defender, at Camp Contreras, is surrendered, the bondees being unable to fulfill requirements. F. B. Joyce, owner, will operate the mine.——The Sheep Ranch will use electric power from the Utica plant.——Seventeen men are employed at the Oriole, near Angels. A good body of ore is reported opened up up on the 1600-foot level.——At the Ozark, in Quartz gulch, near Murphy, drifting east and west is in progress; Supt. G. Scantlebury.

Work on the Emerson, near Mokelumne Hill, is begun. Water pipes are in and water is being pumped.——C. Weatherwax, Supt. Sunrise, is putting in a new steam hoist; good ore is opened up in bottom of shaft.——Work is progressing at the Last Chance.——The Paragon will resume.

The Lloyd, on Central Hill, near San Andreas, is temporarily closed down, owing to a heavy flow of water which was tapped recently. Pumps of larger capacity will be put in and work resumed.——W. W. Cook of Mokelumne Hill has bonded the Petticoat, near Railroad Flat, and will begin development work.

At Albany Flat ore yielding $14 to the ton is opened up on the Tulloch.——The mill at the Sheep Ranch is temporarily shut down while electric light plant is being put in. Shaft will be repaired and other improvements made.——The tunnel on the Hexter, near Mokelumne Hill, now in 1400 feet, will be driven to the 2000-foot mark.

EL DORADO COUNTY.

The French M. Co. is putting in a big dam at Long canyon for hydraulicking this winter.——The Gopher-Boulder at Kelsey has resumed operations.——Work on the Alpine, Georgetown, is being pushed.——Hughes, Davey & Simpson have bonded the Maggini, an extension of the Hart Consolidated, and will push work.——The Carey M. & M. Co., of Oakland, capital $100,000, is incorporated to work the Carey group near Josephine.——The new pipe for the Hart Consolidated is going in. They will have a head of 400 feet to drive the Huntington mill.

GLENN COUNTY.

The Glenn County Oil & Coal Co., Fruto, is putting in machinery, supplies, etc. Work will be pushed during the winter. The Great Northern Oil Co., Elk Creek, is putting in boring machinery.

KERN COUNTY.

The Golden Gate, Bakersfield, is putting in a rig on 2, 11–24.——The Imperial Oil Co. has ten wells on 33, 28–28, each said to produce 150 barrels of oil per day. ——The Clarke Co., drilling on the southeast quarter of 20, 28–28, has finished its well at 910 feet.

A strike was recently made on the Orphan Boy, in Stringer district, near Randsburg.

LOS ANGELES COUNTY.

The Columbia M. & M. Co. has incorporated in Los Angeles; capital stock $100,000; R. J. Dyas, P. B. McCabe, W. Boeck, C. F. Karns, D. P. McLeod.

MARIPOSA COUNTY.

The annual meeting of the stockholders of the Columbus Con. G. M. Co. of Mariposa will be held in San Francisco on the 10th inst.

MONTEREY COUNTY.

(Special Correspondence).—New placer diggings have been found on the headwaters of Wilson creek. The gold is coarse. A new find has been made near the Lion's Den of coarse placer gold. Gillis & Co., on Spruce creek, the last day they worked took out one nugget weighing thirty-two ounces avoirdupois, together with several smaller ones weighing three ounces, the whole weighing three pounds. The Plasketts, working on the same creek, exhibit pieces weighing from $5 to $10. F. Melville is ground sluicing one of his claims at the head of Spruce creek. He has taken out nuggets from $5 to $12.

Los Burros, Dec. 1.

MONO COUNTY.

The mill of the Goleta Co., at Jordan, is closed down for the winter. Supt. Nelson will push mine work during the winter. ——At the Castle Peak the boiler and air compressor are in, and hoist is going up; piping is being laid.

NAPA COUNTY.

The Mt. Shasta Oil Co. is pushing work on its property in Berryessa valley.

NEVADA COUNTY.

The Empire mill, Grass Valley, is undergoing extensive repairs. New mortars, framework, iron work, concentrators, etc., are going in. A new hydraulic pump will also be put in. It is thought that it will take two months to make the improvements. Forty men are temporarily laid off. Twenty stamps will run while repairs are being made. The new mill will be run by water power, and pipe is now going in to connect mill with the Yuba Co.'s water supply.

PLACER COUNTY.

The Boston–South Dakota M. Co. is handling 25 cubic yards of gravel daily, which averages $5.25 per yard; the product will be increased. The cost of handling it, with the improved machinery now being installed, will be reduced to $1.25 per cubic yard. The mine is being equipped with electrical machinery. The company's agent estimates that there are 900,000 yards of gravel in the Weske channel alone, or enough to supply 250 to 300 yards daily for more than ten years.

The River M. Co., operating the Pleasant Bar, American Bar and Willow Bar placers, on Middle Fork of the American river between Michigan Bluff and Forest City, has leased the Horseshoe Bar property, including ditch and water right of 800 inches under 400 feet pressure, hydraulic elevator, pumps, giants, etc., for five years. The tunnel at Horseshoe Bar is paved with 100 feet of rock and 50 feet of T rails.—At the Dewey Consolidated (gravel), at Iowa Hill, piping is under way; 800 inches water are available.—— At Deadwood, twelve men are employed at the Basin Con. Drift. Average width of channel is 60 feet; main working tunnel is in over 4000 feet. J. C. Whitney, owner; J. W. Dunlap, Supt.

Mr. Patterson will resume operations on the Patterson (gravel) in Badger ravine, near Loomis.——On the Bellevue, the shaft is down 70 feet.

In the Morning Star, at Iowa Hill, portions of the mine may be leased.——Supt. J. Sullivan is pushing work on the Pioneer and expects to have the mill running soon.——Dorer Bros. are running their 10-stamp mill, one shift at present, but will run it steadily as soon as development permits.——Olson & Co. have contract to drive a tunnel on the Southern Cross.——The old Bob Lewis (gravel), at Damascus, will be reopened, it is said, with G. W. Snyder as Supt. A 2000-foot tunnel will probably be run to strike the channel.

A strike is reported made on the Bellevue, near Ophir. Drifting is in progress on the 210-foot level. The ledge is said to be from 18 to 20 inches wide, and that the ore assays $1000 to the ton.

SAN BERNARDINO COUNTY.

A strike of $15 ore is reported 12 miles from Twenty-Nine Palms.

SHASTA COUNTY.

A deposit of bitumen is reported found near Redding.

The Mountain Copper Co. pays the county an annual tax of $45,000.

Shares in the Trinity Copper Co. sell in New York City at $25. The company is capitalized at 240,000 shares. T. W. Lawson of Boston is president of the company and at present owns most of the shares.

The Three Sisters, on Kline gulch, near French Gulch, is bonded to M. Stourfer of Nebraska, Vinege & Hammond of Chicago and T. Motherwell of French Gulch for $10,000. Work will begin on Feb. 1st, it is said.

SIERRA COUNTY.

All materials, etc., for the new stamp mill at the Frost, near Downieville, are on the ground and construction will be pushed.——Another strike is reported made on the Osceola, at Alleghany.

SISKIYOU COUNTY.

Milne & Hassick have leased the Old Vet in Humbug district, near Yreka. A recent twenty-ton shipment returned $20 per ton.——Morton & Shurtleff are pushing work on the North Star.——Manager T. Hegler is pushing work on the Nelson group.——Stoping will soon begin in the upper level of the Craggy.——The hoisting plant at the Black Bluff, in Fool's Paradise district, is in, and operations will soon begin.——The Gold Ball, in Salmon River district, is reported to be producing $600 per day. Ore runs about $60 to the ton. Supt. Ball has sixty-two men working,——Behnke & Welker have put in a water-power arrastra on the Snow Flake, in Eddy's gulch, near the Gold Ball.——In the Olympia the tunnel is in 64 feet; near the end of latter a 25-foot winze is sunk.——Work will soon begin on the Black Bear under new management. A 500-foot shaft will be sunk.——Work on the Van Brunt, in Happy Camp district, is resumed. Two giants are working. Supt. Miller has twenty men working.——Kingsbury & Cuddihy have leased the Minnetta B. (hydraulic) and hydraulicking will soon begin.——B. Hamilton is putting the Siskiyou in shape for a run. ——Woods Bros. will soon begin operations on the Mason Bar.——Gordon & Sons will begin operations on the Gordon soon.——The Lightman, in Cecilville district, is equipped with a No. 2 giant, having a 5-inch nozzle. Water volume is given as 500 miners' inches.——Work on the Giles is being pushed.——The King Solomon closed down for the season on Nov. 16th; Supt. Fletcher.——H. Bowerman will push work on the Wild Irishman, Cecilville, during the winter.——West Bros. will put in pipe and a giant on the Cody Bar.——The Big Bear M. Co., at Orleans Bar, on the Klamath river, has ten men employed and a No. 3 giant at work. They expect to hydraulic the year round. The property consists of 1200 acres.——An assessment (No. 7) of ¼ cent per share is levied by the Golden Star M. Co. on Humbug creek, near Yreka, delinquent Jan. 2, 1901.

Twelve tons ore from the McKinley, on Sutter Creek, in Humbug district, yielded $50 per ton. Perkins & Marlin, owners. ——On the Greenhorn No. 2 (gravel), near Callahan, the shaft is about cleared of water, and drifting will be started.——Russell Bros., of Oakland, have tapped the extension of the Sheba, on Patterson Creek, by running a tunnel through the hill. A ledge of low grade ore, over 12 feet thick, was opened up.——The Little Humbug will start up when sufficient water is obtained.

TRINITY COUNTY.

The new 10-stamp mill on the Brown Bear, Deadwood, is completed.

TUOLUMNE COUNTY.

Unwatering of the Norwegian, Sonora, is in progress.——The Longfellow cyanide plant is running steadily.——Sinking and drifting are being pushed on the Densmore. A larger mill will go in.——The Grand View G. M. Co., capital $250,000, is incorporated and will work a gravel claim near Montezuma.——Work on the tunnel in the Philadelphia Diggings (gravel), at American Camp is progressing. A restraining dam is built, and the 15 miles of ditches are in good shape. Water will be brought from South Fork of the Stanislaus river, 4 miles below Strawberry, and from Rose creek.——On the Over, on Bald Mountain, the tunnel, now in 250 feet, will be driven an additional 700 feet. ——Twenty stamps are dropping at the Dead Horse, near Carters. Supt. Kane is pushing work in the mine also.——A strike is reported made in the Golden West, near Jamestown. A 10-stamp mill is going in, and a double-compartment shaft will be sunk to 1000-foot level.

A strike is reported made on the Tri-Color at Tuttletown.——On the Hopeton, Sonora, the shaft is down 140 feet. The vein is 12 inches wide.——May & Son are drifting at the 70-foot level on property off Baretta street, Sonora.

The Goldwin M. Co. will put in a 10-stamp mill near Jamestown.

COLORADO.

DOLORES COUNTY.

The average cost of drifting, including timbering in and around Rico, is said not to exceed $4 per foot.——The mill of the Colorado M. & C. Co. is running steadily. ——The electric power drills driving the Pro Patria tunnel on Dolores mountain are working successfully. Progress is at the rate of from 4 to 6 feet per day.——A new gasoline engine for running the blower at the Smuggler-Alta group, Rico, is placed.——The Mt. Gorman M. Co. project 1000 feet of development work on the Mt. Gorman group this winter.——The Emma mill, Dunton, is closed down for the winter.

EL PASO COUNTY.

A. C. Adams and associates are reported to have made a strike of 20-ounce ore on block 44 of the Anaconda, Anaconda, recently.

FREMONT COUNTY.

The flues and smokestack for the Rocky Mountain smelter, Florence, are in. Twenty ore bins, 12x14 feet, are going in; automatic conveyors will take ore to the latter. The new 500 H. P. compound Corliss engine is in place and connections with boilers and line shaft are made.——The Florence Oil Co. has five rigs up near Florence and drilling is progressing.——The United Oil Co. has put up a power plant which is operating fourteen wells.——The new mill of the Union Gold Extraction Co. at Florence will be finished Dec. 20th. All departments, with the exception of the finishing rolls and driers, which will be run by steam, will be operated by electric motors. Power will be furnished by a 500-volt Westinghouse multipolar direct current 310 H. P. generator, driven by a 500 H. P. engine, with flywheel 18 feet in diameter, and weighing 36,000 pounds.

GILPIN COUNTY.

The Unexpected, in Lake gulch, Central City, is reported bonded to Boston men. Machinery formerly on the Moyle, on Swede hill, near Black Hawk, is going in on the property. A new shaft house, 30x50 feet, will be erected; S. Hoskin Supt.——The Minnesota is shipping ore to the Rocky Mountain smelter at Black Hawk. On the 300-foot level drifting and stoping are in progress, and a winze is being sunk from the 400-foot level to cut the ore body. Central Development Co. operators.——Night and day shifts are working on the Ophir-Burroughs, on Quartz hill. The shaft is down 1300 feet. Daily shipments of ore are made. Fifty men are employed; A. Waters manager.——The West Notaway is shipping ore to the mills at Idaho Springs.——The new hoisting machinery at the Carr, operated by the Carr M. & Colo. Co., Ltd., is in and working successfully. The new rope is 1600 feet long and ⅞ inch thick. New additions for blacksmith shop and coal sheds are up and the work of straightening and cutting down the shaft is in progress. The shaft, now down 500 feet, will be continued several hundred feet farther.——The Carcasonne M. Co. will put in a gasoline hoisting plant on the Carcasonne. The shaft, now down 175 feet, will be sunk to the 200-foot level. Two shifts are working.——The Imperial M. Co. is cutting a pump station at the fifth level of the First Centennial, in Chase gulch. When completed sinking will be continued 100 feet, and probably 200 feet. The shaft has been retimbered and drifting on the fourth and fifth levels is in progress.——A strike of good smelting ore, carrying copper, iron and lead, was recently made on the West Calhoun, in Leavenworth gulch, near Central City, by the Gold Investment M. Co.

GUNNISON COUNTY.

A long drainage and transportation tunnel is projected by M. A. Hanna and others to run from the head of Tomichi creek and cut the May Mazeppa, North Star, Eureka Nest Egg and other silver-lead properties at Lake hill, near White Pine. The tunnel will be a little over a mile long, and work will be begun next spring. The smelter at White Pine will be put in shape to treat ore as it is opened up.

HUERFANO COUNTY.

New machinery is going in at the Walsen coal mines, near Walsenburg.——The Robinson is shipping coal.——At Santa Clara Supt. Breen is shipping thirty-five cars of coal per day.

LAKE COUNTY.

At the Greenback, Graham Park, Leadville, three additional 125 H. P. boilers are in, and plant now has 555 H. P. A "6" steam line and a "10" water column are in and two No. 3 B sinkers are throwing 800 gallons water to 800-foot level, from which it is conducted to the Emmet, and from the latter to the surface.——A shaft-house is going in on the Congress on Poverty Flat.——The meeting of the Big Six M. Co., which was to have taken place on Nov. 15th, was postponed until Jan. 15th.——On the Ohio, on Breece hill, the shaft is down 200 feet; levels are run at 65, 150 and 200 feet. Ore from the latter runs about $6 per ton.——Ore bins and an elevated track are in at the Moyer.——The shaft on the Valentine, Leadville, is down 500 feet. The Benton M. Co. is sinking another shaft southwest of No. 1 shaft on the Breece.——On the Highland Chief the shaft, now down 100 feet, will go an additional 400 feet.

A new plant is going in on the Black Prince No. 2, on Breece hill, Leadville, operated by Lessee Rodgers. The shaft, now down 250 feet, will be sunk an additional 100 feet. Good ore is opened up.——Work on the Spot Cash will be continued through the winter. The shaft is down nearly 700 feet. At this level drifting will begin.——Carnahan & Gaw, leasing the President, are pushing work on that property with good results.——During the past ten months considerable development work has been done on the Ballard, on Breece hill. At the 422-foot level drifts have been run in four directions, all of them in ore. From the 360-foot level upraises have been run, showing ore up 90 feet. Shipments now average 1000 tons per month.——Operations on the Chrysolite, on Fryer hill, Leadville, will probably be resumed soon.

SAGUACHE COUNTY.

The Eureka Exploration Co., capital $400,000, is incorporated to work property near Crestone.——Coleman & Quinn have men blocking out ore, etc., on their properties near Crestone.——The big mill at the Independent is running. By Jan. 1st it is thought that 200 men will be employed in and around the mill; sixty men are now employed.

SAN JUAN COUNTY.

H. Moore and associates will put in an electric drill on their group of claims in Cascade basin. Electric power will be obtained from the Telluride Power Transmission Co.'s line, which will be run to the mines. Work on the group will be pushed next year.——It is said that the shut down of the Japan will probably be of long duration, as development and repair work will be done that will require nearly two years to finish.

SAN MIGUEL COUNTY.

The Peck cyanide plant at Telluride is closed down for the winter. At time of closing down it was treating 200 tons tailings daily.——Work on the Nellie is progressing. Elliott & Morrison will enlarge their concentrating plant, now 10 stamps, to 15 stamps. The plant is running on ore from a dump on the Sheridan, a Smuggler-Union property.——Shane, Treais & Smith are driving a tunnel on the Fairview; it is in 75 feet. A mill run of 20 tons is being taken out, and it is thought that it will return $30 per ton. Work will be pushed during the winter.——Manager S. D. Sayer is pushing work on the Butterfly.——In Bridal Veil basin, E. L. Sleeper is running a tunnel on the Hacienda group. Work will be continued through the winter.

SUMMIT COUNTY.

The North American Gold Dredging Co., operating the Swan and Blue river placers, will be reorganized and work pushed.

TELLER COUNTY.

(Special Correspondence).—The Arno G. M. Co., of which John Sharpe is president and manager, Sol Camp vice-president, E. W. Sebben secretary and treasurer, was organized to operate on a group of about ten acres of mineral ground underlying the town of Anaconda, Cripple Creek district. In the title by which the lots of this town were transferred to lot owners the mineral rights were not reserved. Within the last few months Mr. Sebben, promoter of the Arno Co., quietly purchased the mineral rights from the numerous lot owners, securing surface title as well to eight lots in one locality, with the result that the portion of the mineral ground lying between the Anaconda and Mary McKinney groups is grouped in one compact ownership, a twenty-year lease from the town having been secured for the mineral rights under the streets and alleys. A steam hoist has been installed on the surface holding of the company and an 85-foot shaft sunk, from the bottom of which a crosscut is being run toward the Anaconda, by which it is expected to open one or two well-known leads. The project is attracting much favorable attention. WASCOTT.

Cripple Creek, Nov. 26.

(Special Correspondence).—The Work is a large group of mines mostly on Raven and partly on Gold hill. The Work Co. is conducting operations on the major portion of the Poorman claim, the rest of the group being in the hands of lessees. Besides the lease of the Woods Investment Co. on the Morning Glory shaft and contiguous ground, there are six other leases, including the May Queen, Poorman, Pelland, Whitford, Regan and Carlson, the total tonnage from all amounting to considerable, the grade of ore being unusually high. The Woods Co. spent nearly $100,000 for equipment and improvements on their lease, the shaft through which they work being 700 feet deep, with crosscuts to the Jack Pot vein at the 550 and 700-foot levels. Other lessees have also spent money freely for improvements. All the leases referred to expire Sept. 15, 1902, thus giving the lessees nearly two years yet to operate. At the expiration of that time the company expects to assume charge of operations. The group carries several distinct veins; there being four veins on the Pelland lease and five on the Whitford. The ore generally has run from one ounce to twenty-five ounces, the maximum value of shipments made, however, being 158 ounces gold and 94 ounces silver per ton. From one of the Gold hill shafts a connection is being made with the Ophelia tunnel, which at that point cuts Work ground 435 feet below the surface. WASCOTT.

Anaconda, Nov. 28.

(Special Correspondence).—The 800-foot, three-compartment shaft No. 2 of the Portland mine has been equipped with a wood gallows-frame, the corner timbers forming a 16x9-foot rectangle, rising 60 feet above the shaft collar. The back braces, which extend from the top toward the hoisting engine, are double, made of 10x14-inch pieces, the upright pieces being 14x14 inches. This construction has been in charge of J. W. Wade, who has directed most of the timbering in the Portland mine within the past two or three years.

At this same shaft No. 2 a new first motion hoist has been installed, as well as a battery of water tube boilers of 1000 H. P. capacity. The installation of a forty-drill compressor for No. 2 is also planned.

Victor, Nov. 24.

Sinking of Climax No. 2, Victor, shaft is suspended at 330-foot level and drifting is in progress at that depth.——Delaney Bros. have placed a gallows-frame over an 80-foot hole, west of the Santa Rita, and will begin sinking as soon as engine and hoist are put in. Work in the tunnel is abandoned, but sinking and crosscutting are progressing.——The Santa Rita shaft, now down 580 feet, will be sunk to the 610-foot level, where drifting north and south will begin. A new hoist may be put in this winter. A new office building is completed; Manager, Conant.——The tunnel on the Climax No. 1 is in 700 feet.——The Gold Bond M. Co. will sink a new 300-foot shaft.——Ross & Hummer, leasing a block of the Gold Bond, will run a second level at a depth of 127 feet.——The Eclipse Con. Co. will soon make a shipment of ore from the 350-foot level.——The German-American G. M. Co., owning the Puzzle, on Gold hill, will develop that property through the Gold Exploration tunnel. Drifting was begun at a point 900 feet from the mouth of bore.

Operations on the Doctor, Cripple Creek, are resumed. The shaft is down 900 feet.——The Ironclad is shipping ore running about two ounces to the ton.——The old shaft-house at the Jewel is being torn down. It is said the property will be worked through a single shaft along with adjoining property on Poverty gulch.——The Elsmere Milling & Land Co., leasing block 14 of the Cameron, Cameron townsite, have opened up a 3-foot vein of $25 ore at the 24-foot level. The shaft will be sunk an additional 50 feet. Ore bins are going in.——A station is being cut on the 800-foot level of the Legal Tender on Bull hill, and sinking is suspended temporarily.——The Isabella is shipping ore.——Drifting is in progress on the 550-foot level of the Marie, and ore is being shipped.——The Victor recently made a shipment of nine carloads of ore. The production runs about 100 tons per day.——F. G. Clark is working the Kitty M. through the Anaconda tunnel.——To Nov. 1st the total gold output of Cripple Creek is given as $104,917,586; October output was $1,956,000.——A strike is reported made on the third level of the Wrockloff lease on the Burns, Victor.——On the Pinto the crosscut driven northwest on the 625-foot level cut the vein 120 feet from the shaft. A third shift will be put on.——J. A. Fitting, bonding the Bertha B., on Raven hill, is crosscutting east through a phonolytic dyke on the 200-foot level to cut the Moose vein.

Supt. Hills of the Sacramento has discontinued drifting on the 250-foot level and is now stoping. Ore runs from $50 to $500 to the ton. Shipments average one carload per week. On the Midnight claim of the Sacramento drifting and crosscutting are in progress.——McCormick and others, leasing block 4 of the Eclipse, on Battle mountain, are drifting north on the 70-foot level.——On the Last Dollar a new lift is completed and the shaft is down 900 feet.——The new 40x60-foot shaft-house at the Rubie is completed and the two new 100 H. P. boilers and ten-drill compressor will be in inside of two months. Shaft is now down 950 feet and will be sunk an additional 400 feet. A new hoist will probably be put in, as the present one is capable of lifting only 1050 feet.——Supt. Fitting will put the new engine on the Lafayette dump, 20 feet above the present location.

The Colorado Ore Reduction Co., with plant at Arequa, will suspend operations, as it has been found impossible to run the plant at a profit. Most of the contracts now in hand will be turned over to the Union Co. at Florence, which is practically owned by the same people. By the closing down of this plant, but one reduction mill—the Economic—will be left in the Cripple Creek district.——A strike of high-grade ore is reported from the Theresa, Goldfield. The shaft is down 500 feet.——Bodewin & Co. are taking out good ore from the 100-foot level of the Trenton on Gold Hill, Cripple Creek. Assays run from $40 to $200 per ton.——T. Bradford, manager Bankers Leasing Co., operating the Morning Star, is shipping ore.——Ore from the Morning Glory of the Woods Investment Co. assays from 5¼ ounces to 8½ ounces gold per ton, obtained from the screenings, while 1¼ ounces are obtained from the coarse rock.——Shove, Aldrich & Co. have secured control of the Little Bessie Co., owning eight acres on Beacon Hill, and will push development.——E. S. Gibbs has leased the J. J. L. on Beacon Hill for one year.——Murray & Swift have opened up $10 ore on 100-foot level of the Maggie, on Gold Hill.

IDAHO.

ADA COUNTY.

Fifty-dollar ore is reported opened up on the Black Hornet, in Black Hornet district.

BLAINE COUNTY.

The new 20-stamp mill for the Hattie group, Hailey, Supt. Black, is expected to be on the ground Jan. 1st.——Operations on the Golden Star are delayed, owing to lack of lumber, coal and wood.

The Hailey Times reports the sale of the McFadden group, near there, for $100,000.

A strike of copyritic ore is reported on 400-foot level of the Tip Top, near Hailey; another strike of same kind of ore is reported from 300-foot level of the Golden Star, ½ mile west from the Tip Top; ore in both cases is said to run $100 gold and 30% copper per ton.

BOISE COUNTY.

Mr. Grayson will resume operations on the Gold Hill, Quartzburg, next spring. Eastman & Hall are developing property near Horseshoe Bend.

Operations on the Little Sammie, near Idaho City, will be continued through the winter. The mill is temporarily closed down.

ELMORE COUNTY.

The Homestake, Neal, Manager Balbach, is closed down for the winter.——Gary & Enebo will work the Elmore during the winter.

Williams & Miles have contracted to work the Denver, owned by Supt. Williams of the Homestake.

OWYHEE COUNTY.

At Silver City, H. Sullivan is crosscutting in the Steuben.——The Trade Dollar Co. has bonded the Ontario.——The Wagener arrastra is running on ore from the Steuben, and will soon run on thirty tons ore from Jacobs gulch strike.

Eight men are employed at the Poorman, Silver City, under Foreman Gerling. Work on the 350-foot level is being pushed.

Wildernicker Bros., operating the Meadow Bank, on Cow creek, near De Lamar, have sunk a 70-foot shaft and have opened up good ore on that level. They will drive a 600-foot tunnel and put in a track.

SHOSHONE COUNTY.

Work on the Sunset and Kill Buck mines, Wallace, owned by J. K. & W. A. Clark, is progressing favorably. A concentrator will be put in next year on Lake gulch. Water power will be used.

WASHINGTON COUNTY.

The new smelter at Mineral is nearing completion.——A new wagon road is built to the Silver Bell.

F. Pierce, manager Iron Dike (copper) on Snake river, in Seven Devils district, near Bear, states that Receiver Price of the Northwest Copper Co. is expending $2000 per month in development work.

The Peacock is shipping ore to Boston, Mass. Ore is hauled by wagon to Concord, on the Weiser river, 75 miles distant, for $7.50 per ton, and rail freight to Boston is $20 per ton; cost of mining is $4 per ton, making total cost $31.50 per ton.

Three railroads are projected into the Seven Devils district—one from Baker City, Oregon, one from Huntington, Idaho, and another down the Weiser river.

MICHIGAN.

HOUGHTON COUNTY.

Shaft No. 5 on the Tamarack copper vein, begun in 1895, is now close to the conglomerate vein and expects to reach it some time this month, at a distance of 4750 feet from the surface. It will continue down after intersecting the lode and next year will attain the depth of 1 mile. It has five compartments and is 27 feet long and 7 feet 2 inches wide inside the timbers.

MONTANA.

DEER LODGE COUNTY.

Placer gold is said to have been found recently 3 miles from Anaconda.

FERGUS COUNTY.

Two shifts (ten men each) will be employed at the Sapphire mines, Yogo, during the winter.——It is said the owners of the Northern Pacific group, in the Judith range, near Lewistown, recently refused an offer of $75,000 for the group.——The new Kendall mill, in the Moccasins, capacity 100 tons ore per day, is running successfully.

FLATHEAD COUNTY.

The new mill of the American Kootenai M. Co. at Libby is about completed. The terminal stations of the tramway are being enclosed, so that operations can be continued through the winter.——Supt. Beager has men running a working tunnel on the Gold Bug. Ore assays $10 to the ton.

GRANITE COUNTY.

The Lehigh, Sunflower and Blue Bell, on Franklin hill, Phillipsburg, are bonded to Eastern men for $15,000. Men are driving an air tunnel to crosscut the lead.

LEWIS AND CLARKE COUNTY.

J. Breen of Spokane, Wash., has bought a one-third interest in the Monitor, in Monitor gulch, on Ten-Mile creek, near Rimini.——Work on the property of the McClure Co., in Basin gulch, will be pushed during the winter. A 1000-foot tunnel is in and the shaft is down 75 feet. ——The Drum Lummon M. Co., operating the Drum Lummon, near Marysville, has bonded the Jeanette, Redemption, Virginia and Marie lodes, and will push work on same. The 60-stamp mill is being put in shape to run.

MADISON COUNTY.

The Salt Lake M. & D. Co. has relinquished the Old Joe, Pony, after paying $2500. It is said that 238 tons of ore were run through Cowan's mill and that returns were only $5.50 per ton; concentrates, 8 to 1, averaged about $25—$1.50 being saved on plates and from 80 cents to $1.80 being found in tailings.——G. Gade will do 600 feet of work on the Nugget Gulch mine.——G. Brown has bonded placer ground near Sheridan. He will interest Eastern men and work it on a large scale, it is said.——The Centennial-Toledo C., G. & S. M. & M. Co. are sinking on claims near Brandon. Work will be continued through the winter.——The new 20-stamp mill of Glass Bros. at Silver Star is running on Broadway ore.——The Vernia & Vedia will be opened up by Holter, Quail & Hanks. A tunnel will be driven.——The mill that was built some years ago to work the Comet tailings will be in operation soon again. New machinery will be put in and work pushed. ——The Eva May and the Ada are shipping ore.——Drifting is in progress on the 600-foot level of the Kennett, Virginia City.

MEAGHER COUNTY.

The Diamond R. concentrator at Neihart will be enlarged, it is said. Ores from the Moulton and Broadwater mines are treated by this plant.——A custom concentrator for treating gold and silver ores is said to be needed in the Neihart district.

PARK COUNTY.

The Milwaukee-Montana-Natural Bridge G. & C. M. Co., Livingston, is getting out ore ready for the new stamp mill which will be put in next spring.

NEVADA.

ESMERALDA COUNTY.

It is reported that Siegel & Co. will soon begin operations on coal mines near Columbus.

EUREKA COUNTY.

Adams & Johnson are pushing work on the Silver Connor, on Prospect mountain, near Eureka.——M. Moran has leased the El Dorado. It has a 100-foot shaft. Work will be pushed during the winter.——Ten men will be employed on the Bay State, at Newark, during the winter.

Negotiations are pending for the sale of a number of mining properties on Adams Hill, near Eureka.——The Venture Corp., of London, England, has bought the Dambler (copper) for $100,000,——The new compressor and electric motors at the Yellow Jacket are running.

LANDER COUNTY.

The Nevada M. Co., of Salt Lake, will sink a 100-foot shaft on the Nevada, near Galena.

LINCOLN COUNTY.

G. C. Fetterman, of the Magnolia, De Lamar, says there are 1000 tons of $30 ore on the dump at the present time.——It is said that from 7000 to 8000 tons of coal are used monthly in the mines at De Lamar.

The Quartette M. Co. has completed the new 20-stamp mill on the Quartette, at Quartette, 13 miles from Searchlight. Contracts will be let this month for the delivery of eighty tons ore daily at the mill. F. W. Dunn, Manager; Mr. Macready, Supt.; Mr. Wheatley, Foreman.

LYON COUNTY.

A strike of $100 ore is reported made at Como.

STOREY COUNTY.

During the week ending Dec. 2, output of ore at the Con. California & Virginia, Virginia, was sixty-five cars, assaying on a basis of $56.63 gold per ton and 106 cars assaying on a basis of $23.97 gold per ton; 45,450 pounds ore, assaying $62.88 per ton, and 76,850 pounds (railroad weight) ore, assaying $60.52 per ton, were shipped to the Selby Smelting & Lead Co., San Francisco.

In the main shaft of the Ophir repairs are under way. The Sutro tunnel on 1700-foot level is in 223 feet.——On the Mexican the Central tunnel level is in 208 feet.——The west drift on 1600-foot level of the Sierra Nevada is cleaned out and repaired 500 feet.

The Holman tunnel on the Silver Hill is in 690 feet. A connection with the Overland winze is made from the 600-foot point, providing good ventilation for both the Overland and Silver Hill mines.

The new electric machinery going in at the Yellow Jacket, Virginia, is expected to be ready by Jan. 1st. The compressor, a compound tandem machine, driven by 75 H. P. motor, and with capacity of compressing 400 cubic feet air per minute, is running.——At the Caledonia the drift from a point 195 feet in on 1000-foot level is out 63 feet. Face of drift is hard quartz and porphyry. Ore recently shipped ran $17.45 per ton, $11.26 being gold. On the 900-foot level west crosscut No. 1 is in 28 feet.——Seven cars ore have been extracted from the north drift on the 900-foot level of the Overman. Ore ran $20.16 per ton, $12.51 being gold.

It is locally reported that the Ophir Co. may buy the Bowie, on Mount Ophir, near Virginia. Should the deal go through a mill will probably be put in.——Three miles south of the Mendha, $20 ore is opened up at a depth of 675 feet.

WHITE PINE COUNTY.

The 20 H. P. hoisting engine, formerly used at the Bowman, on Adams hill, near Eureka, is being put in on the Pilot Knob group (copper) near Ely.

The Rocco-Homestake-Nevada M. Co.'s statement for quarter ending Sept. 30, given to the county assessor, shows total shipments to have been 780 tons ore, value $32,136; extraction charges were $8700, transportation $15,600, reduction $1900, leaving a net profit of $5936.

NEW MEXICO.

BERNALILLO COUNTY.

C. Yocum will push work on the Maiden Bush, Bland, during the winter.——Work is progressing at the Lone Star. The main drift is driven 400 feet. An upraise is being driven from drift to upper workings.

SANTA FE COUNTY.

The Santa Fe G. & C. M. Co., T. J. McLaughlin manager, has completed the new 200-ton copper smelter at San Pedro: 150 men are employed at mine and mill.——R. Griffith is pushing work on the Cash Entry, near Cerrillos.——The Baird M. Co. has forty-five men erecting a mill near Golden. If water supply is sufficient, capacity of mill will be increased to 300 stamps.——On the Hazleton, of the Argo Milling Co. of Milwaukee, Wis., the shaft is down 320 feet.——A 30-stamp mill is going in on the Black Copper (gold) mines, near Santa Fe. Shaft is down 300 feet, and levels are being run both ways at this depth. Twenty men are employed.——On the Iron placers, in Placer gulch, $1 per cubic yard is extracted.

TAOS COUNTY.

The Rio Hondo Copper Co. contemplates the erection of a 500-ton mill at its mines, near Amizett, next year.

OREGON.

BAKER COUNTY.

It is reported that Snake river will be utilized to generate electric power for dredging purposes on Burnt river, near Huntington.

On the Alamo, near Alamo, the shaft is down 150 feet. A tunnel is being run to cut the ore shoot at a depth of 400 feet. A 10-stamp mill—already contracted for—will go in in the spring; J. G. McGuigan, Pres. and general manager.

GRANT COUNTY.

At Granite the Red Boy has a 20-stamp mill and cyanide plant, the Cougar has a 200-ton roller mill and cyanide plant, the Magnolia has a 10-stamp mill, and the Little Giant has a 20-stamp mill.——Hoisting machinery is going in on the Red Boy and a 2000-foot three-compartment shaft will be sunk.——Work on the Ibex group, 5 miles east of Granite, will be resumed. A 10-stamp mill and concentrating plant will be put in.——The tunnel on the Pyrites, now in 500 feet, will be driven an additional 600 feet.

JOSEPHINE COUNTY.

B. E. Meredith, Supt. Wilson-Meredith hydraulic mine, has completed the suspension bridge for his pipe line over Illinois river. The water supply for the mine comes from the other side of the river, and on account of the rocky channel the pipe could not be sunk to the bottom. The bridge consists of two crucible steel cables, 1¾ inches thick and 475 feet long, giving a clear span of 200 feet over the river. The pipe to be carried is 24 inches in diameter, water rushing through under 210 feet gravity pressure. Its total weight is 80,000 pounds. Mr. Meredith will operate two giants, and expects to have a six months' run. Besides the cable for the bridge there is a ¾-inch cable, with trolley, for passengers.

F. Colvig has resumed operations on his Rocky Gulch placer mine, near Galice. ——The Yellow Horn, Leland, stamp mill will soon start up. Supplies are going in and work will be pushed.

UNION COUNTY.

Supt. F. J. Perkins of the Gem, Sparta, has four men getting things ready for a run.——On the Union group there are 700 feet of tunnels ——Work on the Windsor group may be resumed. A 10-stamp mill is on the property.——Work on the Crystal Palace group will probably be resumed this winter.

SOUTH DAKOTA.

LAWRENCE COUNTY.

P. Kleeman will put in a pump on the Mandaline, near Deadwood, and will work the mine through the winter.——A 100-foot shaft will be sunk on the Monarch (mica). Mica is shipped to Valparaiso, Ind., where the company has a plant.——Drifting will begin on the Mayflower (gold).——It is estimated that there is enough ore in sight to keep the 50-ton cyanide plant on Yellow creek running for three years.

The Crosby-Ehrich Co., of Colorado, has bought 230 acres land near Kirk for $400,000, it is said. A new 1000-foot hoist will be put in and sinking of main shaft begun about Jan. 1st. A mill will probably be put in when development permits. The company will be known as the Belt Extension Co., O. B. Armstrong, manager. ——The American Tin M. Co. will push work on its tin properties in Bear gulch.

TEXAS.

The Mine & Smelter Supply Co., of Mexico and Denver, has acquired the El Paso Mine, Mill & Smelter Co., for $100,000.

UTAH.

BOX ELDER COUNTY.

Good reports are received from the Century at Park valley.

CACHE COUNTY.

The Copper King M. & M. Co. will drive a 3000-foot tunnel on the Copper King and Queen mines in Blacksmith Fork canyon, near Logan. The tunnel will cut main deposit at depth of about 285 feet. Tunnel will be 6x4 feet, and it is estimated that it will cost $2000.

JUAB COUNTY.

Operations on the Cleopatra, Tintic, will resume early in January, it is said.——A strike of high-grade ore is reported made on 525-foot level of the Shoebridge Bonanza, Tintic.——On the 2d inst. fire destroyed the boiler-room and blacksmith shop at the Ajax, Mammoth.

MORGAN COUNTY.

The Carbonate Hill and Carbonate Gem mines, in Cottonwood district, near Peterson, are shipping ore to the smelters at Sandy. The two mines may be consolidated and worked under one management.

SALT LAKE COUNTY.

The Sampson, Bingham, recently shipped 250 tons of ore to the Dewey mill.——The Erie is shipping two cars of ore weekly. —— Supt. Garretson of the St. James group is shipping ore. —— The Rogers mill is treating second-class ore from the Silver Shield.——On the Fortune group the Freedom tunnel is in 500 feet. Two feet of good copper ore were opened up recently.——The Dewey mill will run on second-class ore from the R. J. C. Craze lease on the Neptune. Seventy tons of ore from the Red Wing recently returned 27% lead, 24 ounces silver and $2 gold per ton.——The Northern Light shipments of ore to the Dewey mill are temporarily suspended, owing to bad condition of the roads.——The Bingham C. & G. tramway is delivering over 50 tons of ore to the depot daily. Additional cars have been put on.——The Fortune is shipping 25 tons of concentrates daily; values run from 34% to 37% lead and from 10 to 12 ounces of silver per ton.——Work on the Red Wing, Bingham, is progressing. Ore from the Silver Hill tunnel recently gave $1900 to $2000 per ton.——The Savanic, near Grand Gulch, is shipping high-grade copper ore.——The Bingham C. & G. M. Co., Bingham, will put in a switch to connect mine with the Copper Belt railway. Output at present is between 60 and 70 tons of ore per day.——The Dewey mill, Bingham, is running on Neptune ore.

Ore running twenty-five ounces silver to the ton is reported opened up on the Kansas group, near Bingham.——Manager Packard of the Star Con. recently shipped 110 tons of ore which netted about $30 per ton.——A car of ore recently shipped from the Humbug, J. Knight owner, returned $5000.

The Highland Boy, Bingham, tramway, now being extended to upper terminal at tunnel No. 7, will be ready early in December. The new smelter will be ready by Jan. 1st, when from 400 to 500 tons ore per day will be handled. A shipment of 60,141 pounds pig copper was made to the East on the 24th ult.

It is reported that a Sadtler process smelter, with capacity of from twenty-five to fifty tons per day, will be built for the Horn Silver mines at or near Salt Lake. If built, it will be the first commercial smelter using that process, the only other one being an experimental plant in Denver, Colo.

On the Silver Shield and Toledo claims of the Silver Shield M. & M. Co., Bingham, there are 120 feet of shafting, 4000 feet of tunnels and 510 feet of upraises. Eighteen men are employed and regular shipments of crude ore and concentrates are made.

SUMMIT COUNTY.

Drifting is in progress on the Creole at Park City; drift in 25 feet.——The cable and half of the buckets for the Silver King aerial tram are on the ground and construction work will be pushed. Work on ore depot and the refinery will be pushed also.——High-grade ore is being taken from the Ontario drain tunnel at the 1300-foot mark.

S. Bamberger has bought a three-fourths interest in the Dalberg, at Park City, for $12,500, it is said. After January 1st the mine will be worked by a company which will put in a compressor to be operated by electricity, power being obtained from Provo.

TOOELE COUNTY.

The Sharp M. Co. has levied an assessment of ½ cent per share, delinquent January 4.

WASHINGTON.

FERRY COUNTY.

The Roaring Eagle group, on Bridge creek, 32 miles from Republic, is reported sold to E. L. Tate and others of Spokane; J. Sunk manager.——The Flag Hill, Republic, has temporarily suspended operations owing to inflow of surface water.——The crosscut on 425-foot level of the Mountain Lion is in 180 feet. On the 150-foot level the ledge shows an average width of 8 feet. The shaft will be sunk an additional 200 feet, and, possibly, an additional 400 feet.——The crosscut on the Gold Ledge is in 16 feet from the foot wall.

OKANOGAN COUNTY.

Machine drills are in operation in the Palmer Mountain tunnel, near Loomis. The tunnel is in over 4000 feet.——The tunnel of the Utica-Oro Fino is in 500 feet and crosscutting is now in progress. Ore runs from 1% to 8% copper and $10 to $30 gold to the ton.

SNOHOMISH COUNTY.

A strike of gray copper ore is reported made on 320-foot level of the Monte Carlo. The tunnel is in 330 feet and the pay streak has widened to 14 inches.

SPOKANE COUNTY.

The New York M. Co., capital $50,000, is incorporated at Spokane.——The Silver Queen, near Deep Creek, is shipping ore to the Great Falls, Mont., smelter for a test.

STEVENS COUNTY.

W. E. Newton, manager Newton Copper Co., operating the Newton copper group, just across the International boundary line from Greenwood, B. C., reports shaft down 95 feet.

Work is being pushed on the Copper Bullion. A 250-foot tunnel is in on 80-foot level; A. McKinley Supt.——Work on the First Thought, Bossburg, is being pushed by Supt. A. Sharpe.——The Orient has air compressor, machine drills and a hoist; 500 feet of tunnels are run.——On the Examiner, on Flat creek, F. A. Russell manager, a steam pump and hoist are in and work will be pushed during the winter.

The Lafayette, on Iron mountain, will resume operations within a few weeks.——On Sulphide mountain the Pacific Star Co. is sinking on the Pacific Star.——The Easter Sunday is being prospected with a diamond drill. A 100-foot shaft is sunk on the property.——The tunnel on the old

Eagle, at Chewelah, is said to have opened up a good body of galena recently.

WHITMAN COUNTY.

A find of a 5-foot vein of coal is reported made by Warren & Howe in the Clearwater mountains, 12 miles from Orofino.

WYOMING.

Denver says that Union Pacific officials have bought for $250,000 the Rambler mine, Battle Lake, and that the Union Pacific R. R. may build a spur to the property. G. Doane, the owner, says that the mine has not been sold and that he does not propose to sell it.

FOREIGN.

BRITISH COLUMBIA.

Over 4000 tons ore have been shipped from Slocan lake points this year.——The Chaplean Co., operating near Kaslo, has bought the Clyde Fraction for $10,000, it is said.——The Humming Bird, Grand Forks, is shipping regularly to the Granby smelter.

The new electrical compressor for the Nickel Plate, Rossland, is going in, and stoping is in progress preparatory for shipping ore.——The C. P. R. R. Co. is building 100 cars for Kootenay ore traffic.——The tunnel on the Storm, Slocan, is in 150 feet; crosscutting is in progress on this level. The wagon road up Silver mountain is completed.——The new Boundary Falls pyritic smelter will probably be blown in before Jan. 1st.——A smelter may be erected in South East Kootenay next spring.——Ten thousand sacks of ore are ready for shipment at the Paradise, Windemere.——Supt. E. W. Liljegran of the Humming Bird, Grand Forks, says that shipping is resumed, fifty tons ore being sent to the smelter at that point weekly. The ore averages $20 per ton.——The Stemwinder, Rossland, shaft is down 300 feet. There are 700 feet of crosscuts, drifts, etc.——On the Brooklyn the shaft is down 250 feet.——The sampling mill at the Le Roi, Rossland, is nearing completion.——A diamond drill is working in the face of the north drift on the 350-foot level at the White Bear.

CHILI.

It is said that the Guggenheims will build another smelter on the west coast.

MEXICO.

M. T. Burgess, formerly of Utah, is developing an old Spanish mine at Cerro de Galligos, 100 miles west of Chilpancingo, capital of State of Guerrero, southwestern Mexico. Mr. Burgess says ore will average $50 per ton.

G. Kislingbury, representing New York men, is closing deal for a half interest in the Escuadro (silver), Oaxaca.

Commercial Paragraphs.

W. H. STROUT & SON, who have opened an assay office at 1725 Arapahoe street, Denver, Colo., have put in a double muffle furnace, manufactured by F. W. Braun & Co. of Los Angeles, Cal.

THE Electric Railway & Manufacturers' Supply Co., 548 Mission street, San Francisco, Cal., is the exclusive distributing agent on the Pacific coast for the Ericsson's interior telephone. Replaces speaking tubes for stores, mills, mines, etc.

SECRETARY and General Manager H. W. Hoyt has been elected President of the National Founders' Association at its recent convention in New York. This is the largest body of employers in the United States having the avowed object of promoting harmonious relations with its employes. The Association represents a capitalization of more than $200,000,000.

THE Homestake Mining Co. of Lead, South Dakota, has placed an order with Gates Iron Works for 10,000 special stamp shoes, probably the largest order for stamp shoes ever placed by one company. The Gates Iron Works has been supplying the Homestake Co. with its shoes for several years, the trade having been established under severe competition on the point of quality, the Gates Iron Works having been successful in producing stamp shoes combining great strength and hardness. The order will require fifty-one freight cars to transport it.

ASA M. MATTICE has been appointed Chief Engineer of the Westinghouse Electric & Manufacturing Co., and will enter upon his duties this month. Mr. Mattice was for ten years up to a year ago principal assistant to E. D. Levitt of Cambridgeport, Mass., and has been actively connected with the design of all the large machinery coming from Levitt's office during that time. During the past year he has been remodeling the Cocheco cotton mills at Dover, N. H. Mr. Mattice is an engineer graduate of the Naval Academy of the class of '74, of which class E. H. Warren, vice-president of the Westinghouse Electric & Manufacturing Co., is also a member. He was assistant to Admiral Melville at the beginning of the new navy, and had an important part in the design of the machinery of the Maine, San Francisco and others of the important early ships. The Westinghouse Co. is to be congratulated on the additional strength which he will give to their already strong engineering staff.

Personal.

C. A. CLARK of Mercur, Utah, is in Denver, Colo.

E. C. DEFORREST of Denver, Colo., goes to Florida.

W. SCALLON is elected Pres. Anaconda Copper Co.

M. R. WILBURN of Nevada is in Grass Valley, Cal.

B. S. REVETT has returned to Colorado from Siberia.

GAY LOMBARD of Cedros Island is in San Francisco.

J. J. BLAKE of Salt Lake, Utah, is in Downieville, Cal.

L. D. SIVYER, E. M., of Spokane, Wash., is in Colorado.

H. SNYDER of Culiocan, Mexico, returns there from Salt Lake, Utah.

F. C. LAIRD of Willow River, B. C., will spend the winter in Chicago, Ill.

J. LOWLES of London, Eng., one of the directors of the Velvet, is in Rossland, B. C.

THOMAS COUCH of Montana, Massachusetts and California, is in San Francisco.

A. R. PARKER of Boston, Mass., is examining the Centennial–Eureka, at Tintic, Utah.

D. H. LAWRENCE, Supt. Waldo G. & C. Smelting Co., Waldo, Or., is in San Francisco.

H. H. ROGERS will succeed the late Marcus Daly as Pres. of the Amalgamated Copper Co.

A. C. MORRISON is now general manager Crystalline M. Co., Sonora, Cal., vice T. Mickel.

G. EHRENBERG succeeds Jos. McDonald as manager Helena–Frisco mine, Cœur d'Alenes, Idaho.

R. D. GRANT of Salt Lake, Utah, goes to Butte, Mont., and from there to New York and Boston.

M. D. KELLY has resigned as Supt. Jumper Gold Syndicate properties, Tuolumne county, Cal.

T. F. WALSH of Colorado was elected Pres. of the National Irrigation Congress recently held in Chicago, Ill.

B. H. TATEM of Montana is nominated by the President to be assayer in charge of the assay office at Helena, Mont.

F. KLEPETKO, general manager Anaconda and Butte & Boston properties, Butte, Mont., is in Salt Lake, Utah.

H. TREMBATH is appointed foreman of principal Gold Hill mines, Eureka, Nev., vice J. Langan, now in California.

A. BORDEAUX, general manager Ralston Divide G. M. Co., Long Canyon, Cal., will spend the winter in Georgetown, Cal.

T. H. OXNAM has gone from Redding, Cal., to examine property in the vicinity of the Palmarijo mines, Chinipas, Mexico.

J. B. HARRELL, formerly of DeLamar, Idaho, now has charge of the 100-stamp mill of the San Luis Valley M. Co., Crestone, Colo.

JOS. MCDOWELL, late manager Frisco Con., Wallace, Idaho, goes to Alaska to take charge of the Treadwell mines on Douglas Island.

A. C. WEHE, Pres. and general manager Milwaukee–Palmer Mountain G. & C. M. Co., Weheville, Wash., will spend the winter in Los Angeles, Cal.

J. M. BOUTWELL of the United States Geological Survey has completed the survey of the Bingham, Utah, district, and returns to Washington, D. C.

A. L. WATERS of Globe, Ariz., has returned to Matape, Sonora, Mexico, where he is in charge of mines owned by the British Gold Mines of Mexico Co.

S. E. BRETHERTON, Denver, Colo., has been engaged of late examining various properties with the view of introducing his method of pyritic smelting where conditions are found adaptable to it.

CALEB WHITEHEAD, the special commissioner who was sent by the United States Government to Alaska to examine the gold deposits of the Seward peninsula, has returned to Washington and is now engaged upon the compilation of his official report. Dr. Whitehead was recently offered, and refused, $20,000 a year to join the Turkish Government as metallurgical adviser.

List of U. S. Patents for Pacific Coast Inventors.

REPORTED BY DEWEY, STRONG & CO.,
PIONEER PATENT SOLICITORS
FOR PACIFIC COAST.

FOR THE WEEK ENDING NOV. 27, 1900.

662,757.—JAR CLOSURE — Mae Birney, New Whatcom, Wash.
662,665.—CULTIVATOR — G. L. Bradley, Palaha City, Wash.
662,684. — PAVING BLOCK PRESS — J. Brower, Oakland, Cal.
562,685.—AMALGAMATOR—I. P. Clarke, Alameda, Cal.
562,895.— UNDERREAMER — W. Duncan, Los Angeles, Cal.
662,563.—HAND CAR—Hall & Gray, San Marcos, Cal.
662,623.—GRATE BAR—T. W. Heintzelman, Sacramento, Cal.
662,597.—SIDEWALKS, ETC.—P. H. Jackson, S. F.
662,625.—TYPE CASE—H. L Keyte, Merlin, Or.
662,871. — FIREPROOF STRUCTURE — D. Kilpatrick, Los Angeles, Cal.
662,540.—VEHICLE AXLE—A. C. Massey, Los Angeles, Cal.
662,677.—HOOK AND EYE—Nevada McMahon, S. F.
662,573.—REPRODUCING TYPE—W. H. B. Miller, Oakland, Cal.
662,576.—ROLL PAPER HOLDER—T. C. Phillips, S. F.
662,818.—SHINGLE JOINTER—J. Randall, Gate, Wash.
662,552.—STEAM TRAP—J. St. Mary, S. F.
662,597.—PHOTO MOUNT—P. J. Stuparich, S. F.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

REPRODUCING TYPE OR THE LIKE.—No. 662,573. Nov. 27, 1900. W. H. B. Miller, Oakland, Cal. This invention relates to a means for reproducing metal type, both face and body, from any corresponding type and at a single operation without the use of a pattern or need for finishing processes. It consists of a mold-box having a movable side between which and the fixed side of the box the type may be fitted, spacing blocks adjustable in the channel thus formed to fit upon each side of the type, a bottom formed of enameled surface blotting paper, in which an impression of the type face may be made by a blow or pressure, a cap fitting the top of said mold having an opening, a melting pot and guides therefor and a gate movable under the opening and means for opening said gate in unison with its adjustment to the molding-box.

PROCESS OF PRODUCING PHOTOGRAPHIC MOUNTS.—No. 662,579. Nov. 27, 1900. P. J. Stuparich, San Francisco, Cal. The object of this invention is to produce variously shaded card mounts for photographs by proper blending of suitable inks upon the printing plate, and so mounting the plate and the cards which are to be printed as to properly apply the shade at a single impression. It consists in removing the center from the printing plate and applying a shaded ink to the remaining portion of the plate to form a deepening tint from one side or angle to the other and bounding an uncolored center, finally impressing the plate upon a card placed to receive the impression.

HOOK AND EYE.—No. 662,667. Nov. 27, 1900. Nevada McMahon, San Francisco, Cal. This invention relates to hooks and eyes for clothing. It consists of a hook formed by bending wires substantially as shown to form a bight which comprises the hook, divergent portions of said wire upon each side and above the level of the hook and divergent and rectangular fastenings formed at front and rear upon opposite sides of the structure. An eye is formed by a curved bight adapted to enter between the guards and engage the hook, the wire diverging from the base of the eye to form exterior angles, and thence converging, extending parallel and finally turned outward to form rectangular fastening loops.

Recently Declared Mining Dividends.

	Payable.
Plumbago M. Co., Cal., 8 cents per share, $15,200	Dec. 10
Bunker Hill & Sullivan M. & C. Co., Idaho, $21,000	Dec. 4
Tamarack C. M. Co., Mich. (semi-annual), $10 per share	Dec. 10
Calumet & Hecla M. Co., Mich. (quarterly), $20 per share, $2,000,000	Dec. 28

Latest Market Reports.

SAN FRANCISCO, Dec. 6, 1900.

SILVER—Per oz., Troy: London, 29⅞d (standard ounce, 925 fine); New York, bar silver, 64⅝c (1000 fine); San Francisco, 64½c; Mexican dollars, 51c.

COPPER.—New York: Lake, 1 to 3 casks, $17.25 cash; carload lots, 17.00; Electrolytic, 1 to 3 casks, 16.87½; carload lots, 16.50; Casting, 1 to 3 casks, 16.75; carload lots, 16.50. San Francisco: 18. Mill copper plates, 20c; bars, 22@23c.

LEAD.—New York, $4.32½; Salt Lake City, $4.00; St. Louis, $4.25; San Francisco $5.00, carload lots; 5½c 1000 to 4000 lbs.; pipe 6¾, sheet 7½, bar 6c; pig, $4.70 @5.10. London, £17 per ton=3.67c per ℔.

SPELTER. — New York, $4.35; St. Louis, $4.15; San Francisco, ton lots, 5¾c; 100-lb lots, 6c.

ANTIMONY.—New York, Cookson's, 10½c; Hallett's, 9½c; San Francisco, 1000-lb lots, 12c; 300 to 500 lbs., 13@14c; 100-lb lots, 15@18c.

IRON.—Pittsburg, Bessemer pig, $14.50; gray forge, $14.00; San Francisco, bar, per lb., 2½c in small quantities.

STEEL.—Bessemer billets, Pittsburg, $20.00; open hearth billets, $23.50; San Francisco, bar, 7c to 12c per lb.

TIN.—New York, pig, $28.50; San Francisco, ton lots, 30c; 1000 ℔s., 30½c; 500 ℔s., 30¾c; less, 31c; bar tin, ⅌ ℔, 35c.

QUICKSILVER. — New York, $51.00; large lots: London, £9 2s 6d; San Francisco, local, $48.00 ⅌ flask of 76½ ℔s.; Export, $45.

NICKEL.—New York, 50@60c ⅌ ℔.

MAGNESIUM.—New York, $3.00 ⅌ ℔.; San Francisco, $4.00.

ZINC.—San Francisco, 5¼c; slab, 5¾c; bar, 7c.

BABBITT METAL.— San Francisco, No. 1, 10c.

SOLDER. — Half-and-half, 100-℔. lots, 18.70c; San Francisco, Plumbers', 100-℔. lots, 15.85c.

ASSAY LITHARGE.—San Francisco, 10c ⅌ ℔, small lots.

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 30c to 35c.

BISMUTH.—New York, ⅌ ℔., $1.60 50-℔ lots; San Francisco, $2.50 to $2.75 ℔ lots.

PHOSPHORUS. — F. o. b. New York 50@60c ⅌ ℔.

TUNGSTEN.—New York, ⅌ ℔., 95c; San Francisco, $1.15.

FERRO-TUNGSTEN. — New York, 37%, 35c; San Francisco, 65c (60%).

FERRO-MANGANESE. — Pittsburg, 80%, domestic, $85, large lots.

PLATINUM.— San Francisco, crude, $17 ⅌ oz.; New York, $18.20 per Troy oz

POWDER.—F. o. b. San Francisco: No. 1. 70% nitro-glycerine, per ℔., in carload lots, 15¼c; less than one ton, 17¼c. No. 1*, 60%, carload lots, 13¼c; less than one ton, 15¼c. No. 1** 50%, carload lots, 11¾c; less than one ton, 13¾c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9½c; less than one ton, 11½c. No. 2** 30% carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9, in lots not less than 1000.

FUSE.—Triple tape, $3.60 per 1000 feet; double tape, $3.00; single tape, $2.65; Hemp, $2.10; Cement No. 2, $3.00; Cement No. 1, $2.65, in lots of 3000 feet and up.

CANDLES.—Granite 6s, 16 oz., 40s., 11½c ⅌ set; 14 oz., 40s., 10c.

CHEMICALS.—Cyanide of potassium, 98%–99%, jobbing, 32½@33½c ⅌ ℔.; carloads, 30@31c; in 10-℔. tins, 40c; sulphuric acid, 66% B, 2c ⅌ ℔.; soda ash, $1.60 ⅌ 100 ℔s. 58%; hyposulphite of soda, 2¾@3c ⅌ ℔.; blue vitriol, 5½@6c ⅌ ℔.; borax, concentrated, 7@8c ⅌ ℔.; chlorate of potash, 12@13c; roll sulphur, 6c; alum, $1.90@2.00; flour sulphur, French, 2¼@2½c; California refined, 1¾@2c; nitric acid, in carboys, 8c ⅌ ℔.; caustic soda, in drums, 3@4c ⅌ ℔.; Cal. s. soda, bbls., $1.00; sks, 95c ⅌ 100 ℔s.; chloride of lime, spot, $2.50@2.60; nitrate of potash, in kegs, 8c; caustic potash, 10c in 40-℔. tins.

COAL. — San Francisco, coast, yard prices: Wellington, $9; Seattle, $7.00; Coos Bay, $5.50; Southfield, $9.00. Cargo lots, Eastern and foreign: Wallsend, $8.00; Brymbo, $7.50; Pennsylvania, hd., $14.00; Scotch, $8; Cumberland, $12; Cannel, $9.50; Welsh Anthracite, $12.00; Rock Springs, $8.50; Colorado Anthracite, $14.50. Coke, $16 per ton in bulk; $18 in sacks.

San Francisco Stock Board Sales.

SAN FRANCISCO, Dec. 6, 1900.

100 Belcher	15c	200 Ophir.	65c
500 B. & B	25c	500 Overman	07c
200 Caledonia	36c	600 Potosi	13c
200 Challenge	22c	100 Savage	08c
200 Chollar	15c	100 Sierra Nev.	27c
520 C. C. & V.	$1 25	200 Silver Hill	49c
100 G. & C	54c	500 Y Jacket	22c

CALIFORNIA STATE LIBRARY

This Paper not to be taken from the Library. * * * *

MINING AND SCIENTIFIC PRESS. AND PACIFIC ELECTRICAL REVIEW.

Whole No. 2108.—VOLUME LXXXI. Number 24. SAN FRANCISCO, SATURDAY, DECEMBER 15, 1900. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

The Link-Belt Stair Lift.

The latest contribution to elevating machinery for passengers is the Link-Belt stair lift, the invention of the president of the Link-Belt Engineering Co., James Mapes Dodge of Nicetown, Philadelphia.

The stair lift, of which are here presented several illustrations, departs radically from other machines designed for this purpose and possesses many unique advantages. Its general appearance is that of the familiar one-flight staircase. A great number of steel links are so assembled as to make a belt flexible in one direction and rigid in the other, which is fitted at intervals with shafts carrying self-oiling rollers. By means of a stationary frog, which switches the rollers alternately into the upper and lower channels of the steel sides, treads and risers are formed at the base, presenting a smooth, flat surface on which the passenger steps as naturally as upon a regular step and maintains his position, the steps sliding upward without jar to the floor above, when they disappear around the sprocket after delivering the passenger independent of any effort of his own.

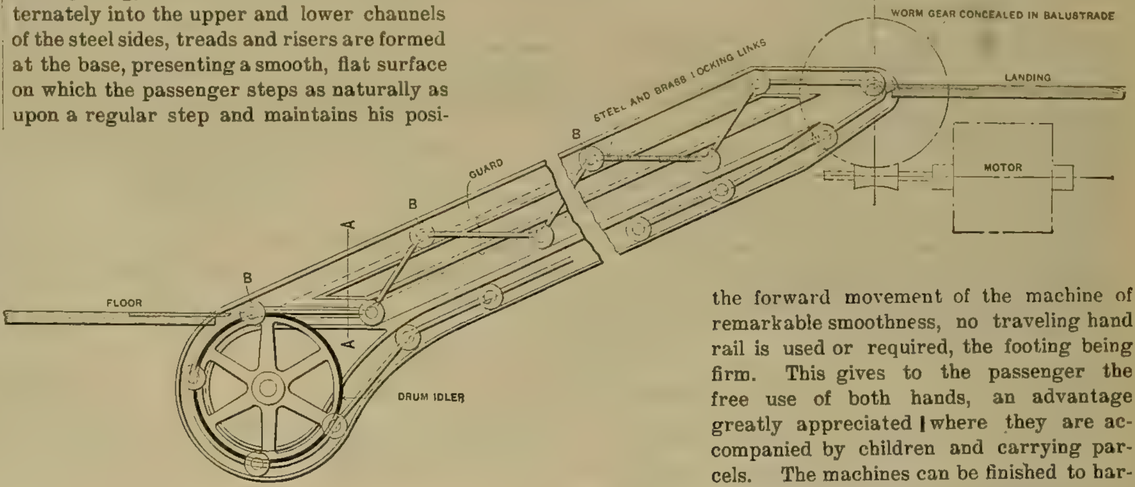

WORM GEAR CONCEALED IN BALUSTRADE
STEEL AND BRASS LOCKING LINKS
LANDING
B
B
B
GUARD
MOTOR
A
A
FLOOR
DRUM IDLER

FIG. 1.

The treads and risers after passing around the head roller again become a flat belt, thus reducing the space required for their return and making the vertical depth of the stair lift but a trifle more than of an ordinary stairway.

This construction makes a strong and noiseless apparatus of light weight, so that buildings of reasonable strength can carry the machine without the necessity of building special foundations.

The Link-Belt stair lift occupies but little space on either floor. Its width from rail to rail is 3 feet. The belt constituting the steps is 21 inches wide, experience having shown that greater width does not give increased actual carrying capacity. The width of the steps and slant of the risers prevent overcrowding and insure comfort to passengers when every step is occupied. Traveling at the rate of 90 feet a minute, with a passenger on each step, 3000 per hour can be elevated without crowding and without the delays due to waiting for an elevator. This is six or seven times the capacity of large passenger elevators of the best type. Under maximum load, 5 H. P. electrical current is required to operate the machine, and as no attendant is necessary to load or unload passengers, its cost of operation is limited practically to the price of the current.

The treads being level, and the forward movement of the machine of remarkable smoothness, no traveling hand rail is used or required, the footing being firm. This gives to the passenger the free use of both hands, an advantage greatly appreciated where they are accompanied by children and carrying parcels. The machines can be finished to harmonize with even the most esthetic surroundings. They can be stopped or started from either floor instantly, and in case of panic or fire may be used as an exit. The five figures portrayed herewith are self-explanatory of the device described, that will be noted with interest in connection with its manifest need and convenience.

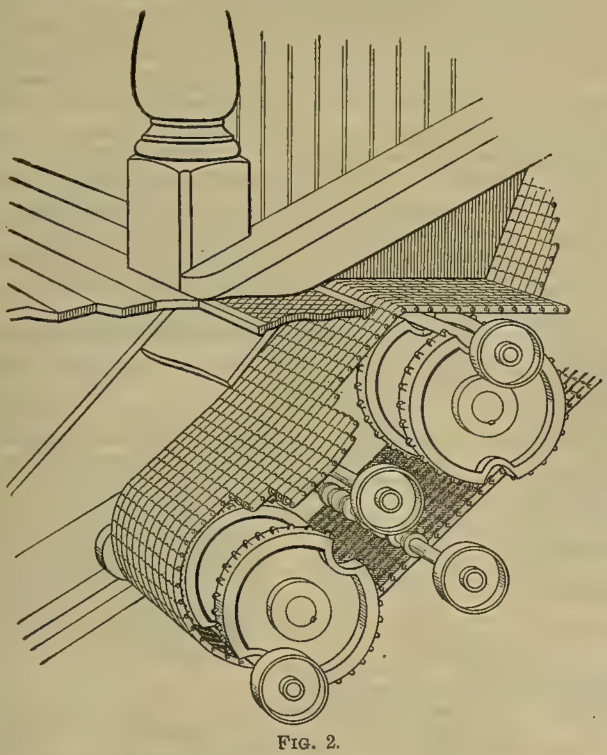


FIG. 2.

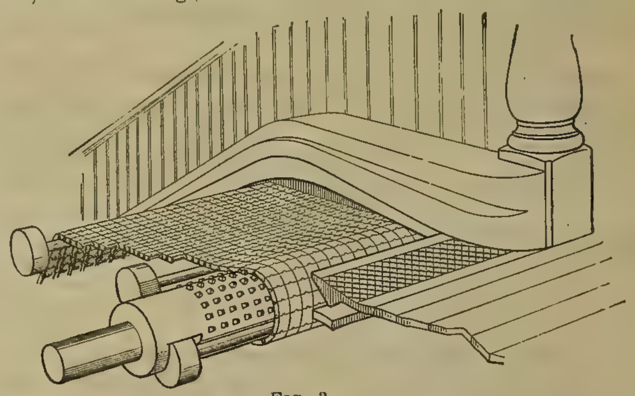


FIG. 3.

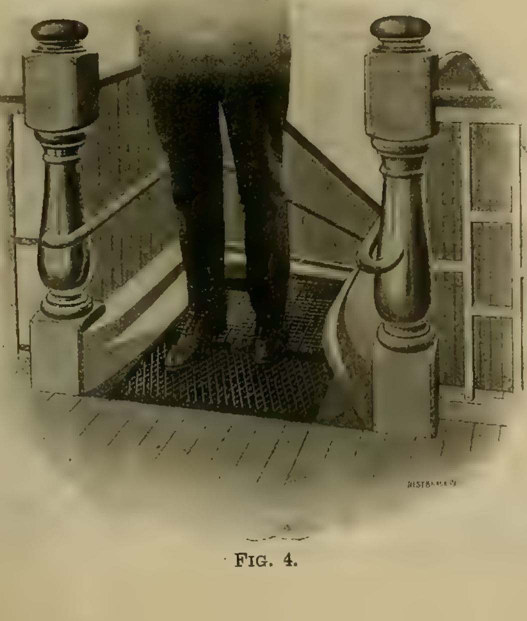


FIG. 4.

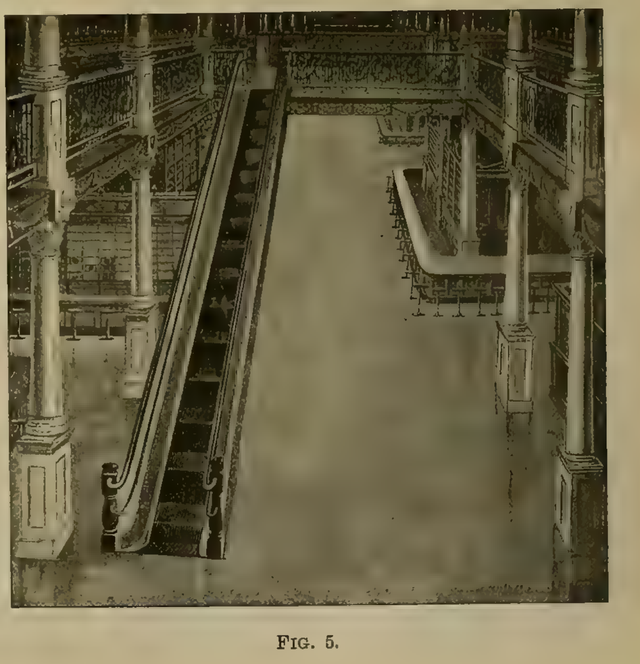


FIG. 5.

MINING AND SCIENTIFIC PRESS.

ESTABLISHED 1860.

Published Every Saturday at 330 Market St., San Francisco, Cal.

ANNUAL SUBSCRIPTION:

United States, Mexico and Canada..............................$3 00
All Other Countries in the Postal Union.......................4 00

Entered at the S. F. Postoffice as second-class mail matter.

J. F. HALLORAN..............................Publisher.

Special Representatives:

EASTERN.
E. H. HAVEN........................150 Nassau St., New York City.
MIDDLE WEST.
CHAS. D. SPALDING..................153 La Salle St., Chicago, Ill.
INTER-MOUNTAIN.
W. A. SCOTT........................43 Jacobson Building, Denver, Colo.
SOUTHERN CALIFORNIA.
W. D. CURTIS.......................223 W. Second St., Los Angeles, Cal.

San Francisco, December 15, 1900.

TABLE OF CONTENTS.

ILLUSTRATIONS.—The Link-Belt Stair Lift, 578. The Marigold Dredger, Oroville, Cal., 582. Mining and Metallurgical Patents, 584. Direct-Acting Hoist, Single Drum, 585.
EDITORIAL.—New Economic Phase of the Telephone; Of Public Value; Miscellaneous, 579.
MINING SUMMARY.—586-587-588.
LATEST MARKET REPORTS.—589.
MISCELLANEOUS.—The Link-Belt Stair Lift, 578. Concentrates, 580. Review of West Australian Mining Laws—A Comparison; To Users of Auger Bits, 581. A California Gold Dredger; Platinum; Large Storage Battery, 582. Jobbers and Manufacturers; Shipping Molten Iron; Broken Hill Sulphides; New Metallurgical Process; Success Dependent Upon Success, 583. Mining and Metallurgical Patents, 584. Copper Dividends and Prices; Oil and Gas Yielding Formations of California; Atomic Weights of the Elements; Direct-Acting Hoists, 585 List of U. S. Patents for Pacific Coast Inventors; Notices of Recent Patents; Personal; Recently Declared Mining Dividends; Commercial Paragraphs; Books Received, 589.

IT has been the pleasure and the privilege of this paper for forty years to get commendatory letters from men whose good opinion was worth having, and who, in renewing their subscriptions, have said kind words regarding the value of the paper to them. Year by year many of those who so wrote have crossed the great divide; but yet, as the years go by, come in increasing numbers the same kindly commendations from an ever widening circle of new readers who like the paper and say so. The paper is cordially appreciative of such universal good-will, and is glad to carry into the next century consciousness of continued friendship and interest on the part of so many that seems to increase in numbers and extent as the years go by.

PROBABLY no modern invention has been proved capable of more extended and developed use than the telephone. Every month evolves some new economic phase of its applicability. The latest is the reported project of the Northern Pacific Railway Company to substitute through telephone service for its telegraph line, with intent to use the telephone to the entire discarding of telegraph and mail service. The plan does not seem wholly feasible, and the matter must be looked upon as an experiment. In large establishments the telephone is now used as a great saver of time, affording instant communication with different heads of departments and the various employes. The long-distance telephone service has seriously cut the business of several Eastern railroads, it being quicker, cheaper and a saving of time for business men to talk from Chicago to New York or Cincinnati to St. Louis instead of making railway trips to and fro.

THE review of West Australian mining law, the subject of a specially written paper on page 581, is interesting in connection with the long continued and unsuccessful effort to secure needed changes in U. S. mining law. The colonies do not seem to be above profiting by experience. Since the last (or latest) election of Stewart of Nevada to the U. S. Senate, this journal has postponed hope of manifestly necessary changes in the Federal mining law—changes made mandatory by conditions that do not wait upon musty precedent or "senatorial courtesy." The suggestion in the article in this issue regarding the erection of public reduction plants has been a favorite idea among some mining men for several years, but can not meet with unqualified approval. Anything of so paternal a tendency is not to be strenuously advocated. Those things can best be settled by the laws of private economic advantage, and, while the idea may work well in Australia, it would be a probable failure here, as the whole thing would soon become the prey of professional politicians.

Of Public Value.

Under the auspices of the California State Mining Bureau has been published Bulletin No. 19, the result of extensive research on the part of W. L. Watts, E. M., concerning the oil and gas yielding formations of California. The importance of the oil interest and the magnitude of operations therein demanded such work, and the bulletin forms a compendium of up-to-date scientific information on the oil fields of California. It is of further value to any and all anywhere interested in the geological circumstances attendant thereon, or in the economic values of such production.

In the last four issues of this paper have appeared copious extracts from this latest bulletin; and now that the monograph itself has appeared, it is commended to those who want complete information on the subject of which it treats. The work has been carefully and accurately compiled, and, like other publications of the California Mining Bureau, will doubtless be in universal demand.

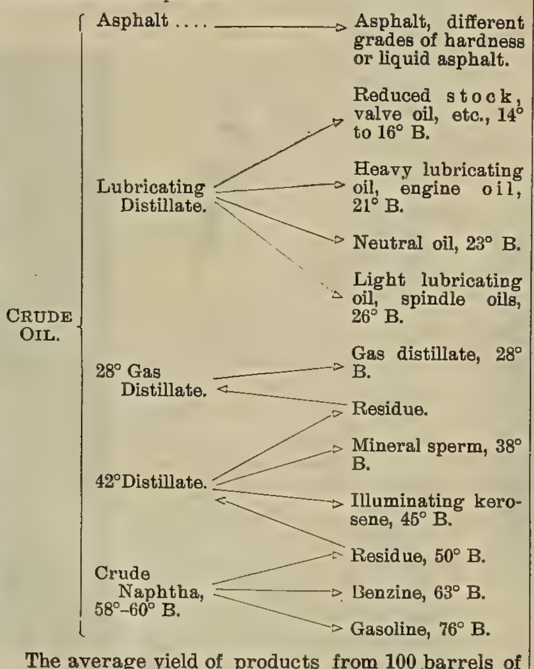
In addition to the special articles contributed to this paper on the subject of relative oil values, and bye-products which have appeared during the last three years, there is considerable matter in the latest bulletin that deserves notice because of the applicability in all parts of the country of the specific information furnished.

The bulletin shows that the ultimate analyses of samples of oil from California and the Eastern States compare as follows:

Locality Where Oil Was Obtained.	Specific Gravity.	Nearest Degree..	C........	H........	O........	N........	S........
Oil Creek, Pa.	0.730	62° B.	82.0	14.8	3.2	......	....
W. Virginia..	0.840	36° B.	84.3	14.1	1.6	......	....
California....	......	......	86.934	11.817	....	1.1095	....
California....	0.920	22° B.	84.0	12.7	1.2	1.7	0.4

An examination of the foregoing table shows that in the California oils the content of carbon as compared to that of hydrogen is greater than it is in oils from Eastern States. Dr. Salathe says: "The refining of the crude California oils is not an easy task, and they require refining methods different from those practiced with Eastern or Russian oils. The complicated nature of this class of asphaltic crude oils necessitates complete elimination of all unstable hydrocarbons by inexpensive practical processes. Another great difference exists between the specific gravities of Eastern oil distillates and those of California oils. Viscosity of distillate or reduced stock being equal, the gravities are from 5° to 6° B. lower in California oil fractions than in those of Eastern oils. Flash and fire tests are from 10° to 30° F. lower in California oil distillates than in Eastern distillates of the same gravity."

Following is a diagram of products available from California crude oil by refining, showing where redistillation is required:


CRUDE OIL.
Asphalt ....
Asphalt, different grades of hardness or liquid asphalt.
Lubricating Distillate.
Reduced stock, valve oil, etc., 14° to 16° B.
Heavy lubricating oil, engine oil, 21° B.
Neutral oil, 23° B.
Light lubricating oil, spindle oils, 26° B.
28° Gas Distillate.
Gas distillate, 28° B.
Residue.
42° Distillate.
Mineral sperm, 38° B.
Illuminating kerosene, 45° B.
Residue, 50° B.
Crude Naphtha, 58°-60° B.
Benzine, 63° B.
Gasoline, 76° B.

The average yield of products from 100 barrels of Ventura county mixed crude oils of 24° B., determined by actual running on a large scale, is as follows:

	Bbls.
Gasoline, 76° B	3
Benzine, 63° B	4
Kerosene, 45° B	15
Heavy kerosene, 38° to 40° B	8
Gas distillate, 28° B	21
Light lubricating (spindle) oil, 26° B	10
Neutral oil, 23° B	12
Heavy neutral oil, 21° B	6
Reduced stock, lubricating oil, 14° B	5
Asphalt, crude	11
Loss	5

The bulletin continues: "The extraction of pyridine bases with dilute sulphuric acid should be done before the redistillation of the distillates, as the treatment of those distillates with concentrated sulphuric acid will otherwise form certain sulpho-conjugated products, which, during the washing process with water and alkali, decompose and reenter into solution with the refined products."

"The petroleum of the Eastern States is composed principally of hydrocarbons of the paraffine series. As previously mentioned, by far the greater portion of the California oil is used for fuel, and that in a crude state. It is the general opinion of those who use oil as fuel that, weight for weight, there is not much difference between the fuel value of oils of different specific gravities, provided the oils are clean, or a suitable allowance is made for water and other foreign substances which they contain. A portion of the oil is used for fluxing asphaltum and for the manufacture of illuminating gas, and a portion is refined. The portion refined yields crude naphtha, illuminating oil, gas distillate, lubricating oil and asphaltum. The naphtha distilled from California oils is of special value for use in gasoline engines. Those who have made comparative tests of California and Eastern gasoline in gasoline engines claim a superiority for the California product.

"As might be expected from the foregoing statements concerning the relative composition of petroleum from the Eastern States and the asphaltic oil of California, illuminating oil manufactured in this State contains more carbon and less hydrogen than does illuminating oil manufactured from Eastern petroleums. The result is that, when burned under similar conditions, California oil gives a more smoky flame than does oil manufactured from Eastern petroleum. This is due to the fact that it requires more oxygen to effect the complete combustion of carbon than it does to consume hydrogen."

"There is no doubt that, as time goes on, more use will be made of the constituents of our asphaltic oils in chemical manufacture."

FUEL VALUES OF CALIFORNIA PETROLEUM COMPARED WITH FUEL VALUE OF COAL.

	Available Heat Units in One Kilogramme.	Available Heat Units in One Ton, Calculated as 909 Kilogrammes.	One Ton of 2000 Lbs. Nanaimo Coal and Equivalent in Bbls. of Petroleum........
Nanaimo coal..............	6,684	6,075,756	....
Sample of petroleum, 15° B., from practical working test in locomotives on Southern Cal. R. R.....	......	9,886,585	3.870
Sample of crude petroleum, 16.5° B............	9,800	8,908,200	3.487
Sample of lubricating oil, 16° B. to 17° B..........	10,788	9,796,192	3.834
Sample of Los Angeles oil, 13° B..................	10,203	9,274,527	3.630
Maximum fuel value obtained in calorimetric tests....................	10,381	9,436,329	3.693
Minimum fuel value obtained in calorimetric tests....................	9,991	9,081,819	3.554
Sample of Summerland oil (crude)................	9,688	8,806,392	3.447
Sample of Summerland oil extracted by naphtha...	10,242	9,309,978	3.644

The relative fuel value of coal and Los Angeles oil, as shown by combustion in furnaces, is given as follows: The heating furnaces of Los Angeles Steel & Iron Co.: One ton Wellington coal equals 2.50 barrels of oil; for steam purposes, one ton of Wellington coal equals 3 barrels of oil. Los Angeles Consolidated Electric Railroad Co.: Steam purposes, one ton of Wellington coal equals 3.62 barrels of oil. Los Angeles Courthouse: Steam purposes, one ton of good coal equals 3.10 barrels of oil. Southern California Railroad Co.: Steam purposes, one ton of Nanaimo coal equals 4 barrels of oil.

Concentrates.

A LAKH OF RUPEES is $32,100.

THE California State Miners' Association is not incorporated.

T. M. LOMBARD at Cedros island uses salt water for amalgamation.

ONE person can not locate 160 acres placer ground; eight, jointly, can.

THERE is no substance which will render dry paper an electrical conductor.

A PLACER MINING CLAIM can be located within the limits of a Government forest reservation.

THE gold commissioner at Dawson estimates the season's Klondike output of gold at $20,000,000.

CYANIDE OF GOLD is insoluble in water but is soluble in alkaline sulphides and sodium hyposulphite.

A LIFTING MAGNET can not be made with an alternating current; direct current must be employed.

NO LEGAL mining location can be made on land on which agricultural patent has regularly issued.

GRANOLITE is a generic term for granular igneous rocks of all kinds, syenite, granite, gabbro, etc.

REGARDLESS of what is asserted in advertisements or otherwise, any corporation stock in California is assessable therein.

CHROME ORE carrying 50% sesquioxide of chromium is worth about $10 per ton in San Francisco and $20 in New York City.

NOTHING has been received from the Chemical & Metallurgical Society of South Africa since the breaking out of the Boer war.

WHERE a dyke accompanies a vein, it is ordinarily to be considered more as an indication of permanency than of richness of the fissure.

MINING STOCK may be issued either for cash or property in Colorado. Where issued at par, for cash, "full paid," it is non-assessable.

HYDROCYANIC ACID, or "Prussic acid," or hydrocyanide, is a very poisonous gas, formed by the action of acid on cyanide of potassium.

A "50-TON PLANT," in the sense referred to, means that the capacity of the roller mill is to put through fifty tons in twenty-four hours.

LIQUID AIR is the extreme limit of compressed air; its boiling point is 312° below zero F.—that is, it boils at 524° F., below the boiling point of water.

PAPER can be made fireproof by moistening with a solution of ammonium sulphate, 8 parts; boric acid, 3 parts; borax, 2 parts; water, 100 parts.

THERE remain sixteen days in which the necessary $100 assessment work can be done on unpatented mining claims located since Jan. 1st, 1899.

THE eightieth meeting of the American Institute of Mining Engineers—its thirty-first annual meeting—will be at Richmond, Va., beginning Feb. 19, 1901.

THE subject of earth backing for masonry dams is one of constant discussion, with the strength of the argument apparently in favor of those who oppose such practice.

"CONCENTRATES" does not know what causes the magnetism of the earth, but believes that it is caused by its great weight and the speed at which it rotates on its axis.

AN alloy of aluminum with magnesium is even lighter than aluminum and can be worked like brass—that is, it can be turned, bored, etc.—but does not file quite so readily as brass.

DURING the first half of the current year the Mountain Copper Co., Keswick, Cal., produced and smelted 99,948 tons of ore, which yielded 5038 tons of copper, the ore carrying about 5%.

THE three pages of mining summary published weekly give the latest and most authentic information to manufacturers and furnishers of mining supplies regarding contemplated purchases.

ELECTRIC ground connections made by attaching wires to water pipes will ruin the pipes themselves by electrolysis, and will also seriously interfere with the operation of the water meters.

IT was a French mechanic, Lenoir, who first produced motive power through the explosion of illuminating gas —1861—and a German mechanic, Otto, who made the first atmospheric gas engine in 1867.

SILICA BRICKS are made at Mt. Union, Pa., and inquiry addressed to W. A. Haws, there, should elicit the desired information, from the quarrying of the ganister to the loading of the finished product.

SHOULD the South African Republic be declared an English colony, it is probable that the cyanide patents declared invalid by a South African court will be recognized as valid as in other British colonies.

THE third annual session of the International Mining Congress was held in Milwaukee last June and was not a distinguished success. The fourth session is set for Boise, Idaho, next July and may not convene.

AN engine or locomotive having cylinders 19 inches diameter by 24 inches stroke, having an average cylinder pressure of 53.7 pounds per square inch, the driving wheels 78 inches diameter, and making 260 revolutions per minute, develops 959 H. P.

"CROSS TALK" in a telephone is occasioned by the wire of a grounded circuit close to the line on which the "cross talk" is heard. The evil is obviated by the use of a metallic return wire twisted around the other wire of its own circuit.

IT is not necessary to the validity of a claim that the discovery of mineral should be made in the "discovery shaft." A discovery either within the shaft, or in any other part of the surface ground within the limits of the claim, is sufficient.

THE best paper on mica that "Concentrates" knows of is one by J. A. Holmes, "Mica Deposits and Mica Mining in the United States," read at the Washington, D. C., (February, 1900) meeting of the American Institute of Mining Engineers.

IN lacing belts, if the ends of the lace leather are gently charred over a match—not too much—it will be found that they have acquired a stiffness and rigidity sufficient to enable them to be pushed through the holes in the belt with ease.

IT now takes about 1½ ounces gold to buy what 1 ounce of gold would have bought in the way of miners' supplies two years ago. Nearly everything that miners buy has advanced in price, except candles, powder—and the MINING AND SCIENTIFIC PRESS.

THE mineral collection at the State Mining Bureau, Ferry building, San Francisco, is probably the finest and most completely representative of any in the country. There is also a creditable exhibition of minerals in the Academy of Sciences, on Market street, San Francisco.

IN the electrical extraction of mercury the cinnabar ore is crushed to a fine state of division, and is then treated with a hot solution of sodium sulphide containing sodium hydrate. The electrolytic vats are of iron and may be used as cathodes. The anodes are made of steel.

WITH mining stocks "cheap" is a relative term. There are good "cheap" stocks: cheap because the property they represent is not yet developed into a paying mine. Perhaps when they get to selling for five times what they do now some of those stocks will be "cheaper" than they are now.

THE Commissioner of the General Land Office states that mining locations cannot be legally acquired within the limits of the meander lines of Rogue river, Or., that the State of Oregon has full control of the mineral in the river, and that the only way to proceed legally is to lease from the State.

THE American Iron & Steel Association of Philadelphia can give a complete list of the steel works in the United States, and the Gold & Silver Extraction Co. of America, Ltd., McPhee building, Denver, Colo., can give an approximately complete list of the cyanide plants in the United States.

ALMOST any number of this paper since July, 1892, has some valuable reference of technical detail concerning the cyanide process. To look through some volumes of the paper at any public library of any consequence should afford a fair idea of the principles and practical operation of the process.

IN California the Standard Electric Co. uses a 30-inch pipe, 1485 head, 640 pounds pressure; the Blue Lakes Water Co., 22-inch pipe, 1040 head, 451 pounds pressure; the Mt. Whitney Power Co., 20-inch pipe, 1300 head, 574 pounds pressure; the San Joaquin Electric Co., 20-inch pipe, 1411 head, 612 pounds pressure.

ACCORDING to figures from the San Francisco custom house, the U. S. Government has received from California to June 30, 1900, from internal revenue $111,000,000, from custom duties $264,000,000. California has yielded a gold total of about $1,400,000,000. The Government has spent about $13,000,000 on California—about three-fourths of 1% of what it has received.

AS EXPECTED, the "Concentrate" in the issue of Nov. 17 about longest ore shoots has elicited several statements as to extraordinary lengths of ore shoots. The longest heard from is that of the Smuggler-Union, San Miguel county, Colo., which is claimed to be "over a mile long, with one stope of 800 feet, where the ore holds its width and grade unbroken."

TO RECLAIM the gold from the gold-toning powder, which contains borax and soda, dissolve the powder in water, then add a solution of sulphate of iron, which will precipitate the gold as a black powder. Then decant the solution, wash the powder and dry it. The powder is now to be redissolved with nitro-muriatic acid, evaporated and again redissolved, when chloride of gold, free from acid, will result.

ALIENS can not legally locate or hold mining claims. An alien who has never declared his intention to become a citizen is not a qualified locator of mining ground, and he can not hold a mining claim, either by actual possession or by location, against one who connects himself with the Government title by compliance with the mining laws. But, upon declaring his intention to become a citizen, an alien may have advantage of work previously done, and of a record previously made by him in locating a mining claim on the public mineral lands.

THE tensile strength of any material is the resistance it offers to being pulled apart. When one speaks of the plates in a boiler having a tensile strength of 50,000 pounds per square inch, it is meant that if a bar of the same metal, 1 inch square, is subjected to a stress of 50,000 pounds, it will break. This is called the breaking stress and also the ultimate tensile strength. The resistance of a plate is proportional to the area of its cross-section. When it is required to find the breaking stress of any piece of material, we find the area at the minimum cross-section, and multiply it by the strength per square inch. The tensile strength of wrought iron may be taken as 50,000 pounds per square inch of section; that of steel, 70,000 pounds per square inch of section. These figures may not always be found correct; an actual test only can determine just what the tensile strength is. The term safe tensile strength refers to the load per square inch that can be borne in safety by a piece of material. In boilers, it is usually taken at from one-sixth to one-fifth the ultimate tensile strength of the material.

THE Commissioner of the General Land Office says: "Contests may be initiated against any entry filing or other claim to the public lands. There must be something to protest before proceedings can be instituted. The mere fact that land is in railroad limits does not constitute a claim, because mineral lands are excepted from the grant to the railroad. This position is illustrated by the fact that no notice to the railroad company is required of a mineral application or entry for land which has not been listed or selected. The fact that lands may be selected under the Act of June 4, 1897, is no reason to allow protest for land which at the time of filing is absolutely free from any claim. The public land laws contemplate that parties possessing a claim to the public lands will proceed to patent therefor. This is, of course, not necessary to invest mineral claimants with a vested right to their claims, but a mere protest is not a filing or a claim of record; it does not segregate the land and should not be received or noted on the records. Parties desiring to protect their claims, without proceeding to patent therefor, must advise themselves as to any adverse claims and then proceed under the rules." These rules were published in full in the first volume of the issues of 1898.

THE simplest method of calculating the pressure that wrought iron and steel pipes will stand is as follows: $P = \frac{T \times t}{R} \div c \times f$. Where P = safe working pressure. T = tensile strength of plates, taking iron at 48,000 lbs. to the square inch and steel at 75,000 lbs. t = thickness of plates in inches or decimals of an inch. R = radius of pipe in inches. f = proportional strength of plates, as follows: When double-riveted = 0.7 and single-riveted = .5. c = a coefficient or factor of safety, usually taken at 3. p = pressure in pounds per square inch due to head of water. Example: What is the safe working pressure for a 36-inch pipe, double-riveted along the longitudinal seams, and made from wrought iron plates, rolled across the grain, and ⅛ of an inch thick? Answer: $P = \frac{\overset{T}{48000} \times \overset{t}{.125}}{18} \div \overset{c}{3} \times \overset{f}{0.7} = 77.7$ pounds to the square inch, or 179 feet pressure head. By means of the same formula the thickness of plate is easily found that will safely stand any given pressure. For instance: $t = \frac{P \times R \times c}{T \times f}$. Example: Having a pressure of 179 feet, or 77.7 pounds to the square inch, what thickness must the wrought iron plates be for making a pipe 36 inches in diameter? Answer: $t = \frac{\overset{P}{77.7} \times \overset{\text{radius}}{18} \times \overset{c}{3}}{\overset{T}{48000} \times \overset{f}{0.7}} = .125$ inch.

IN recovery of the silver in the U. S. Mint, the silver solutions, together with the wash waters from the gold treatment, are transferred to a precipitation tank—capacity 2000 gallons, never filled to its full capacity, since abundant room must be left for stirring and rousing the contents. Salt water is run into the silver solution until a test shows that enough has been added to convert all silver present into chloride. An excess is avoided, since silver chloride is slightly soluble in salt water. The contents of the tub are drawn off through a filter, a wooden tank 6½ feet long, 3 wide and 1¼ in depth, lead lined and provided with a perforated false bottom, the bottom and sides carefully covered with cotton cloths as a filtering medium. The curd-like silver chloride is run into this filter through a large wooden stopcock. The liquid which drains off is returned to the filter until it runs clear, after which it is passed through several traps to the sewer. Fresh water is passed through the chloride until all soluble matters are removed, when it is allowed to drain. The filter tank is mounted on low wheels for convenience of removing the chloride to the reducing vat. This is again a lead-lined rectangular tank. The silver chloride is transferred to this tank by a copper scoop shovel. Hot water is run on, and granulated zinc added in sufficient quantity to reduce the chloride to metallic silver. The addition of sulphuric acid hastens the action and serves to dissolve the slight surplus of zinc which it is necessary to use to insure complete conversion into metallic silver. The reduced silver is now taken out with a copper scoop having a shovel handle and put into a filter colander, in which the silver is washed with hot water until entirely sweet. It is now ready for compression into solid cakes by hydraulic pressure. These cakes are dried in a current of hot air, when they are ready for melting. This is usually done without fluxes, and the resulting bars have a fineness of 0.998 to 0.999.

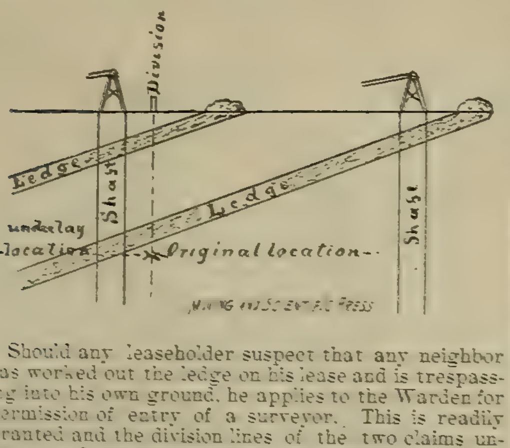
Review of West Australian Mining Laws: A Comparison.

Written for the MINING AND SCIENTIFIC PRESS by GEORGE HOPE.

The American mining laws, created over a quarter of a century ago by legislators not practically acquainted with the subject on which they framed their enactments, have worked out constantly in practice, not so much to the benefit of the industry they were intended to serve, as to the individual profit of those interested in stirring up litigation on all possible points. There is scarcely a clause on the statute book through which a coach and four can not be driven by the skilled legal practitioner, and while the mining industry, of all others, has been a record of constant progression, the laws that govern it have virtually stood still, till a demand, universal and imperative, has arisen for amelioration and revision. That a radical change need not be necessarily hostile to vested interests has been proved in the successful efforts to bring the laws and regulations up in line with the requirements of the industry that have engaged the attention of the Australasian parliaments almost every session of late years.

In the case of West Australia, in what was practically a sterile desert a decade ago, one-third the size of the United States, a gold-mining population is now peaceably working under laws that embrace every phase of widely differing interests with a maximum of security and a minimum of litigation. True, in the case of a new country, the lessons learned the world over in practice could be and were applied without friction, and many valuable suggestions may be gained from a brief review of the salient features which have tended towards a successful control of the industry there and may serve to guide judgment in the revision of the law so urgently needed at home.

The fundamental principles of the Australian statutes as applied to mining differ essentially from those of the United States. Where lands were alienated from the Crown in times past, no reservation of minerals was made, and a special Act dealing with "mining on private property" was passed. The provisions of this Act are in no wise so liberal as our own laws in similar case. Most of the metalliferous country, however, lies in the barren interior, and the fee simple to this remains vested in the Crown, areas being leased in tracts not exceeding twenty-four acres for a term up to twenty-one years at an annual rental of $5 per acre, and the fulfillment of certain labor conditions defined by law are a part of the rental due and payable. No patents are ever issued. Another essential point of difference lies in the fact that there are no extralateral rights to cause conflict, a lessee being only entitled to the minerals within his corner pegs. Thus, if a ledge dips at a shallow angle out of a leased area, it belongs to the holder of the adjoining ground on the underlay side so soon as it passes beyond the limit of the side line of the original claim. A lease may not exceed in length along the line of the ledge more than twice its breadth, but there is nothing to prevent a person taking up two, or even three, leases, side by side, covering the underlay of a ledge to an indefinite depth. The object of the limitation of the lease area is twofold. It prevents the locking up of large tracts of valuable ground without adequate development, and it conserves the rights of labor in a democratic community equally with those of capital, for the employment of one man to every six acres is compulsory on each and every lease. Easements and exemptions are allowed, if applied for in open court, when objections from any interested party may be lodged, for certain specified reasons, such as inflow of water, collapse of workings or shaft, absence of machinery, or other cause, deemed sufficient by the Warden of the Goldfield. In the case of two or more parallel ledges, the underlay claim is often more valuable than the original location, though there is no reason why the first locator should not have secured them both. Thus:



Should any leaseholder suspect that any neighbor has worked out the ledge on his lease and is trespassing into his own ground, he applies to the Warden for permission of entry of a surveyor. This is readily granted and the division lines of the two claims underground are correctly ascertained. Cases have occurred where a ledge, after going down a hundred feet or so, has turned and come up to the surface again on an adjoining holding. Here, this might cause endless trouble; in Australia it creates none. The same is true of a Y-shaped vein with two outcrops. It is immaterial which is the prior location or which the mother vein and which the feeder.

The same argument holds with ledges that cross each other or lie partly in one claim, partly in another.

Two main divisions are recognized in the Australian laws, one portion being devoted to alluvial, or placer, mining, the other to reef, or ledge, mining. In West Australia water is absent: the country is flat and the gold lies close to the ledge from which it was derived. Dry washing, or, as it is called there, "dry blowing," is the means of recovery availed of. An alluvial may work ground up to within 50 feet of the ledge or leased ground. He may enter upon any lease and call up the owner or manager to define the strike of his ledge, and may work up to 50 feet of such line on either side. In Queensland no leasing is permitted until two years after discovery of auriferous ground, so that the alluvial may first exhaust the surface deposits. In West Australia ground known to contain alluvial gold can not be leased until abandoned by the alluvial diggers. The surface deposits being shallow and the process of alluvial recovery rapid, no great injury is worked to the deep mining industry as a whole.

For quartz mining the process is as follows: Armed with his miner's right, the prospector maps the outcrops till sufficient color warrants a location. He then has the right to mark out a prospecting area 160 yards square to hold the ground while he investigates its merits. This "pegging out" will hold the ground for thirty days, at the end of which time he must register his claim (cost $2.50) at the nearest registrar's office. This affords a clean title till payable gold is struck, when notice must be given to the Warden and a lease applied for. A lease, of course, may be applied for on any ground without first holding it as a prospecting area, which is designed for the poor man only. When a lease is desired, the area wanted is defined by corner pegs, trenches and cleared lines as nearly correct as possible; notices of intention are posted and application made for the lease within ten days of marking. The fees must be paid on application, $5 per acre per year rental being deposited for the first year in advance, together with the fee for survey, from $20 to $50. At the end of thirty days the application is heard in open court, when all objections are considered. If no valid objections are sustained, the lease is recommended by the Warden and issued later by the Minister of Mines. Immediately upon its recommendation the labor conditions come into force. For the first six months one man for every twelve acres; after that, one man for every six acres, must be constantly employed for eight hours five days in the week, four hours on Saturday. A lapse of three days in the labor conditions renders a lease liable to forfeiture on the application of any person applying for the same and proving the default. The case is tried by the Warden in open court and his decision is handed to the Minister for decision. The fulfillment of the labor conditions is part of the consideration paid to the Government for the lease.

When several leases are held by one ownership the Warden may, on application, allow the due complement of labor for the total lease to be concentrated on one particular lease. The object in all cases is to have the ground developed and prevent its being locked up in large areas by speculators. Under these laws scores of propositions were floated on the London market during the late mining boom at Coolgardie and Kalgoorlie. To the bona fide company no hardship was worked. Working capital was subscribed and active mining prosecuted. To the wildcat concern it proved a wholesome deterrent. After excuses for idleness were exhausted in the Warden's court on pleas for exemption, the properties were mostly abandoned, if worthless, or leased on tribute. The writer recalls a dozen properties held by London companies that, through bad management or other cause, were abandoned or shut down, and which are now producing ore running from $15 to $40 per ton in the hands of practical men or working tributors. Non-payment of rent will forfeit a lease, also, and the conditions appear stringent at first sight; it is under these conditions that Kalgoorlie, with its gigantic plants and invested capital, is working its mines to-day. The principle, though novel and socialistic, is sound in practice and has tended to purify gold mining, as an industry, of some of its worst and most unwholesome abuses.

For purposes of efficient jurisdiction, the auriferous country in Australia is divided into separate gold fields, each under the charge of a Warden and a Registrar. A Warden's court is established, in which mining disputes are tried, pleas for exemption from labor conditions heard and the like business transacted. No one has a locus standi in this court without a miner's right, which every miner is required to secure and renew annually at a charge of $2.50—formerly $5. Anybody can appear to conduct a case, not necessarily a qualified legal practitioner. The Warden is endowed with the power of a Supreme Court judge in many cases; but, being chosen for his tact, judgment and experience, he is enabled to check litigation and obviate expensive appeals. Had justice suffered under this "mild Cæsarian despotism," an outcry for a change would have undoubtedly arisen. The contrary has been the case; rich and poor, capital and labor, being satisfied with the machinery provided for maintaining their rights.

Throughout Australia the fostering care of the central Government is everywhere apparent. They build the roads, provide water supply, overcome the prohibitive veto of costly transportation for fuel, timber and supplies generally by building railways to promising centers—and this, not with a view to profit earning, but solely as an encouragement to the mining industry, carrying low-grade ore for 1 cent per ton per mile in some cases, recognizing always the economic truth that when $10 rock, scattered over a large area and hitherto irreducible at a profit, can be successfully treated for $8, then capital is forthcoming, population attracted and the latent element of a national wealth availed of to the utmost.

This policy of encouragement has been lately extended in a new direction with the happiest results, affording an object lesson in State socialism we may well afford to study here in the development of the New West. Two years ago the West Australian Government voted a quarter of a million dollars to be expended in the erection of public reduction plants in districts where indications showed capacity to support a population of diggers and small claim holders. Locations in plenty were held by individual miners who could neither sell nor raise funds to hold on and develop. In such centers mills were erected after careful inspection of auriferous possibilities by experts, the charges for treatment being fixed to cover cost of handling, of management and of providing for interest and sinking fund on the money borrowed by the Government under the grant. Last year nine batteries were successfully operating at an average charge of $2.75 per ton to the miner in a country where water and fuel are costly luxuries. They paid all the costs enumerated above and indirectly added thousands to the national treasury. The effect, in spite of many adverse predictions, was magical. Townships sprung up around the batteries and hundreds of useful citizens found profitable employment in operating ledges hitherto valueless. Another vote in expansion of the policy was granted by Parliament quite recently.

An example of the beneficial effects accruing from the erection of public reduction works may be seen in Shasta county, Cal., where the smelter of the Mountain Copper Co., Ltd., at Keswick, absorbs large quantities of low-grade quartz mined by small claim holders in the vicinity, who would otherwise be looking for work—supporting, in fact, a very considerable population of independent miners, and, by the exigencies of its own requirements for flux, doing it at a very cheap rate to its customers. There is room in the low-grade ore belts of California for half a dozen smelters erected in suitable localities, not for profit, but on the co-operative plan, with money advanced by the Government and operated on a scale of charges that will repay the loan in, say, thirty years, principal, interest and all intermediate expenses. It has not been found in Australia that the Government ownership of "public batteries" (custom mills) interferes in any way with capital seeking legitimate avenues of investment.

The foregoing is merely a sketch—a brief outline—of the general principles governing the industry in West Australia. The regulations which follow and form part of the mining Act in force cover every detail and are readily comprehensible to the digger of ordinary intelligence, so that he is enabled to fill out his own forms and transact his business without the aid of a lawyer or middleman. Active development is aimed at, so that the auriferous resources of the country may become national assets of practical, revenue-producing utility to all concerned.

To Users of Auger Bits.

TO THE EDITOR:—It frequently occurs that the operator bores a hole $\frac{1}{16}$ or $\frac{1}{8}$ too small for the bolt, or other purposes intended, and, naturally, the next move is to secure a bit the proper size and to rebore or ream out the hole; but nine times out of ten the bit will work its way through like a screw and not accomplish the desired effect. If the operator will reverse his stroke, i. e., turn backward instead of forward from the start, the same bit, if of the Russell Jennings pattern, will cut a clean, smooth hole.

Redding, Cal. WM. STEPHENS.

REGARDING the governing of turbines in a generating station at Davos, in Switzerland, there are four 200 H. P. turbines worked under a fall of 330 feet: if automatic governors were slipped under such a high fall, a sudden change of load would cause the gate of the turbine to shut very rapidly, and the sudden change of velocity of the water in the pipes would produce a shock, or excess of pressure, which is all the more dangerous the longer the pipes. In this case the pipes are 7200 feet long. To prevent the water hammer, there is a large air vessel about 4 feet in diameter and 40 feet high, connected with the main pipes, and also a special contrivance connected with the automatic governor, to open automatically the waste water valve and furnish an exit for the water as soon as the governor acted on the gates of the turbines. If the load is taken off suddenly, the normal speed of the dynamo does not change more than 4%, which appears satisfactory.

A California Gold Dredger.

Written for the MINING AND SCIENTIFIC PRESS by
R. H. POSTLETHWAITE

As dredging for gold is now coming into such prominence in this country, a brief description of the latest dredger on the Feather river, designed by the writer and built by the Risdon Iron Works for the Marigold Dredging Co., may be of interest.

This dredger is of the standard Risdon type of gold dredger, similar in principle to those already built, and described in the MINING AND SCIENTIFIC PRESS, but embodying many improvements and additions which have proved fully adapted to their various uses. The dredger will dig from a depth of 30 feet below the surface of the water and elevate the tailings to 30 feet above the water level, which will enable it to handle a bank at least 15 feet above water level.

The Marigold Dredger, Oroville, Cal.

The Marigold Dredger, Oroville, Cal,

The ladder consists of a heavy lattice girder with ½-inch side plates, 3 feet deep in the center and tapering off to 2½ feet at each end. The lower end carries a pentagonal cast steel tumbler and has a unique feature (protection for which is applied for) consisting of a strong stop or fender made of heavy plate and angle iron. The purpose of this is to get rid of the accident common to all continuous bucket machines, of the bucket belt occasionally leading off the lower tumbler, which, besides wasting time, is liable to cause serious damage. With this new stop, the bucket belt, when first starting to climb the flange, strikes the stop which is sufficiently strong to release the friction clutch. When this occurs all that is necessary to run the belt on again is to reverse the motor a few turns, which can be done in less than three minutes.

The ladder is provided with steel chafing rollers running against steel I beams built into the hull, which gives a smoother motion than the old style chafing beams, and reduces the wear and tear to a minimum. The belt travels upon cast steel rollers running in enclosed grease cup bearings, which system of lubrication is used for all parts subject to water and grit, and has proved very successful.

The bucket belt consists of thirty-two heavy, substantial buckets, each of a full 5 cubic feet capacity. These buckets have cast steel links bushed with manganese steel, and are heavily reinforced from the link some inches up the side. The lips, which are easily renewable, are made of a special grade of nickel steel which has undergone a special treatment to make it withstand the heavy blows, at the same time being hard so as to stand abrasion. The lips are 7 inches wide and 1 inch thick. The buckets are connected together with cast steel links and forged manganese pins. The top tumbler over which the belt travels is square, with renewable cast steel wearing strips, the design being very heavy and solid.

The main gantry, which carries the tumbler and countershafts, is of steel throughout and has proved absolutely rigid. This is one of the greatest improvements on the dredger, and the extra first cost will be far more than counterbalanced by its increased stability over the old style wooden gantries, especially in the Oroville district; however well timber is fitted, the excessive heat and dryness causes the joints to shrink, which necessitates constant tightening up of bolts, and even then bearings are apt to get out of line and cause trouble.

The main bucket belt is driven through a train of gears and one belt by induction motor of 50 H. P., taking a three-phase current at 1000 volts. The average horse power consumed, however, does not exceed 25 H. P., dumping twelve and one-half buckets per minute, which gives a capacity of approximately 150 cubic yards per hour. The material dumps into a steel delivery plate which conveys it into the revolving screen. Under the delivery plate are placed three sets of bar grizzlies which catch any drip there may be from the buckets.

The revolving screen is 4½ feet in diameter by 25 feet long, perforated with ⅜-inch diameter holes. The screen carries on its lower end a heavy cast steel ring; under this ring is a cast iron self-contained bedplate carrying friction rollers driven by steel bevel wheels, all bearings being brass bushed and having the end thrust taken up by fiber washers. The brasses are made interchangeable and reversible, to allow of the utmost amount of wear being taken out of them. The screen delivers the coarse material directly onto the stacker buckets, which are of the Risdon standard type, carried by steel I beams of sufficient length to elevate the material 30 feet above water level; both top and bottom tumblers are cast steel and five-sided. This elevator belt, instead of being driven from the top end by means of a rope transmission from the main shaft, is driven from the lower end by the same induction motor which drives the screen. Motion is conveyed from this motor to both the screen and elevator by means of a chain of gears carried by shafts running in babbitted bearings fitted onto a self-contained cast iron bedplate, which also carries the motor, thus insuring true alignment and pitch distance, which cannot be permanently secured where the several bearings are bolted onto timber.

The water supply is furnished by two centrifugal pumps, direct coupled, one on each side of an induction motor, one pump delivering 2000 gallons per minute into the screen through a perforated pipe, and the other supplying water into the distributing box and various save-all grizzlies. The pump takes about 30 H. P. to drive it, and owing to its construction does away with all troubles from belts. The gold and fine material passes through the perforations of the screen into the distributing box and over 300 square feet of standard Risdon tables which practically save all the gold. The sand and small gravel is then delivered behind the dredger by a sluiceway fitted with riffles. Under one sluice a sump is arranged from which a direct connected centrifugal sand pump takes the sand and some of the water and deposits it over the top of the tailings. This pump is lined with renewable liners and takes about 10 H. P. to drive it, and is only used very occasionally if a sand fill requires to be cut through.

The winches on this dredger show great advantages over those formerly used and are entirely new in design. The main winch is directly geared with steel gears to a 10 H. P. induction motor. The operating handles work in quadrants of locomotive type and are all brought to one platform, one handle for each of the four side-line drums. The design is such that the movement of one handle enables a drum to be instantly set in motion, allowed to run loose, or held by the brake; each drum is entirely independent and can be operated in any way regardless of the condition of the others, whether driven, loose or held. This prevents any delay in changing the position of the dredger, and, together with the independent ladder winch, will increase the actual capacity of the dredge probably 30% over the old style. The head line is operated by a slow-running drum, giving a steady but very powerful advance to the dredge. The ladder winch is entirely independent and consists of a 15 H. P. induction crane motor, fitted with brake and controller by which the ladder can be rapidly raised or lowered, the rope speed being 100 feet per minute.

The hull is very strongly framed and planked, 80 feet long by 30 feet wide and 7 feet deep, all the operating machinery being housed in. All gears are of cast steel and only one belt is used on the dredger, thus doing away with a fruitful cause of stoppage and annoyance, owing to the difficulty of getting belts and ropes to run well in the various changes of weather experienced. Current to operate the motors is conveyed on board by a three-core cable, braided together and well insulated. Each core is equivalent to No. 6 B. S. The supply is three-phase, 7200 alternations, 1000 volts. The large motors take this current at its full voltage through plunger type switches and the smaller motors through transformers which reduce the voltage to 400 volts, all switches being arranged on a convenient switchboard. The whole of the plant is of most substantial design, the ladder and buckets loaded weighing some thirty-five tons and the steel gantry some twenty-five tons. The actual average daily capacity of this dredger for the year will be some 2000 cubic yards bank measurement. The crew consists of two men per shift and the energy used about 70 H. P., and the daily cost of wages and energy for operating ought not to exceed $30 per day. The dredger has in the neighborhood of 200 tons of machinery on board, and costs about $50,000 in complete running order.

Platinum.

The platinum of commerce has been obtained entirely from alluvial deposits, although it has been reported in limited quantities in situ. About 80% of the present supply is derived from the alluvial deposits of the Ural mountains, but there are few, if any, of the gold-bearing gravel beds of the world that have failed to yield platinum, and it is more than likely that large quantities of platinum ore have been thrown away with the black sand washings from gold placer deposits. The distribution of platinum may be regarded as coexistent with gold placer deposits, as is evidenced by the list of localities, excepting Russia, that have yielded it in varying quantities. In California in nearly if not all of the gold-bearing gravel and sands; in Oregon, Georgia, Alaska on the Yukon river, Canada, British Columbia, Mexico, Colombia and Brazil, South America and Australia. The genesis of the native platinum is not well understood. In two cases the metal has been reported as found in quartz veins, but these reports have never been verified and are open to grave doubt. The undoubted occurrences of platinum in situ are in Russia, Brazil, New South Wales, Canada and Colombia. Platinum is usually found in the form of rounded or flattened grains of "sand," occasionally in irregular lumps of the size of peas; large nuggets are very rare—the largest as yet found weighing twenty-one pounds. The ore has a metallic luster and is distinguished by its steel-gray color, shining light gray streak when rubbed on a hard white surface, high specific gravity (16 to 19), malleability, infusibility in the hottest blast furnaces and not affected by borax or salt of phosphorus before the blowpipe, except in the finely divided state, when reaction for iron and copper may be obtained. It is soluble only in hot nitro-hydrochloric acid. The method generally adopted for extracting the ore is to pass the sand and water with gravel through puddling machines or revolving conical screens; the platinum and fine sand pass through into sluiceboxes beneath, while coarser materials are discharged at one side. The contents of the sluiceboxes are washed in the usual manner, and when gold is present in paying quantities it is removed by amalgamation with mercury, the platinum remaining behind. Experience shows that it is seldom profitable to work mines yielding less than three grams of platinum ore to the ton of gravel. The average yield of the richest Russian mines is about six grams per ton. Platinum has an affinity for iron, and is never without it. It alloys with copper, but is never found with it.

Large Storage Battery.

The Baltimore & Ohio Railroad has contracted for a huge storage battery to be used in hauling its trains through the Baltimore belt tunnel by electricity. This battery will consist of 320 tanks made of hard wood, lined with lead, each holding thirty-nine plates, nineteen negative and positive. Each tank will weigh, with plates and electrolyte, about 1800 pounds, and the complete battery will have a capacity of 1200 H. P. for a short period of time. The horse power of the electric locomotive ranges from 1000 to 1500, and this entire load has to be supplied by the power house at present. As the load is only required when the locomotive is in action, it is a spasmodic demand, the average use throughout the day being less than 500 H. P. When the battery is put into service, it will act as a reservoir of power, accumulating electricity while the locomotive is not in use, and relieving the power station of the load above the average by discharging into the line this accumulated current.

Jobbers and Manufacturers.

Eastern exchanges give considerable attention to a peculiar controversy between some San Francisco jobbing houses and the Selby Smelting & Lead Company as regards the handling of loaded shells, shot, lead pipe, sheet lead and other goods manufactured by the Selby Smelting & Lead Company at their cartridge factory and shot tower, which is one of the oldest institutions in California, and, because of its position as smelters and refiners of precious metals and low-grade ores, has a national reputation. In addition to smelting and refining the various ores and bullion, they are large dealers in tin, copper, zinc, antimony, etc. It has always been assumed that the Selby Smelting & Lead Company not only has the ability, but also the disposition, to be liberal; that they were specially anxious to protect all dealers against encroachments, thus endeavoring not only to promote local enterprises, but to make it to the interest of dealers to get their supplies in San Francisco.

The chief cause of the trouble appears to be that the jobbers complain that the Selby Smelting & Lead Company insists upon selling to certain San Francisco retailers and plumbers. The jobbers claim that, as manufacturers, the Selby Company should distribute their goods only through the jobbers. The latter have a combination—the Pacific Coast Hardware & Metal Association—whose first object is to promote good feeling and cordial relations among the different jobbing houses on the Pacific coast, and having in view definitely co-operation in endeavoring to secure better freight rates, and exercising such influence with the railroad and transportation companies as to protect them against the jobbing houses of the East. The association is now contesting with St. Louis and other jobbers before the Interstate Commerce Commission for better freight rates on less than carload lots from the East to the Pacific coast. Locally, however, some members of the Association have endeavored to exercise control over manufacturers declining to buy goods from any manufacturer who sells to retailers.

One of the difficulties is to know where to draw the line between jobbers and retailers. The general definition of what constitutes a jobber or wholesaler is a concern which sells more goods at wholesale than it does at retail. Some, in endeavoring to define the position more exactly, state that only a concern which sells at least 75% of its goods in whole packages should be considered a jobber. Many retail establishments do a large business, and will sell in any quantities they find best. Some of these houses have such great ability that they can handle goods to great advantage, and thus it seems inconsistent for certain jobbing houses to discriminate against such retailers. Reference to the customs in vogue among Eastern firms shows that they have had there the same difficulties to contend with, and that it is a positive rule with many manufacturers to establish schedules of prices on quantities, always favoring the larger dealer with a better percentage than the smaller dealer—schedules of prices being so arranged that the jobber, when buying in quantities, has such margin reserved to him by the manufacturer that he can sell the retailer at a reasonable profit. Where the business is managed with proper consideration for all interests, the jobbing houses are able to control the larger portion of the business; but there are some retailers who, having ability, are able to buy in quantities which seem to entitle them to more favorable terms than the ordinary retail concern, these houses having large capital deeming themselves entitled to consideration. The relations between the manufacturer and the dealer should always be amicable, co-operating on a basis whereby all the various interests may be harmonized, and in special localities work together in protecting their own industries.

Viewed from an impartial standpoint, it does not seem just that the jobber should claim to himself the right to dictate to the manufacturers how they should dispose of their products. On this line it has been the practice of some of the jobbers to base their margin of sales on the average yearly cost of doing business, and in some instances they have insisted upon charging the small retailer a price which would yield them from 17% to 25%, because they say it costs them from 15% to 17½% to do business. The large Eastern jobbers figure differently, and seem disposed to sell on a very close margin of from 2½% to 5%, calculating to turn over their money not less than six times every year; and at the rate of 2½% it is manifest that they have at the end of the year their 15%. These parties are jobbers; they aim to do business on a large scale, and to make their profit from the volume of business and frequent transactions, asserting that this is the better way. It is not wise to try to make the full measure of profit from each individual transaction.

The position of San Francisco, and the coast cities, is different now from what it was before the completion of the many railroads; the extremes of the country are coming closer together. Merchants and dealers on this coast should be satisfied with less margins on individual transactions, but aim to increase their profits by frequent transactions and larger volume of business. This can be done by adopting more liberal policy all round, and not attempting to oppress small dealers, or to inconvenience manufacturers. It seems to be the policy of the Selby Smelting & Lead Co. to adopt the same general plans as prevail in the East, by establishing such schedules as will protect the large dealer in a margin of profit, and also the small dealer against ruinous competition. It is not good business policy to ignore certain interests which it should be mutual pleasure, as it certainly would be ultimate profit, to conciliate.

The Selby Smelting & Lead Company use their shot tower as one of the channels for disposing of the lead produced at their refinery; they have also other channels open, and supply demand for their pig lead and manufactured materials from places tributary to San Francisco. They are able to compete with the East on this coast because the cost of lead in their ores and base bullion is purchased at prices corresponding with the Eastern cities; they have the advantage of freight from the East, and are enabled to distribute from this point in competition with Eastern manufacturers. They do not belong to the Trust. They have not sought to invade Eastern territory, and have reciprocal understandings with the various manufacturers in the East of their products, so that as a rule the Selby Company has not attempted to interfere with the trade of the Eastern manufacturers, and although at times they have a surplus of pig lead which could be manufactured and distributed to advantage, they have in good faith preferred to ship the pig lead to New York, and sold there rather than cause any disturbance.

It were better for mutual good that the contending parties get together and harmonize disputes to the end that all local interests be protected.

Shipping Molten Iron.

The construction of a new bridge across the Monongahela, Pa., directs attention to a striking feature of modern metallurgy. The usual way to make steel is to melt cold pig iron, to which other materials are added, and then purify the mixture by burning out certain undesirable elements. Pig iron, however, is itself the product of a previous heating process, in which the ore is melted up with carbonate of lime to remove the oxygen. It occurred to some ingenious metallurgist that if the product of the blast furnace could be converted into steel before it had cooled sensibly a great economy in fuel could be secured.

The bridge mentioned has been built for the Carnegie Co., and will be used to convey molten iron from the Carrie furnaces to the Homestead Steel Works, a mile away. At the present time Homestead obtains molten metal from Duquesne, 4½ miles away. The new route has been laid out so as to save time, distance and heat. There has been for some time one hot metal bridge across the Monongahela, controlled by the Carnegie Co., and, besides the new one about to be opened, a third is in process of erection for the Jones & McLaughlin interest.

One gets a vivid idea of this remarkable procedure when he reads about the precautions taken in the construction of the new bridge to prevent harm in case any melted metal leaks or slops over while in transit from the iron furnace to the steel works. The spaces between the ties are to be filled with sand, so that no iron may fall to the decks of passing steamers. The ties will be of wood, but are to be protected by a covering of sand. On either side of the track there will be raised a screen of heavy metal plates, faced with firebrick and reaching to the height of 4 feet. An extension of thinner plates will bring the screen up 6 feet farther. The cars are ladle-shaped and the molten metal runs directly into them when the furnaces are tapped. A locomotive then draws the train to the steel works at a moderate pace.

Broken Hill Sulphides.

A circular from Wm. Lidderdale, chairman of the Broken Hill Smelting Corporation, Australia, says:

"The directors have much pleasure in reporting to the shareholders that their process for treating mixed sulphide ores of lead, zinc, silver, etc., is now in complete operation at the Stanlow Works, Ellesmere Port. The process makes a full and satisfactory separation of the zinc from the lead, silver, gold, etc., and the recovery of metals, especially in silver and lead, promises to exceed the original estimates. On the ore already smelted the recovery of lead and silver is higher than was realized at the works at Llansamlet. The recovery of zinc has already reached upwards of 60%, and is improving. The directors have every reason to believe that the 70% originally promised will shortly be attained. In starting new works of every description some initial mechanical difficulties are invariably experienced before all the various parts of the plant work satisfactorily. This has been the case at Ellesmere Port, but the difficulties have been purely mechanical and not such as to affect the soundness of the process. Owing to this, and the very great rise in the value of coal and all other smelting materials, the working costs have hitherto been in excess of the estimate made at the beginning of 1898, but as important savings are being effected in sundry directions, your directors believe that eventually the working costs will exceed but little, if at all, the original estimates. The directors have no hesitation in assuring the shareholders that the important and difficult problem of treating mixed sulphide ores, which has created so much interest in metallurgical circles for years past, has been completely and satisfactorily solved by the process which is owned by the Smelting Corporation. During the last few weeks an inquiry has been received from a well-known and experienced smelter in the United States as to the directors' willingness to sell or lease the patent for that country, where large deposits of rich sulphide ores have been long awaiting a satisfactory process for their successful treatment."

New Metallurgical Process.

In the issue of Aug. 11, 1900, appeared an extended account of a new metallurgical process that attracted universal attention. In answer to numerous inquiries, it may be stated that the experiments there spoken of as carried out by Dr. Goldschmidt with aluminum as a reducing agent are now considered to have passed from the experimental stage. According to a paper read by Mr. Lange at the Paris meeting of the Iron & Steel Institute, the success of Dr. Goldschmidt's method is due to the fact that he found that the reducing mixture need not be heated from the outside; it is only necessary that the reaction be started, and this is done with the aid of a mixture of powdered aluminum and some peroxide, barium peroxide by preference. This mixture is now prepared by the Societe d'Electro Chimie, Paris, under the name of "alumino-thermie." For engineers there has been prepared a substance called "thermit," a preparation of iron oxide, Fe_2, O_3 and aluminum, its chief use being for repairs of large pieces which can not be heated in the ordinary way—such, for instance, as welding the ends of rails together, or replacing a tooth on a broken wheel. Assuming that a new tooth is the object sought, it is moulded in situ in fireclay, clay and coke, with or without the addition of sand. Then the required amount of "thermit" is melted in a special crucible, supplied by the company, one pound of the mixture giving one-half pound of iron. * * * *

To start the operation, a pound or two of "thermit" is placed in the crucible and some of the primer (aluminum and peroxide), about 1% of the mass, is strewn on this. Ignition is set up by throwing a lighted match on top of the primer or by dipping a red-hot iron wire into the mixture. The reaction starts suddenly. More "thermit" is strewn—not thrown—into the white-hot mass, until the desired weight has become molten. The temperature is estimated at 3000° C. The liquid corundum is poured off, and then the iron is poured into the mould. The piece is slowly cooled and the tooth hammered and filed down to the required dimensions. It would seem, however, that the process has achieved the greatest success in welding proper, for some test bars welded with thermit and shown at the meeting gave a strength of 36.8 kilogrammes, against 35.8 kilogrammes per square millimeter before treatment, and an elongation of 11.5% as against 15%. The tensile strength was thus impaired, but the fracture occurred some distance from the weld. To the boilermaker it will, however, perhaps be most interesting to note that tubes which have been welded endways with this process have withstood a pressure of 400 atmospheres, finally splitting lengthways when hammered or bent, but not breaking at the joints. Flanged tubes of this type would not have stood more than half the pressure, and the achievement is all the more noteworthy when it is considered that only the edges of the tubes are in contact.

Success Dependent Upon Success.

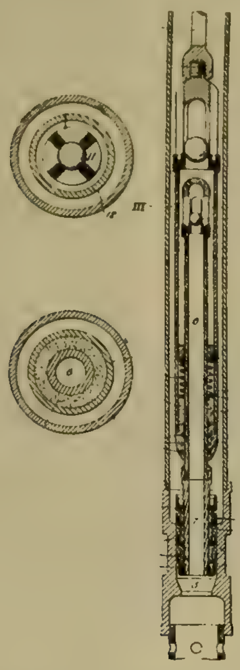
There is no other profession in the world so dependent for success on the smiles of Dame Fortune as that of mining. A lawyer counts but on himself to achieve position; a doctor earns honor by his own ability; but with the mine manager, fortune must be with him in his mine, and, even when so, success is only assured when followed by his own exertions, splendid organization, mining knowledge and management. No profession calls for men of hardier constitutions, pluckier hearts or of more intelligence, and to be successful in its ranks is to reach a goal which may well be envied by the rest of our fellow men. The life of a mine manager is a continual gamble. He is often expected to achieve results where there is no mine, and pay dividends where the most expert management can only meet expenses. The profession might well be called a lottery, which has, however, a big drag in favor of the bank, and, even when a prize is drawn in the shape of a good mine, it is only won after the years of study have been turned to such account as to make it a success, and that bigger than anticipated. No profession numbers in its ranks such a quantity of good fellows; the fortunate of one day are the unfortunate of the next; this tends to make men like each other for their qualities alone, and leaves a silken thread of good fellowship running through them which is the envy of all other professions and the pride of their own. The helping hand should be extended by the fortunate one of to-day to those of yesterday, or, let us hope, of to-morrow.—Machinery Register.

Mining and Metallurgical Patents.

Patents Issued December 4, 1900.

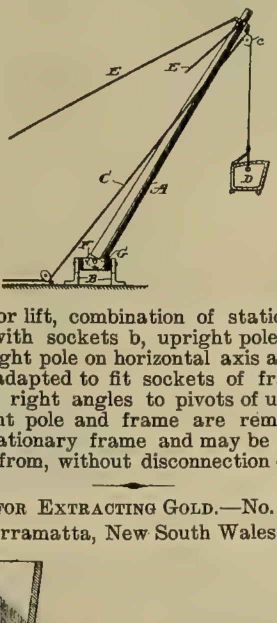
Specially Reported for the MINING AND SCIENTIFIC PRESS.

OIL WELL PUMP.—No. 663,029; J. Horsley, Glade Mills, Pa.



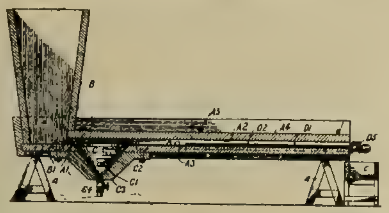
Combination of hollow stationary plunger provided at lower end with series of expansible packing rings with intervening separators and securing nut, adapted to be expanded by pressure of contained fluid and to be set in main tubing of well, check valve at upper end of stationary plunger with surrounding cage projecting outwardly beyond stationary plunger, outer inclosing section constituting reciprocating plunger provided with check valve at upper end mounted in cage, operating rod secured to top of cage by which reciprocating plunger is actuated, coupling connecting lower end of reciprocating plunger with downwardly extending packing chamber, coupling embracing stationary plunger and adapted to engage with cage of check valve of stationary plunger, an externally tapering terminal plug at extremity of packing chamber embracing stationary plunger and provided with internal annular packing rings, and compressible sponge packing, follower, and coiled spring surrounding stationary plunger and enclosed between coupling and terminal plug.

HOIST OR LIFT.—No. 663,109; B. Tucker, Philadelphia, Pa.



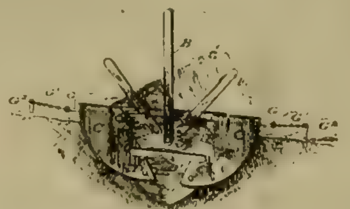
In a hoist or lift, combination of stationary frame B provided with sockets b, upright pole, frame pivoted to upright pole on horizontal axis and carrying trunnions g adapted to fit sockets of frame B and arranged at right angles to pivots of upright pole, where upright pole and frame are removably supported by stationary frame and may be removed together therefrom, without disconnection of parts.

MACHINE FOR EXTRACTING GOLD.—No. 663,375; G. Webster, Parramatta, New South Wales.



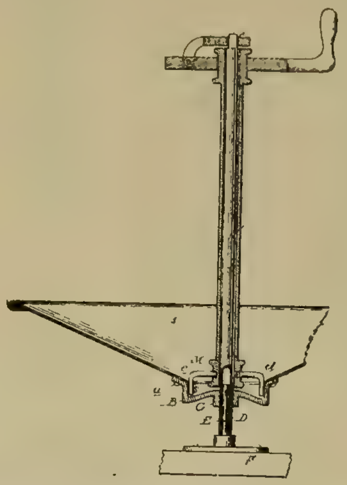
Combination of comparatively long, shallow covered-in passage or chamber having lining on bottom, hopper at one end thereof, conical catch receptacle or basin arranged at discharge end of hopper and having riffles arranged one in advance of other, toward delivery end of passage or chamber, a series of water pipes arranged to discharge jets of water, oppositely to flow of material through passage or chamber.

WATER STOP OR GATE.—No. 663,265; W. S. Fisher, Artman, Colo.



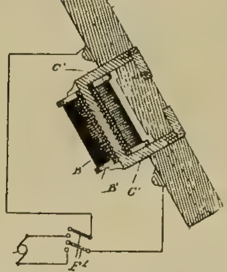
A water stop composed of main plate, extension wings pivoted thereto and movable on pivots whereby they may be projected beyond edges of main plate, levers for operating extension wings, levers being pivoted to main plate and connected with extension wings.

GOLD PAN.—No. 663,296; D. B. Newkirk, Detroit, Mich.



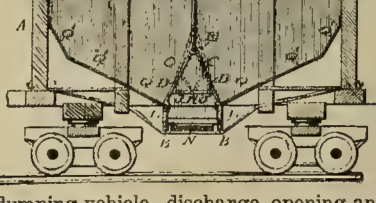
In a gold pan, combination with pan proper having formed centrally therein cylindrical depression or socket, standard to which pan is secured, tubular member sleeved upon standard for independent rotary movement, two sets of stirrer blades carried by tubular member at lower end, one set extending upwardly in proximity to pan and remaining set projecting downward into pan socket, handle for rotating tubular member, and link attached to handle and adapted to engage with standard.

MAGNETIC SEPARATOR.—No. 663,304; F. Theilengerdes, Memphis, Tenn.



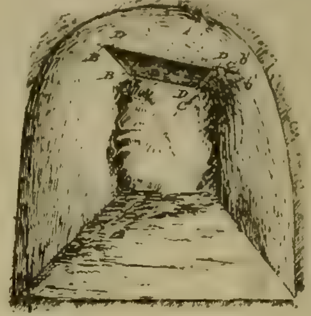
Combination with inclined hinged feed board, of flat electro-magnet core beneath and extending nearly from end to end of same, having broad ends turned upwards into slits in board, approximately parallel bars of magnetizable material sunk in upper surface of board, resting upon ends, non-conducting plates resting against upturned ends, oppositely extending lugs, coil wound about core between plates.

DUMPING CAR, ETC.—No. 663,310; I. L. Vansant, Philadelphia, Pa.



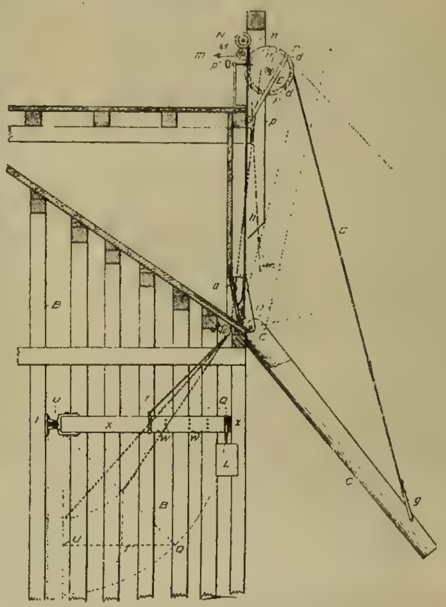
In a dumping vehicle, discharge opening and shutters therefor, top of walls of opening forming seat for shutters, formed of pair of diverging members jointed together at top, diverging downwardly, forming wedge-shaped structure, base convergible, means for raising and lowering shutters, toggle lever mounted on body of vehicle, connected with shutters for positively folding and unfolding latter.

AWNING FOR MINE SHAFTS OR TUNNELS.—No. 663,316; B. B. Wheeler, Apex, Colo.



Improved awning, comprising two sets extensible supports, each consisting of two parallel parts adapted to slide lengthwise on each other, means for clamping parts in any adjustment, and awning proper, applied to two sets of supports on opposite sides, whereby apparatus is adapted to be secured transversely in mines or tunnels having walls at different distances apart.

COUNTERBALANCED CHUTE.—No. 663,323; L. J. Anderson, Escanaba, Mich.



Combination of drum N, line V, with two strands of different lengths, door a, T-shaped lock lever pivoted at T-end, lock bolts F F, two strands of line being attached respectively to door and to lever O.

MIXTURE FOR SILVERING METALS.—No. 663,340; C. Gottig and W. Kottgen, Wilmersdorf, Germany.

Mixture for silvering metals comprising silver chloride, compound whose aqueous solution is capable of dissolving silver chloride, metallic chloride capable of yielding up chlorine and transferring same to any decomposition product formed from silver chloride under action of light and material which favors silvering action.

PROCESS OF MANUFACTURING METALLIC SILICIUM. No. 662,548; B. Scheid, Frankfort-on-the-Main, Germany.

Process of manufacturing crystallized silicon, mixing silicic acid, carbon and silicate of the alkalies, alkaline earths, or earths, and heating mixture to such temperature and under such conditions as to cause production of silicon and avoid its volatilization; formation of silicon carbon simultaneously therewith.

PROCESS OF MAKING ALUMINUM ALLOYS.—No. 662,952; L. Mach, Berlin, Germany.

Process of manufacture of workable aluminum alloy consisting in adding from two to ten parts of magnesium to every 100 parts of melted aluminum and then suddenly chilling alloy thus obtained.

THE Engineers' Club of San Francisco is a new organization in process of formation to include in its membership mechanical, civil, electrical and mining engineers and those allied with engineering projects.

THE Idaho Supreme Court this week decided that all patented mining property is subject to taxation.

Copper Dividends and Prices.

The Boston News Bureau gives figures as to the record of Michigan and Montana mines for 1900. The following table shows the total dividends paid in 1900 by some Lake Superior and Montana copper mining companies, with a 22-year comparison of the Lake Superior companies. The Calumet & Hecla has paid 71% of the total paid by all the Lake Superior companies during the past twenty-two years.

The total dividends paid this year by the Lake Superior companies were $9,795,000, of which the Calumet & Hecla contributed $7,000,000, and the total of the Montana mines for this year was $13,585,100, of which the Boston & Montana Co. paid $6,450,000, and the Anaconda $4,800,000.

	Per share. 1900.	Dividends in 1900.	Total paid to date.
Calumet & Hecla	$70	$7,000,000	$72,850,000
Boston & Montana	43	6,450,000	20,975,000
Anaconda	4	4.800,000	16,950,000
Parrot	6	1,335,100	4,370,323
Tamarack	17	1,020,000	7,290,000
Butte & Boston	5	1,000,000	1,000,000
Quincy	9	900.000	11,970,000
Osceola	9	558,000	3,652,000
Wolverine	4	240,000	510,000
Atlantic	2	80,000	360,000
Totals	$166	$23,383,100	$140,427,823

The following is a 22-year comparison of dividends paid by Lake Superior copper mines, average price of Lake copper and number of companies paying dividends (Montana mines' totals added):

	Average price Lake copper. Cents.	Total per share.	Total amount paid.
1900	*16.65	$108.00	$9,798,000
1899	16.76	129.00	12,318,000
1898	12.01	67.50	6,383,000
1897	11.33	62.00	5,431,000
1896	10.98	53.00	4,035,000
1895	10.73	53.50	3,280,000
1894	9.52	33.00	2,380,000
1893	10.75	47.00	3,520,000
1892	11.56	46.00	3,260,000
1891	12.76	48.00	3,540,000
1890	15.60	48.00	3,415,000
1889	13.49	45.00	2,670,000
1888	†16.78	52.50	3,260,000
1887	11.22	20.00	1,376,000
1886	10.59	26.00	1,900,000
1885	11.14	24.50	1,970,000
1884	13.73	21.75	1,327,500
1883	15.85	37.50	2,670,000
1882	18.41	44.50	2,850,000
1881	18.27	38.50	2,665,000
1880	20.18	48.50	3,070,000
1879	17.35	26.50	1,780,000

Total dividends Lake Superior copper mines for 22 years	$82,975,500
Calumet & Hecla's contribution (71%)	58,600,000
Balance other companies (29%)	24,298,500

Montana Mines—	Totals.
Boston & Montana	$20,975,000
Anaconda	16,950,000
Parrot	4,370,323
Butte & Boston	1,000,000
Total Montana mines	$43,295,323

* Estimated. † Year when French syndicate flourished.

Oil and Gas Yielding Formations of California.

NUMBER IV.—CONCLUDED.

During the early development of the Oil City field, much inconvenience was experienced through lack of water. In 1899, J. A. McClurg sunk two 275-foot wells in the valley land about 6 miles southwest of Oil City. The formation is: Drift to 200 feet, water-gravel to 212 feet, tough clay to 275 feet. The water rose about 5 feet in the casing. These wells yield an immense supply. Two 4-inch steam pumps are being used to pump the water into the receiving tank. A duplex Dow pump, having a capacity of more than 15,000 gallons in twelve hours, forces the water through 6 miles of 3-inch pipe to an elevation of 275 feet above the top of the wells. The oil field consumes about 15,000 barrels of water every twenty-four hours. This is potable water and rather hard. The output of water from the Oil City field during 1899 was 439,372 barrels. The oil is conveyed by pipe line from Oil City to Ora station on the S. P. R. R., a distance of 8½ miles.

The Alcalde field is about 3 miles southwest of Coalinga and extends from the old coal mines, which are about 4 miles a little west of north from Coalinga, to Alcalde creek. The petroleum claims on which prospect wells have been drilled are situated in the first two tiers of foothills which run in a southeasterly direction from the old coal mines. These foothills are for the most part formed of sandstone containing fossils of the Middle Neocene age. It is conceded that these Neocene rocks lie non-conformably on the Eocene, although the dip of the two formations is about the same. No white shale is seen between the Eocene and Middle Neocene formations in this locality except a slight outcrop near the San Joaquin coal mine. In 1893 the writer obtained a small collection of fossils from the San Joaquin and California coal mines, which demonstrates that the formations of these mines are of the Eocene age.

The outcropping rocks belonging to the Middle Neocene formations are principally sandstones with a little shale and conglomerate, the prevailing dip being about N. 70° E. Several brine and sulphur springs issue from this formation, and at one point there is a spring of tar-like oil. In 1893 the writer visited the San Joaquin coal mine (one of the old coal mines in this locality) and saw a small quantity of oil of medium gravity baled from one of the workings. There are no productive wells in the Alcalde district, but in August, 1900, ten prospect wells had been, or were being, drilled.

Atomic Weights of the Elements.

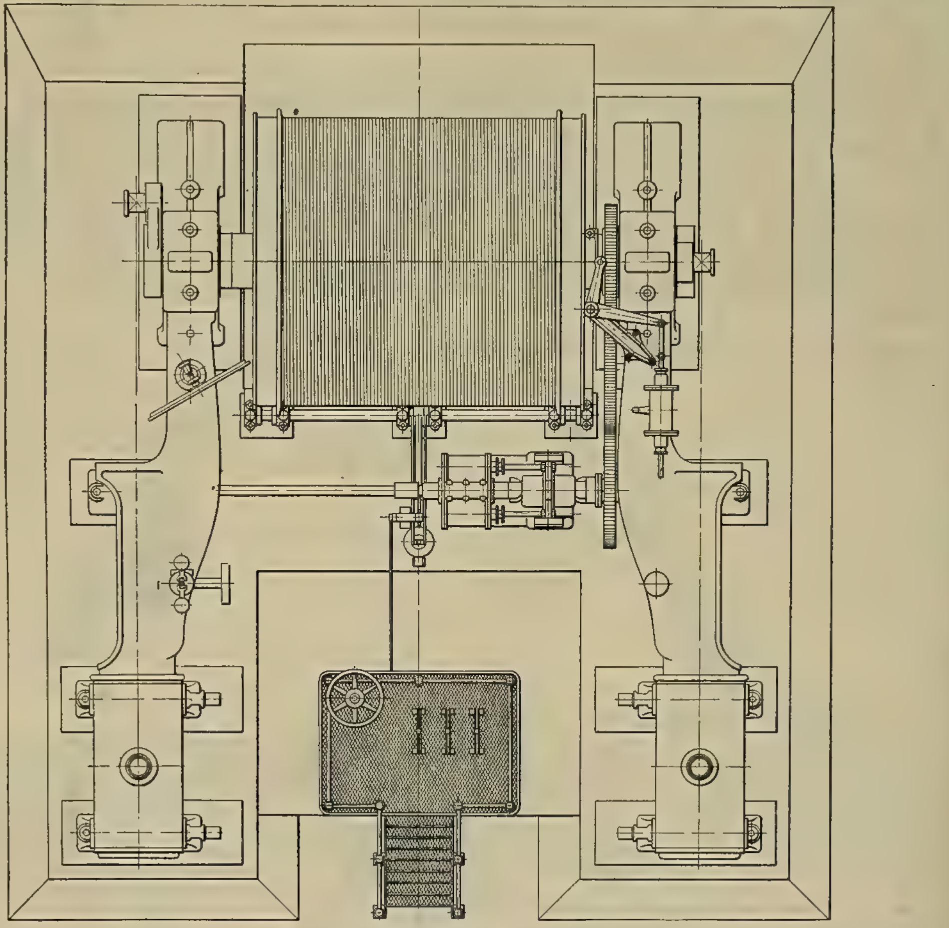
The special committee appointed by the German Chemical Society for the establishment of the atomic weights to be used in ordinary analytical work unanimously recommended the following. The weights adopted differ somewhat from those recommended by Dr. F. W. Clarke in this country:

Aluminum	Al.	27.1	27.11
Antimony	Sb.	120.0	120.43
Argon	A.	40.0	....
Arsenic	As.	75.0	75.00
Barium	Ba.	137.4	137.43
Beryllium (Glucinum)	Be.	9.1	9.08
Bismuth	Bi.	208.5	208.11
Boron	B.	11.0	10.95
Bromine	Br.	79.96	79.95
Cadmium	Cd.	112.0	111.95
Cæsium	Cs.	133.0	132.89
Calcium	Ca.	40.0	40.07
Carbon	C.	12.0	12.51
Cerium	Ce.	140.0	140.20
Chlorine	Cl.	35.45	35.54
Chromium	Cr.	52.1	52.15
Cobalt	Co.	59.0	58.93
Copper	Cu.	63.6	63.60
Erbium	Er.	19.0	19.06
Fluorine	F.	19.0	19.06
Gadolinium	Gd.	....	156.76
Gallium	Ga.	70.0	69.91
Germanium	Ge.	72.0	72.48
Gold	Au.	197.2	197.23
Helium	He.	4.0	....
Hydrogen	H.	1.01	1.008
Indium	In.	114.0	113.85
Iodine	I.	126.85	126.85
Iridium	Ir.	193.0	193.12
Iron	Fe.	56.0	56.02
Lanthanum	La.	138.0	138.64
Lead	Pb.	206.9	206.92
Lithium	Li.	7.03	7.03
Magnesium	Mg.	24.36	24 28
Manganese	Mg.	55.0	54.99
Mercury	Hg.	200.3	200.00
Molybdenum	Mo.	96.0	95.99
Neodidymium	Nd.	144.0	140.80
Nickel	Ni.	58.7	58.69
Niobium (Columbium)	Nb.	94.0	93.73
Nitrogen	N.	14.04	14.04
Osmium	Os.	191.0	190.99
Oxygen	O.	16.0	16.00
Palladium	Pd.	106.0	106.36
Phosphorus	P.	31.0	31.02
Platinum	Pt.	194.08	194.89
Potassium	K.	39.15	39.11
Praseodidymium	Pr.	140.0	143.60
Rhodium	Rh.	103.0	103.01
Rubidium	Rb.	85.4	85.43
Ruthenium	Ru.	101.7	101.68
Samarium	Sa.	150.0	150.26
Scandium	Sc.	44.1	44.12
Selenium	Se.	79.1	79.82
Silicium (Silicon)	Si.	27.4	28.40
Silver	Ag.	107.93	107.92
Sodium	Na.	23.05	23.05
Strontium	Sr.	87.6	87.61
Sulphur	S.	32.06	32.07
Tantalum	Ta.	183.0	182.24
Tellurium	Te.	127.0	127.40
Terbium	Tb.	....	160.00
Thallium	Tl.	204.1	204.15
Thorium	Th.	232.0	232.63
Thulium	Tm.	....	170.70
Titanium	Ti.	48.1	48.15
Tin	Sn.	118.5	119.05
Tungsten	W.	184.0	184.83
Uranium	U.	239.5	239.59
Vanadium	V.	57.2	51.38
Ytterbium	Yb.	173.0	173.10
Yttrium	Y.	89.0	89.02
Zinc	Zn.	65.4	65.41
Zirconium	Zr.	90.6	90.40

If hydrogen is taken as unity these weights have values different from the above, as, for instance, oxygen then becomes 15.88, carbon 11.92, iron 55.60, etc. For refined calculutions it is best to adopt the weights as recalculated by Dr. Clarke, but for all ordinary purposes the weights as given by the committee of the German Chemical Society can be used. Where large contracts are based on percentages of certain ingredients—as, for instance, chrome ore on the amount of acid, iron ore on the amount of metallic iron and the freedom from phosphorus, etc.—it is best to use the Clarke weights.

Direct-Acting Hoists.

In Colorado, California, Montana, Michigan and elsewhere the direct-acting or first-motion hoist is coming into use in many places where a high hoisting speed is required because of the depth of the shaft, or the magnitude of the output, the drum being mounted on the engine shaft, the latter being extra heavy to withstand the strain. The hoisting drum or drums are either keyed to the engine or connected thereto by clutches. An illustration of a single-drum hoist, as furnished by the Bullock Mfg. Co., 1170 W. Lake St., Chicago, appears herewith. This hoist may be arranged with the drum keyed to shaft and reversible engines, or with the drum loose on shaft and a band-friction clutch for driving. In this case the engine runs in one direction all the time, controlled by the governor and throttle. For hoisting, the clutch is tightened, connecting the drum with the driver; for lowering, the clutch is loose and the rope runs out, controlled by the brake. The hoists, as a rule, are supplied with steam and hand brake; steam reverse and steam clutch all operated from a raised platform.



Direct-Acting Hoist, Single Drum.

MINING SUMMARY.

ALASKA.

The 300-stamp mill at the Treadwell mines, on Douglas island, has resumed. ——Supt. Davis is finishing work on the Mexican.

The McKinley Creek M. Co., Porcupine district, will push work next spring.

The November report of the Alaska Mexican mine shows 14,264 tons ore crushed by 120 stamps in 29½ days, producing $22,580 in bullion and 245 tons sulphurets, valued at $4014—an average of $2 per ton; total yield, $28,538; expenses, $21,826.

The Alaska United mine shows in its November report 24,544 tons ore crushed by 220 stamps in 29½ days, $29,315 in bullion, 491 tons sulphurets, valued at $9914; gross yield for month, $42,963—an average of $1.75 per ton; expenses, $39,371.

ARIZONA.

GILA COUNTY.

No action has yet been taken upon the question of issuing the treasury stock of the Old Dominion Copper Mining Co.

GRAHAM COUNTY.

During November, the Arizona Cop. Co., Clifton, produced 910 short tons copper; the company is shipping bluestone to Italy. General Manager Colquhoun projects a tunnel into the mountain to carry off smoke from the smelters, reverberatories, etc.; A. Burke will run the tunnel on the Virginia Queen, in Greenlee district, now in 150 feet to 200-foot mark; Munday & Chase, owners.——Arbuckle & Schuman will run a tunnel on the Buckeye to connect with shaft.——Stewart, McAlpine & Lynch will sink a 100-foot shaft.

PIMA COUNTY.

The Helvetia M. Co.'s smelter, at Tucson, which cost $100,000, was destroyed by fire on the 7th inst.; it will be rebuilt.

Brichta & Cooper are developing copper-silver properties in the Tucson mountains, 14 miles northwest of Tucson.

S. W. Champion has made the last payment of $20,000 on the Tres Amigos, at Tucson. He is figuring on a 20-stamp mill, with power sufficient to increase to forty stamps. The 10-ton cyanide plant on the property will be enlarged.——A 14-foot body of ore is reported opened up on the 250-foot level of the Silver Trail, in Hassayampa district.

SANTA CRUZ COUNTY.

George Westinghouse of Pittsburg is locally credited with having bought the Buena Vista grant, 7000 acres, to erect on the Santa Cruz river a reduction works and smelter and build a railway connecting the mines, the reduction works and Nogales.

A new 25,000-gallon tank is in at the La Democrata, in La Cananea district; the new smelter will soon start up; Manager, L. G. Cloud.——The 20-stamp mill at the Grant-Chenoweth, near Nogales, is running steadily.

YAVAPAI COUNTY.

The Ventura Hill M. Co. is pushing work on its copper properties near Jerome.——The track in the Johnson will be removed to the Octave, at Octave.——A gold nugget, valued at $62.50, is reported found on Rich Hill recently.

The shaft on the Eugene, in Big Bug district, is down 80 feet.

The Prescott & Eastern Railroad Co. will build a line to the Great Belcher and Poland mines, in Big Bug district.

A 50-ton mill test run, made on the First Home, in Big Bug district, returned $37.65 per ton. The ore was taken from the 130-foot level.

YUMA COUNTY.

The new air compressor for the mill at Kofa will soon be in place.

The Papago Copper Co. is pushing work on its gold properties at Camp Dulce. A crosscut is being run on the 60-foot level. The shaft will be sunk an additional 100 feet.

CALIFORNIA.

AMADOR COUNTY.

The Keystone Co., at Amador City, is sinking a double-compartment shaft on an incline. A boiler and engine for hoisting are going in.——The Mitchell, 10-stamp mill, near Pine Grove, is running steadily. Ten additional stamps will be put in in the spring.

The shaft on the Peerless, Jackson, is down 500 feet.——The 900-foot tunnel on the Del Monte is completed. A new hoist will go in, and sinking continued to 500-foot level. T. Schenck, Supt. the Modoc is pushing work; shaft is down nearly 70 feet.

The Belmont, Pine Grove, owned by J. McKelvey, is closed down indefinitely. ——The lower lava tunnel on the Geo. A. Gritton, in Clapboard gulch, near Volcano, is in 1500 feet. ——Men are tunneling on the Martin-Christensen.——The 40-stamp mill of the Keystone, at Amador City, is being fitted with 4-foot concentrators, two to each five stamps; 1000 tons ore are crushed monthly; W. A. Pritchard Supt.

At the Baliol mines, Sutter Creek, W. H. Storms Supt., men are working in the 300, 400 and 500-foot levels. A new tramway from the mine to the mill is going in. ——The management of the Defender was changed recently.

At the Modoc, on Pioneer creek, 4 miles above Volcano, the tunnel has made connection with the shaft 377 feet in.——At the Shenandoah, near Plymouth, Supt. Thornton is getting the Ivanhoe mill in shape to run on ore from the Shenandoah.——Supt. McWayne is unwatering the Pocahontas, near Drytown.——Drifting is in progress on the 600-foot level of the Centennial. —— Unwatering of the Bay State, Plymouth, shaft is in progress.——Electric power is going in at the Oneida, Jackson, and it is said that twenty-five additional stamps will soon be dropping.——The shaft on the Fremont Consolidated, near Drytown, is down 400 feet. The shaft is three-compartment, 4′6″x5′1″, and is going down at an angle of 51°. Machinery from the old Gover shaft has been cleaned, repaired, etc., a new gallows-frame and engine house are up, and the shaft is repaired to a depth of 200 feet. A new pump is going in.——At Clinton G. A. Douet is pushing work on his mine.

BUTTE COUNTY.

The Spring Valley M. Co. at Cherokee will have 3500 feet 22-inch iron pipe made to carry water down to the monitors.

At Paradise the Campbell property, adjoining the Magalia, is reported sold to Mr. Stypher.

The new works for the Hesperian Crude Oil Co., at Cohasset, are up.——Boring for oil is in progress near the Wick ranch, near Oroville.

CALAVERAS COUNTY.

C. Weatherwax, Supt. Sunrise, at Railroad Flat, is pushing work; a new steam hoist will go in.——Work on the Paragon will resume.——The 10-stamp mill at the Del Monte, 5 miles from Railroad Flat, is running on good ore from the mine; the 900-foot tunnel has reached the shaft at a depth of 200 feet.——At the Mitchell, near Pine Grove, the 10-stamp mill is running steadily; a new Gates rock crusher is in place.——Under present plans the tunnel on the Tabeaud, belonging to the Standard Electric Co., will not be worked.——Operations on the Emerson, at Sport hill, near Mokelumne Hill, are resumed; water pipes are in and unwatering of shaft is in progress; Supt., L. K. Mau.——The new working shaft at the Birdena, Mokelumne Hill, is down 70 feet; the new hoist is about in, and sinking will soon begin.——A boiler, pump and other machinery are going in on the Golden West.——At the Santa Ysabel a hoist is in on No. 2 shaft; connections will be made with No. 1 shaft; mine has been unwatered and work will be pushed.——At the Dutch the ledge is reported opened up on the 1000-foot level; the cyanide plant may soon resume.——Sinking is in progress on the Lucky Boy, 3 miles south of San Andreas.——The Marshall, San Andreas, will resume.——An assessment of 3 cents per share is levied by the Ford M. Co.——The Mutual M. Co. is sinking a shaft on the Lucky Boy, Dry creek.——It is locally reported that the Thorpe, at Fourth Crossing, will resume.——Kiser & Nunes are reported to have recently opened up a good body of ore near Mokelumne Hill.——At the Tulloch, near Albany Flat, ore running $14 to the ton is reported opened up.

CONTRA COSTA COUNTY.

The California Powder Works has incorporated; place of business, Hercules; directors—J. Birmingham, Hercules; J. de Lavega, P. T. Morgan, H. T. Pillsbury, San Francisco; F. W. Van Sicklen, Alameda; capital stock $6,000,000, subscribed $2500.

EL DORADO COUNTY.

Work is being pushed on the Gopher-Boulder at Kelsey.——At the St. Clair, 2500 feet of water pipe is laid; a building has been erected over the mill, and ore is being mined.——The Eureka slate quarry has men working.

INYO COUNTY.

Wells, Fargo & Co. has sued the Ratcliff Consolidated Gold Mines for foreclosure of a mortgage on the mines, mill sites and water rights of the company. A balance of $16,982.50 is alleged to be due. M. Sheridan is appointed receiver.

Work on the Montezuma, near Big Pine, will be pushed; a rock crusher, roller mill and five concentrators will be put in near the dump; power will be furnished by a 40 H. P. engine; a 110-foot tunnel is run, tapping ledge 80 feet below the surface.——Mandeville, Fuller & Malone are pushing work on their nickel property near Black Rock.

KERN COUNTY.

The Coast Range Oil Co. has oil at 500 feet on 2, 32-24, near Bakersfield.——The Transfer Oil Co. has begun drilling.——The McKittrick Co. is putting a new derrick on well No. 2.——The Golden Rule has a new standard rig on 6, 10-23, near Sunset, and will begin drilling.——The Hawkeye State Oil Co. is down 200 feet on 18, 28-28.——Near Sunset there are thirty-five rigs drilling for oil.

LOS ANGELES COUNTY.

The Standard Oil Co. is reported to have acquired all the interests of the Pacific Coast Oil Co., paying therefor in the neighborhood of $1,000,000. The productive wells of the company embrace about forty, 7 miles from Newhall, varying in depth from 700 to 2000 feet, in sandstone and shale, the oil being piped 44 miles to Ventura; fifteen in Elsmere canyon, and three in Wiley canyon near Newhall, the gravity of the oil produced from the latter group being about 30° B. The total product of the Pacific Coast Oil Co. is about 150,000 barrels oil per year; gravity mostly 40° B. The company has a 13-still refinery at Alameda with a total capacity of 2215 barrels; tankage for 54,000 barrels crude and 12,000 barrels refined. It employs there thirty-two men; the products are mostly gasoline, illuminating and lubricating oils, distillates and asphaltum.

MADERA COUNTY.

Work on the Sunnyside, North Fork, will be pushed; new hoist and pump are in; miners receive $2.00 per day and board. ——Mullen & Rickard are running their arrastra on ore from Horseshoe Point.——F. Scott has men working in the King.——The Cameron is closed down for the winter.

MONO COUNTY.

The Crystal Lake M. Co., owning the Jackson and Lakeview mines at Lundy, is putting in a plant and will push work next spring.

NEVADA COUNTY.

The Mayflower, Nevada City, recently shipped two carloads sulphurets to the Selby Smelting and Lead Co., San Francisco.——Work at the 16 to 1, Washington, is progressing.

Sixty men were recently laid off at the North Star, Grass Valley, on account of shortage of water for power.——Supt. G. R. Tuttle of the Golden Gate reports opening up a 2-foot ledge of good milling ore in the 175-foot level. ——Ore is reported opened up on the Coe.

The Hudson, at Rough & Ready, is being unwatered prior to development work.

PLACER COUNTY.

A. Gorman is getting the Lady Walker, at Michigan Bluff, in shape for a run.——The Big Gun M. Co. will push work on the Big Gun next season.——W. Muir, Supt. of the Turkey Hill, is putting on men. The electric plant is in and the crushing mill will be running Jan. 1.

The tunnel at the Azalea drift, near Blue canyon, is in 2750 feet; an upraise will be run to tap the gravel channel; Blue Canyon M. & D. Co., owners; T. Rodgers, Supt.——The new tunnel on the Lloyd (quartz), on the American river, 4 miles east of Blue canyon, is in 250 feet; the tunnel was begun at a point 40 feet above high water mark; J. B. Knapp Supt.——D. P. Hocking has thirty men working on the undercurrent tunnel, North Fork of American river. —— Work at the Pioneer, Quartz canyon, is resumed; a tunnel is being run; twenty-one men are working under Supt. J. J. Sullivan.——N. B. Willey, Supt. the Red Stone (quartz) has five stamps dropping at present; more will be started up soon.

PLUMAS COUNTY.

The ledge in the Bluebell group, near Genesee, carries gold, silver and copper.

C. D. Hazzard is building a rock debris dam in Slate creek, below the Plumas Imperial, near Quincy; when completed, operations at the mine will be resumed.

RIVERSIDE COUNTY.

A. D. Hall, Supt. Riverside M, Co. which is operating mines 40 miles north of Salton, says that the company has a 125-foot ledge; it is the intention to put on double shifts of men.

SAN BENITO COUNTY.

The New Idria Quicksilver Co. has but one furnace, producing about 400 flasks per month. It secures all its ore from between the 200 and 400-foot levels. In a recent effort to determine the extent of its ore bodies a body of ore was opened up on the 700-foot level.

SAN BERNARDINO COUNTY.

The smelter of the Needles Smelting Co., at Needles, was started up on the 2nd inst.

The Nevada Con. M. & R. Co. is incorporated at San Bernardino; directors, R. F. Harrison, Los Angeles; S. T. Godbe, Salt Lake; F. Hison, A. H. Ham, J. L. Campbell, F. W. Gregg, San Bernardino; G. E. Otis, Redlands; capital stock $200,000, subscribed $4010.

SAN DIEGO COUNTY.

The Mars, Venus, San George and Goshen mines, near Picacho, are reported sold to Senator Jones of Nevada and others for $100,000. A 1000-ton cyanide plant will be put up.——A rotary drill is in use boring for oil on property near Encinitas.——The San Diego County Oil Co.'s well is down 670 feet.——The Monarch Oil Co. will use 5¼-inch casing in its well.——Drilling is progressing at the La Jolla, La Jolla. The well of the Lakeside Oil & Dev. Co., at Lakeside, is down 75 feet.

SHASTA COUNTY.

The Bunker Hill, near Middle Creek, three miles from Redding, is reported producing considerable gold at present.——The Central Pacific R. R. Co. recently made a gratuitous donation of $250 towards the sinking of the well of the Shasta Con. Oil Co., near Redding.——On the Miner's Dream, on the Shasta & Middletown road, a strike of a pocket of rich ore is reported made; $2000 were taken out in one day recently. The Ballaklalla has passed into possession of the Mountain Copper Co., Redding.——A strike is reported made on the Bunker Hill, on Middle creek.

A company will be organized to work the Red Cross (quicksilver), on Clover creek, in Mason mining district, 30 miles northeast from Redding.——Work on the new Trinity Copper Co.'s 500-ton smelter, 20 miles from Redding, may be started in January.——The Mammoth (copper), on Backbone, is reported bonded to M. Lindley for $125,000 for one year.——The Shasta Con. Oil Co. will begin drilling on Jan. 13th, it is said.——The Mount Shasta Oil & Development Co. will begin drilling in January in the Igo, Sands Flat and Stinking Canyon regions.

SIERRA COUNTY.

Spellenburg, Cook & Devine have men repairing the tunnel in the Bullion, Sierra City.——T. Higgins has leased the Mountain.——Work on the Chipps, leased to Castagna, Nelson and others, is being pushed.——Supt. W. Johns, Jr., is pushing work on the Sierra Buttes.

SISKIYOU COUNTY.

A cleanup from 11½ tons of ore from Hickey Bros.' claim on White gulch, in Liberty district, returned nearly $2000. ——Hathaway Bros., on Sugar creek, have closed down their arrastra for the winter. They will continue development work.——Supt. McKeene, of the Helena G. M. Co., Callahan, says operations will begin Jan. 1st.

The dredger in Yreka creek, at Hawkinsville, is running satisfactorily.

TRINITY COUNTY.

R. C. Wilson, Supt. of the Douglas D. & M. Co., at Douglas City, is pushing work on the ditch and flumes.

The Sikes M. Co. is to operate the old Bloss & McCleary, near Trinity Center. Hydraulic pipe gates, elbows, etc., are on the ground, and construction work will be pushed.

Construction of the new mill at the Headlight, near Carrville, is progressing.

TUOLUMNE COUNTY.

Smith Bros. are down 90 feet on the Fleming, near Quartz; they have put up a whim.——Operations at the Dutch are progressing. It is reported there will be considerable mining activity in and around Tuttletown next season.——At the Draper, Jamestown, a 10-stamp mill and a 10-inch Cornish pump are going in. ——Whitcomb & Boyle are pushing work on the McAlpin near the county line.

At the Santa Ysabel the station at the bottom of No. 1 shaft is completed, the air drills in position and crosscutting to vein begun. Low-grade ore has been found in the old workings on the second level near No. 2 shaft.

The Grand View G. M. Co., capital $250,000, is incorporated at Sonora; directors, C. W. Ayres, J. R. Schupham, M. A. Rothchild, F. M. Parcella, H. Gaytes.——The Stockton Gravel M. Co. is pushing work on the Philadelphia diggings, near Sonora.

YUBA COUNTY.

The Blue Point gravel mine at Smartsville will be worked. O. G. Sage of the Blue Gravel M. & M. Co. says he goes to New York City to interest the larger stockholders of the company in the proposition of building a restraining dam and the erection of machinery for hydraulicking and large capacity belt elevator, and to enlarge the capacity of the mill.

COLORADO.

BOULDER COUNTY.

The Star, Ward, will soon resume.——Men will be put on at the John Jay.——Work is progressing on the Ward Rose. ——Good ore is opened up in the drift on the Bloomer group.——The B. & M. mill is running steadily on ore from the B. & M.——The B. & M. Co. will build ore houses, 60,000 feet of lumber being already ordered.——Bemis & Sons are working the Rag Tag.——The shaft house on the Independence No. 3 is finished.——Sinking is progressing on the Superior.——A strike of tellurium was recently made in 600-foot level of the Ingram, at Salina, Manager Sauer. —— N. D. McKenzie, Manager Poorman (silver), at Eldora, has men putting machinery in shape to run; the Caribou tunnel will be reopened. The Poorman has not run since 1892.——The Native Silver, Manager McBeth, is being worked through the old "217" tunnel.

CLEAR CREEK COUNTY.

The shaft on the Alpha, Gilson gulch, will be sunk an additional 100 feet.——Work is progressing on the Trojan.——The shaft on the Freighter will be sunk to the 700-foot level; twenty men are employed.——The Veto is being cleaned out and put in shape for a run.——Work on the Grand Trunk, recently bought by Eastern parties, is being pushed.——The Amazon has resumed.——J. Manhire is pushing work on the East Santa Fe.——The Mayflower, near Idaho Springs, is reported sold to the Lord Byron M. Co., of Nebraska, for $60,000. The plant on this property consists of a 150 H. P. Corliss engine, two large boilers—60 and 80 H. P., respectively—hoisting apparatus, etc. Shaft is down 230 feet.——The shaft on the Lord Byron is down 500 feet.

The tunnel on the Silver Horn, on Ute creek, near Idaho Springs, is in 700 feet.——The Fraction shaft, now down 450 feet, will be sunk an additional 100 feet; manager, E. W. Redding.——The Mixsell will be equipped with a new 35 H. P. engine and 60 H. P. boiler.——The Allen mill, recently overhauled and enlarged to use German system of concentration, is now owned by Denver men, who will enlarge the plant; H. Strickland manager.——The Wilkie mill will be overhauled and changed to use German system of concentration.——A new 150-ton custom mill is projected for Idaho Springs.

DOLORES COUNTY.

The old Patrick concentrator, at Rico, will be remodeled and put in operation next year.——Wakeman & Hicks have driven the tunnel on the Golden Age over 1000 feet during the last year.——Byerrum & Rohde are pushing work on the Madame De Farge group, on C. H. C. hill.——The Meredith M. & M. Co. will remodel its plant at the mouth of the Horse gulch.——A sulphuric acid plant is projected at Rico; 500 tons of sulphide iron, at $1 per ton on the dump, are proffered the projectors.

Campbell & Webber will put on men and push work on the Atlantic Cable, near Rico.

EL PASO COUNTY.

The annual meeting of the stockholders of the Findley G. M. Co. was held in Colorado Springs on the 3rd inst. The treasurer's report showed that gross output to date for 1900 amounted to $81,174.91.——The Steelsmith shaft, now down 700 feet, will be sunk an additional 100 feet.

FREMONT COUNTY.

The Dorcas mill, at Florence, is running. During November, ore reduction of mills at Florence was as follows:

	Tons.
Metallic Extraction Co.	9,000
National Gold Extraction Co	3,800
El Paso	3,500
Total	16,300

It is reported that the Independent Oil Co. has struck oil on its property on the Wasmouth place, near Florence; supply is not sufficient for a pump, so sinking will be continued.——The United Oil Co. is drilling near Paradise.——Operations on the Smith & Cowan coal mines at Williamsburg are being pushed; a tunnel is driven; fifty men are employed. The Black Diamond Coal Co., operating near Silver Cliff, has opened up a 20-foot vein of bituminous coking coal. The quartz mines in this district are now using coal, hauled from Rockvale, costing $10 per ton. The new find will reduce prices.

GILPIN COUNTY.

(Special Correspondence).—The properties of the Gold Coin group, including the California, Hidden Treasure, Indiana and Kansas shafts, on Quartz hill, are to be started up under the management of P. McCann of Central City. Little work has been done on this group for two years. It is stated that the group will be operated under a new organization. The California shaft, which is 2250 feet deep, is in water up to the 1400 level. It will be unwatered.

A new hoist was recently put in at the Kansas-Burroughs, over the 1200-foot shaft. Shipments from this mine run about 3500 tons of ore per month.

The Gunnell is one of the heavy shippers of the camp. Its tonnage amounts to about 3500 per month. F. C. Young of Denver is manager.

Many of the old shafts near Central and Russell Gulch, which were idle for some time, are resuming work and the district generally is in active condition.

Central City, Dec. 8. WASCOTT.

Manager B. M. Myers of the Chicago Carr M. Co. is sinking a shaft on the Chicago Carr; a 30-inch streak of ore, opened up on the 115-foot level, runs from $78 to $204 to the ton; men are opening up leads east and west from shaft.——The Carr M. & Colo. Co., recently incorporated, has stripped, retimbered and enlarged its shaft for 550 feet; a new 100 H. P. double-engine hoisting plant is in, and sinking operations begin Jan. 1; three eight-hour shifts will be put on.——The new Vulcan hoister on the Phœnix-Burroughs, on Quartz hill, Manager P. McCann, is running; shaft, now down 1300 feet, will be sunk to 2000-foot level.

GUNNISON COUNTY.

Everything at the Silver Basin, near Pitkin, is reported to be ready for sinking operations.——Reynolds, Pearson & Ekbert, who have contract for driving the tunnel on the Gold Link an additional 100 feet, are in 60 feet.——Work on the Maid of Athens and Citizen mines, in Mineral Farm basin, is being pushed.

HINSDALE COUNTY.

A. A. McClurg, operating the General Sherman, near Lake City, is running an 800-foot tunnel, now in 500 feet.

HUERFANO COUNTY.

The Occidental Development Co. of Boston, Mass., operating coal and copper properties near La Veta, will probably put in a smelter at that point to treat copper ores.

LAKE COUNTY.

Twenty-five tons of ore from the Sunshine recently ran $50 to the ton.——Good ore from the 400-foot level of the Jenny Sample is being shipped.——The Princess Alice Co. has put in a small compressor on the Rubie; it has ordered a twenty-drill machine to be delivered Feb. 1st.——A new compressor is going in on the La Bella, making a total capacity at the plant for running sixty drills; this will be increased to ninety or more soon.——The main shaft on the Wild Horse will be sunk to the 1800-foot level.——The new hoisting plant at the Granite, on Battle mountain, is running.——The new power plant at the Loder, Leadville, is running; the two furnaces built by the Denver Engineering Works are in place, and they will be blown in as soon as the engine is in position; 500 tons of ore per day will be treated. A new 50x50-foot fine dust chamber will be built.——It is reported that $300 ore is opened up in the 800-foot level of the Vindicator; No. 1 shaft, now down 800 feet, will be sunk to the 1200-foot level, and No. 2 shaft, now down 2475 feet, will be sunk an additional 600 feet. Three shifts are working; output is 100 tons of ore per day.——The California gulch shaft is down 500 feet.

OURAY COUNTY.

On the Monument, at Ouray, the tunnel is in 400 feet.

SAN JUAN COUNTY.

The Woods Investment Co. has bought two groups on Bear mountain near Silverton, for $16,000. —— The Silver Lake group may be sold to the American Smelting & Refining for $2,500,000, it is said.

The new Kendrick-Gelder smelter at Silverton is running; W. F. Kendrick manager.——A 300-foot crosscut will be run on the Saratoga.——Work on the St. Paul will be pushed.

SUMMIT COUNTY.

On the Laurium, Breckenridge, the crosscut from the lower tunnel has cut the vein 148 feet in.——The old Country Boy tunnel, on the Juniata group, on Nigger hill, is being cleaned out and retimbered.——On the Gold Bug, in Galena gulch, the 15-stamp mill is running steadily.——Smith & Boyd will push work on the Germania. —— Etzler Bros. & Clyde, operating the Hardware, near Lincoln City, are building a shaft house over the 58-foot shaft; crosscutting is in progress on 58-foot level.——Work of sinking new shaft on the Johannesburg is progressing.——W. W. Boyd is pushing work on the Orthodox group, on Mineral hill.——An upraise from lower level of the Jessie is being run to connect with winze on the Seminole.——Whitehead & Nelson are sinking a shaft on the Teller, of the Little Dick group, in Gold Run.——The Cashier, T. L. Wood, manager, will resume soon, and work will be pushed during the winter.——Good ore is reported opened up on the Washington and Ohio properties.

TELLER COUNTY.

Manager Parfet of the Gold Exploration Co., which is driving the Ophelia tunnel, Cripple Creek, states that over 400 feet were driven during November; three shifts are working.——Lessee McCarthy is drifting in 200-foot level of the Nellie V.——Ore is opened up in twelfth level of the Isabella.——The St. Thomas Co. will build a shaft house and ore bins of 100 tons capacity on the Zoe and St. Thomas properties. They will also put in new hoisting machinery capable of sinking to a depth of 500 feet.——Russell, Ray & Co., newly organized, will work the Ray lease on the Minnie Bell; shaft, now down 400 feet, will be sunk to 500-foot level.——It is said that 7 feet of ore were recently opened up on 350-foot level of the Eclipse.——The Corinne G. M. Co. has received patents for the Undine Nos. 1, 2, 3, 4 and 5, and the Corinne, north of Tenderfoot hill, 38¼ acres in all.——The shaft on the Santa Rita, on Squaw mountain, is down 550 feet.

There was a crowded and stormy meeting of the stockholders of Stratton's Independence mine in London on the 7th. After hearing the report of the mine furnished by J. H. Hammond, the shareholders refused to pass on it, demanding a two months' adjournment pending the receipt of a report from the mine's engineers. A majority of the stockholders denounced the directors and left the meeting. After the majority had left, the poll was taken and it was found those present were not in favor of adjournment, so the report was adopted. The company has decided to declare a dividend for the quarter ending Dec. 31.

The main shaft of the Portland, Victor, is down 1000 feet; a station is being cut at this level; a 500-foot crosscut is run southeast of the shaft.——Ore is being shipped from the Unexpected, at Windy Point.——Walker and associates have sunk a 225-foot shaft on the Rigi, on Bull hill, Victor, and are crosscutting west on this level.——The Pueblo fraction, on Bull cliff, above the Maude Helena, is reported sold to the Free Coinage M. Co. for $26,000.——Johnson, Parkinson and others are stoping between second and third levels of the Coriolanus.

The Comanche Plume M. Co., owning eight acres land on Battle mountain, near Cripple Creek, will put in a new plant and sink a 600-foot shaft.——Ross & Hummer are shipping $50 and $100 ore from block 8 of the World's Fair.

The Orphan, Cripple Creek, is bonded to W. H. Spurgeon for three years for $275,000; bond calls for the sinking of a 4½x13½-foot three-compartment shaft, at the rate of 300 feet per year, or a total of 900 feet.

IDAHO.

BLAINE COUNTY.

Work on the Minnie Moore at Bradford will resume. Men are getting the pump in shape to clear the mine of water; thirty will eventually be employed.

BOISE COUNTY.

Work on the Confederate at Quartzburg is resumed. The shaft is down 250 feet.——H. L. Woodburn, assistant manager War Eagle, has bonded the property.——C. L. Clarke has leased placer ground on Clear creek.——Work on the Hidden Treasure, in Willow Creek district, 4 miles from Idaho City, is progressing. The shaft is down 40 feet.

ELMORE COUNTY.

The Idaho G. M. & M. Co. expects to begin operations on its property near Rocky Bar soon.——Operations on the Blackstone, in Volcano district, are closed down for the winter.——The Consolidated M. Co. may buy property near Neal, it is reported.

KOOTENAI COUNTY.

Supt. Heller is pushing work on the Lone Star, near Newport. A new hoist and a 45 H. P. boiler will be put in. A new compressor will be put in soon. The shaft, now down 138 feet, will be sunk an additional 200 feet. The tunnel is in 400 feet.

LATAH COUNTY.

The Elk Creek M. Co. of Moscow, capital $700, is incorporated to work placer property in Burnt Creek district.

OWYHEE COUNTY.

J. A. Purtill of Mountainhome, who is interested in placers on the Snake river, near Grand View, says that active operations will begin in February.

SHOSHONE COUNTY.

The Fannie Gremm M. Co., Ltd., of Mullan, capital $100,000, is incorporated to work the Fannie Gremm, near there.

The Cœur d'Alene M. Co. is operating a hydraulic elevator on Prichard creek placers, near Murray.

Work on the Lucky Friday, at Mullan, is resumed: a 400-foot tunnel is already run on the property.

MICHIGAN.

HOUGHTON COUNTY.

At Houghton the Trimountain M. Co. will put in a 40,000,000-gallon pump and other machinery necessary for the complete equipment of its stamp mill.

On the 25th ult. the last vessel to leave Houghton for the season took every bar of copper on hand at the Dollar Bay and Hancock smelters.

MONTANA.

CASCADE COUNTY.

Work on the A. M. Esler group, in Swift Current district, is progressing; the tunnel is in 400 feet and will be run 200 feet farther.

DEER LODGE COUNTY.

Cooney & Spriggs will put in a 10-stamp mill on a copper property 7 miles from Helmville.——Russell & Ogden have run a 250-foot tunnel on their property.

FLATHEAD COUNTY.

A tunnel is being driven on the Katie Fry (copper), near Leonia; it is expected to cut the vein at the 350-foot mark, which will give a depth of 450 feet from surface.

JEFFERSON COUNTY.

Ore shipments from the mines near Winston average 100 tons per week, returning about $50 to the ton; most of the ore goes to the East Helena smelter, 20 miles distant.——In the East Pacific stoping is in progress in No. 3 tunnel; No. 4 tunnel is in 3000 feet. New ore cars have been put in; F. Link Supt.——Smith & Jackson are shipping ore from the Stray Horse.——Kallock & Co. have bought the X Rays and will push work.——The Iron Age and the Stolen Sweets, in Iron Age gulch, are making regular shipments of ore.——Esler & Co. have their mine and mill in Granite belt, west of Beaver creek, running steadily; concentrates are shipped to East Helena.

LEWIS AND CLARKE COUNTY.

The Justice and Clementh mines, at Rimini, are shipping ore to the Peck concentrator at East Helena.——The shaft on the Belmont is completed; operations on mine and mill are being pushed.

MADISON COUNTY.

The Royal Potosi M. Co. of Butte, capital $300,000, is incorporated.

A twelve-day run of the 10-stamp mill on the Bowery, near Silver Star, Glass Bros. owners, returned $4100. Ten more stamps will be added; ten men are employed at present and more will be put on soon. Twenty tons ore are taken out daily; output will be increased after pumps are put in.——W. J. Miller will push work on the Uncle Sam, on upper Mill creek, near Sheridan, next year ——At Pony the Garnet mill is closed down, owing to lack of water; men are laid off and sinking is suspended; shaft is down 97 feet.——The Clipper-Boss Tweed is closed down for the present.——At Washington Bar, the Mohawk M. Co. of Tacoma, Wash., will drive its tunnel on the Bimetallic, now in 700 feet, to the 1000-foot mark, and then begin crosscutting.——It is stated that W. B. Holmes may suspend operations on the B. & L.——Work at the Madisonian is progressing.——A new boiler is going in on the Red Bluff.

W. Dickerson, manager of the dredger above Laurin, says that another large boat will be built this winter.——A strike is reported on the Sunbeam, on Indian creek.

SILVER BOW COUNTY.

The Boston & Montana, operating a diamond drill on the Leonard, Butte, recently developed ore running 30% copper on 300-foot level.

A. Livingstone has leased the Revenue mill at Jardine for three months; he also has an option on the plant, price being $50,000. He will put on twenty-five men and push work. Ore from the Robinson will supply the mill.

Work on the new ore tramway on Alaska street, Butte, is under way by Manager Wharton.

The Montana Ore Purchasing Co. will increase capacity of its reduction plant at Butte to 3,000,000 pounds of copper per month. Two new blast furnaces and four converters will go in. Most of the ore now treated comes from the Rarus, Nippur, Minnie Healey, Clinton and Homestake mines, and considerable from the Glengarry. The company is sinking a shaft on the Balm and one on the Cora.

The Polaris deal is off; the mine was recently reported sold to Donahue & Snyder of Salt Lake for $200,000.

NEVADA.

ELKO COUNTY.

The Dexter-Tuscarora mill at Tuscarora is treating 100 tons of ore daily.

HUMBOLDT COUNTY.

A 20-foot ledge of ore, running 12% copper, is reported on the Black Maria, near Steen's mountain.——Ore from this district is shipped by wagon to Winnemucca, and from there by rail to Salt Lake, Utah. Wagon freight to Winnemucca is $20 per ton.

LINCOLN COUNTY.

Bowen & Green closed their option on the Azurite mine, gold and copper, paying $5000 cash.

Hamilton & Wilkinson sold a prospect for $1000; Cook disposed of the Copperfiend, a Los Angeles man buying them for Eastern investors.

The Quartette Mining Co. of Searchlight will start their stamp mill this week.

Mining affairs are in prosperous condition at present, especially since prospect of the Salt Lake & Los Angeles R. R.

Campbell & Thomas' copper claim, Copper Chief, is at present under consideration on bond by Los Angeles people.

Goodsprings, Dec. 8.

A strike is reported made at north end of fourth level of the De Lamar mines at De Lamar.

NYE COUNTY.

It is said that ore from the Tonapah district, about 35 miles southwest of Belmont, runs $267.66 silver and $187.23 gold to the ton.

ORMSBY COUNTY.

It is reported that the Ophir Co. has bought the Bowie, on Cedar hill, near Carson, for $8000, and that a mill will be put in.

STOREY COUNTY.

On the 1800-foot level of the Con. California & Virginia, Virginia, the northeasterly drift from east crosscut No. 1 is in 370 feet. The main shaft is repaired. ——The tunnel in the Burning Moscow is in 162 feet. Forty-one tons of ore were shipped to the Selby Smelting & Lead Works, San Francisco, on the 8th inst. ——On the Mexican the west crosscut from a point 90 feet in from the mouth of north drift No. 2 is in 218 feet ——The Hale & Norcross tunnel is in 1902 feet.—— On the 220-foot level of the Sierra Nevada the northwest drift is cleaned out and timbered for 457 feet from the shaft.—— In the Chollar the upraise from the main north drift on the surface tunnel level is completed to the surface.——On the 80-foot level of the Greek shaft of the Potosi the south drift is out 102 feet.——The raise in the Holman tunnel of the Silver Hill is in 16 feet.——From stopes on the 325-foot level of the Gould & Curry 288 cars of ore, assaying $6.29 per ton, were extracted during the week ending Dec. 8. No. 6 crosscut on the 425-foot level of the Best & Belcher is stripped of rails, planks, timbers, etc.——Surface tunnel No. 2 of the Utah is in 770 feet.

WHITE PINE COUNTY.

Verzan & Garaghan are shipping ore from the Copper Queen to Salt Lake.

NEW MEXICO.

GRANT COUNTY.

The Santa Rita M. Co. is pushing work on its new three-compartment shaft on the Santa Rita at Santa Rita. A station is cut on the 300-foot level, and a drift to connect with 300-foot level of the Hearst and with the 250-foot level of the Aztec is being run.

JOSEPHINE COUNTY.

Supt. A. Howland is getting the C. & C., on Jump-off-Joe, near Grant's Pass, in shape to run.——The Sugar Pine, at Galice, is bonded to J. Harrington, representing Eastern men; a force will be put on and work pushed.——Kubli Bros., operating on Gall's creek, will push work during the winter.——Wright's new stamp mill is running steadily.

The Champion M. Co. will put in a gravity tramway on its property on Williams creek, near Williams.

OTERO COUNTY.

The Caballero Onyx M. Co. will push work on its onyx properties near Alamagordo.

SANTA FE COUNTY.

The mica properties of the Santa Fe Mica Co., at Nambe, are reported leased to O. H. Howarth of London, England, for seven months; he will spend $10,000 in development.

SOCORRO COUNTY.

Active operations are carried on in mines near Cooney. The Helen M. Co. is pushing work.

OREGON.

BAKER COUNTY.

The Gold Coin is reported sold to Milwaukee men for $10,000.——The shaft on the Simmons, in Cornucopia district, is down 300 feet; ore is hoisted by a whim. ——Supt. J. K. Romig, of the Sanger, near Baker City, has eleven men retimbering the old workings; a new pump will be put in.——Work will be pushed on the Black Bell, in Cracker Creek district. Forty-dollar ore was recently opened up on 300-foot level of the Bonanza, 20 miles from Sumpter; a 40-stamp mill is on the property.——The Blue Jacket, in the Seven Devils, has resumed; Supt., S. French.——It is reported that twenty stamps will be added to the mill at the Cornucopia mines, at Cornucopia, manager, A. Case; a cyanide plant is also to be put in. —— The 10-stamp mill on the Brazos, in Burnt River district, is running steadily; manager, R. Blewett.

GRANT COUNTY.

The machinery for the Badger, near Whitney, will soon be in. —The Liberty Bell Con. M. Co., capital $1,000,000, is incorporated to work the Hardware group, comprising the Hardware P. & B., Leviathan and Little Gertrude claims, in Alamo district. Work will be pushed during the winter.——On the Little Giant, the lower tunnel, now in 900 feet, is expected to tap the main ledge within the next 150 feet. The upper tunnel, now in 300 feet, has opened up a 12-foot body of ore. A new mill and electric light plant will be put in. A. G. Williams, manager, has twenty men working.——The Granite Creek G. Con. M. Co., capital $250,000, is incorporated.

SOUTH DAKOTA.

CUSTER COUNTY.

The Saginaw M. Co., owning property 8 miles from Custer, has begun operations on same; L. Hoyt, Supt.

LAWRENCE COUNTY.

Plans are on foot to make the Homestake, Lead, the largest gold producer in the country; a 200-stamp mill is projected, which will make a total of 1000 stamps at the mine, with crushing capacity of 4500 tons ore per day. The new pumping plant on the headwaters of Spearfish river is working successfully.

The Hidden Fortune, 1 mile north of Lead, is reported bonded to Chicago men. ——The Belt Extension Co., of Colorado Springs, is sinking a shaft in the Homestake lode, south of Lead.

J. D. Hardin will resume operations on property in Two Bit basin.

UTAH.

BEAVER COUNTY.

Work on the Adelia, in Star district, is progressing.

IRON COUNTY.

A strike of good ore is reported made on the Willowvale, in Stateline district; W. J. Dooley, Supt., has run a tunnel on the property.

A good body of ore is reported opened up on 50-foot level of the Sulphide, at Stateline.

JUAB COUNTY.

The new concentrator at the May Day, Tintic, will soon treat ores from the mine. ——The Clarissa is shipping ore.

MILLARD COUNTY.

Ore from the 135-foot level of the Copper Head runs about $60 to the ton.

SALT LAKE COUNTY.

A new dry process mill will be put in on the May Day, Salt Lake, by the Crown Gold Milling Co.——The Yampa, at Bingham, is reported sold to E. A. Wall, for $3000. —— Manager Channing reported good progress made on the new Highland Boy smelter, at Murray.

The Shawmut M. Co., in Bingham, will mortgage its property and offer to stockholders $50,000 5-year 7% bonds at 95; the proceeds to be used in payment of the company's floating debt and provide working capital.

TOOELE COUNTY.

Sinking is resumed on the Honerine at Stockton, Manager Scheu; a 160-foot tunnel will be run, and shipments of ore are expected to begin in Feb., 1901.

The Sharp M. Co. will push work on the Sharp, near the Honerine.

WASHINGTON.

FERRY COUNTY.

The Wanconda tunnel, Republic, now in 220 feet, is progressing at the rate of 3 feet per day; three shifts are working; timbers for 400 feet of the tunnel are ready to go in. Supt. G. L. Hedges thinks tunnel will strike the ledge within three months. The mill will not be erected until ledge is cut; it will be of 100 tons daily crushing capacity. The tunnel on the Unga, now in 350 feet, is expected to cut the ledge 540 feet from the portal at a depth of 250 feet from the surface; it is expected that tunnel will be completed by March 1. The Bodie M. Co., operating the Bodie, on Toroda creek, has day and night shifts working; shaft is down over 30 feet and work in tunnel is progressing. ——A tunnel is being driven on the Elk, near the Bodie.

The shaft on the California, Republic, now down 110 feet, will be sunk an additional 100 feet. A steam hoist will be put in soon, as horse whim is unable to take care of ore mined. Ore is shipped to the Granby, B. C., smelter.

The Clackamas G. M. Co. will push work on the Clackamas, Republic, under General Manager J. C. Kerley. Republic ores carrying silver can be treated as successfully at the Republic mill as those carrying gold.

The shaft on the Merrimac, Republic, is down 185 feet.——Drifting north and south on 90-foot level of the Hercules is in progress.——The winze of the Princess Maud is down nearly 300 feet below tunnel level.——Ore running $109 to the ton is reported opened up on the Chico.——The ledge on the Knob Hill is developed to a depth of 269 feet.——After a year's shutdown, the Madonna has resumed; S. Severson, Supt.

KITTITAS COUNTY.

At the Mammoth, in Slate Creek district, near Wenatchee, a new compressor, drills, 72 H. P. boiler and tracks are going in; the 5-stamp mill is closed down while improvements are being made.

OKANOGAN COUNTY.

The Wehe Con. M. & M. Co. will sink a 500-foot double-compartment shaft on its property near Weheville. Crosscuts will be run on the hundred-foot levels to cut the Buck Eye vein. Machinery will be put in and work pushed; E. C. Brown manager. —— The Milwaukee-Palmer Mountain G. & C. M. Co., J. Brechlin foreman, has four men working on its property on the Similkameen river. A 200-foot shaft will be sunk and crosscuts made at the hundred-foot levels.——The Milwaukee-Palmer Mountain G. & C. M. Co. will soon begin operations near Weheville.——Supt. Hammer is pushing work on the Milwaukee-Palmer Mountain M. Co.'s property.

The Palmer Mountain G. M. & Tunnel Co., Loomis, will put in a 55-drill compressor, a 3000 H. P. electric plant, and a 100-stamp mill.——Capacity of mill at the Golden Zone will be increased to seventy tons ore per day; new machinery is going in.——A 5-drill compressor is going in at the Puritan mines, on Gold hill; tunnel is in 1000 feet; a new 5000-foot tunnel will be started soon; a 100-stamp mill will be put in next year.——A new compressor will go in on the Six Eagles next spring; work is being pushed at the mine.——A large body of silver-lead ore is reported opened up on the King Solomon group.——The Bright Spot M. Co. will sink a 200-foot shaft.——A new 500-foot shaft will be sunk on the Wehe, Manager Brown.

In the Palmer Mountain tunnel, near Loomis, crosscutting is in progress at the 4000-foot mark. Ore is opened up that will net from $1 to $2.50 per ton.——The 500-foot tunnel on the Utica-Oro Fino is completed and crosscutting is being done. ——At the Puritan mines, work of putting in new compressor is under way; a tunnel is being run; fifty men are employed.——Good ore is reported opened up on the Bull Frog.——The new extra machinery and Huntington mills are going in on the Golden Zone, and it is thought that by Jan. 1st the 75-ton mill will be in operation. Work is progressing in No. 4 tunnel.——A plant will go in on the Six Eagles, on Little Mount Chapacca.——It is said that the Bridgeport M. & M. Co. will soon begin work on the Conconully.

A new $150,000 smelter, of 250 tons daily capacity, will be built in Methow district next spring by Eastern men.

SNOHOMISH COUNTY.

Work on the Blue Bird, at Darrington, is being pushed.——A strike is reported made on the Burns.——Operations on the Forest will resume.——On the Kickapoo, of the Elwell-Darrington Co., sixteen men are working; twenty-four more men will be put on soon.

SPOKANE COUNTY.

The Buffalo Star G. M. Co., capital $100,000, is incorporated at Spokane.

STEVENS COUNTY.

A new hoist is in on the Eagle, near Chewelah, and sinking operations will be pushed. Silver-lead ore was recently opened up on 200-foot level.——On the Nevada the shaft is down 80 feet; sinking is progressing. A concentrator will be put in in the spring, it is said.——The Juno M. Co. has two shifts sinking a winze from the Juno tunnel.

The United States Marble Co. has forty-four men working in the quarry at Valley. A new plant will go in.

WHITMAN COUNTY.

Supt. J. L. Harper has sunk shaft on the Hawkeye, near Rosalia, to 150-foot level, and is now crosscutting at that depth. Average assay of ore is $35.

WYOMING.

Last week G. Dane of Battle Lake denied the reported sale of his mine to U. P. officials for $250,000. This week he acknowledges that the sale has been made. He says it is worth more, but he has enough.

CARBON COUNTY.

The Kurtz-Chatterlin Co., operating copper mines near Grand Encampment, will increase capacity of its concentrating mill to 100 tons per day.——The Little Robert C. M. Co. will push work on the Little Robert. Ore carries copper glance assaying from 19% to 22% copper.

FOREIGN.

AUSTRALIA.

At the Gladstone, at Wandiligong, Victoria, 428 tons ore returned 523 ounces gold.——A 4-foot vein of good ore is reported opened up on 100-foot level of the Luck, Wood's point.

The annual report of the Department of Mines, New South Wales, for 1899 shows that the aggregate value of the mineral products of the colony to the end of 1899 was £134,064,712 4s 9d. The value of the mineral product for 1899 was £6,157,557 7s 6d, an excess of £1,290,559 10s 11d over the preceding year.

BRITISH COLUMBIA.

The Lorne, Woodchuck and Alhambra groups, Lillooet, were recently sold, the Alhambra bringing $150,000, the Woodchuck $75,000, and the Alhambra $30,000. ——The Bend Or, with 10-stamp mill, has a monthly output of from $4000 to $8000. ——The Con. Cariboo Hydraulic M. Co., Ltd., of Bullion, has closed down for the season. The third and last cleanup, after a run of twenty-eight days, returned $63,087. The first cleanup, made in August after a run of sixty-two days, amounted to $135,275; the second, after a sixty-eight days' run, produced $154,765, making a total of $353,127 for a run of 158 days.—— Ore is opened up on 130-foot level of the Tenderfoot, at Copper Creek, near Savona.

Work on the True Blue, Whitewater, is resumed; a station 30x30 feet will be cut in No. 2 tunnel, and winze, now down 40 feet, will be sunk to 190-foot level.

C. Parker, representing Montreal men, has bonded the Republic, near Nelson, for $30,000. Water power and timber are on the property.——The Le Roi Co., Rossland, will probably put in a 600 or 750 H. P. hoist, with speed of from 1500 to 2000 feet per minute, near the 1000 H. P. engine now going in.——The Velvet Co. may put up a smelter for the treatment of ores from that mine. Shipments of twenty-five tons ore daily are expected to begin Dec. 1st.——It is estimated that the season's output of the Cariboo, Cariboo, will be $350,000. J. B. Hobson, Supt.——Repairs to compressor plant at the Kootenay mines are completed, and work is resumed on 1000-foot level.——The Homestake tunnel is in 850 feet; driving is at rate of 5 or 6 feet per day.——Crosscut tunnel on 350-foot level of the Green Mountain is in 200 feet.——Work in the tunnel on the Wallingford, Rossland, is progressing, and vein is widening with development. —— On seventh and eighth levels at the War Eagle development is being pushed.——The shaft on the Spitzee is down 34 feet.——Timber framing and machine shops are nearing completion on the Center Star. —— On the Northern Belle, the crosscut tunnel is in 265 feet. ——During the month of October the Can. Pac. Ry. handled 34,000 tons ore from the mines of Kootenay and Boundary camps. ——A. Banks has men sinking a 20-foot shaft on his Perry creek placer ground, near Fort Steele.——The Kootenay Perry Creek Co. have sixteen men working.—— Work on the Golden Fleece, on Tracy creek, near Fort Steele, is resumed. W. Forsyth, Supt.——Five men are steadily employed on the Silver Belt group, Windermere. Shaft is down 30 feet.——The Paradise has twenty-five men working. ——The diamond drill boring on the White Bear, Rossland, is in 200 feet from north drift on 350-foot level. It is thought that another 150 feet will have to be driven before north end of the White Bear is reached.——The Lavina-Butte Co., operating on Hammel creek, near Kootenay, will ship silver-lead ore during the winter. —— The American Corporation, owning the Leiter, Wonder, and other properties on Sophie mountain, Rossland, will resume operations in the spring.——A meeting of the Rossland-Bonanza M. Co. was held in Rossland on the 1st inst.

After a shut-down of eight months, the Brooklyn, at Phœnix, has resumed; manager, J. Breen; Supt., J. L. Parker. A new smelter is projected.——Night and day shifts are driving tunnel on the Shiloh, at Ymir; another shift will be put on.—— The Granby smelter, blown in on Aug. 21st last, has treated 45,000 tons of ore in 108 working days, yielding 1650 tons of 50% matte; it is estimated that the yearly output of the smelter, at its daily capacity of 600 tons, will exceed $1,000,000.

MEXICO.

S. Merriman has bought a gold and copper property in Guaymas district, Sonora, for $6000; he is interested with Minneapolis men, and it is reported that they will push work on a large scale.——The Melczer M. Co., at Carbo, has 300 men working; the new smelter is going up; C. Spraker of Nogales, Ariz., Supt.—— The West Virginia Chemical Co. will open a sulphur mine 40 miles from San Luis Potosi. —— The Hidalgo M. & Exploration Co. is organized at Parral, with D. R. Hernandez as general manager.—— G. F. Peasley of El Paso will organize a company to work two copper claims near Oaxaca, Sonora.

Personal.

C. H. McIntosh of Rossland, B. C., is in Butte, Mont.

F. M. Taylor of Denver, Colo., is in Salt Lake, Utah.

N. J. Corbel Jr. of San Francisco is in Columbia, Cal.

F. Rainville is now foreman Draper mine, Jamestown, Cal.

D. M. Reardon of the General Electric Co. is in Clifton, Ariz.

F. L. Sizer of Butte, Mont., goes East, and from there to Mexico.

J. Gluyas is appointed foreman of the Erie, at Graniteville, Cal.

J. Dern has returned to Salt Lake, Utah, from San Francisco.

B. MacDonald, manager Le Roi, has returned to Rossland, B. C.

Ross E. Browne has returned to San Francisco from Nephi, Utah.

Supt. Chesnut, Hite's Cove, Mariposa Co., Cal., is in San Francisco.

N. S. Berry is examining property near Clifton, Ariz., for Eastern men.

Manager R. H. Britt of the Cumberland, Silver City, Idaho, has resigned.

W. Campbell is elected recorder Tintic mining district, Silver City, Utah.

Tingley S. Wood, of Leadville, Colo., lately returned from San Francisco, Cal.

F. M. Woods of the Woods Investment Co., Cripple Creek, Colo., is in Chicago, Ill.

G. S. Peyton of Stateline, Nev., will return there soon from Chicago and Denver.

D. E. Bigelow of the Union Iron Works, San Francisco, has gone to Cedros island.

R. A. Parker of the Centennial Eureka, Salt Lake, Utah, has returned to Boston.

Otto H. Tittman, of Missouri, is the new Supt. of the Coast and Geodetic Survey.

S. M. Irwin, traffic manager White Pass & Yukon route, has resigned his position.

C. G. Grim is appointed Supt. the Riverside, Columbia, Cal., vice G. W. Knox, resigned.

P. A. Wagner has returned to Coffee Creek, near Redding, Cal., from San Francisco.

Geo. H. Strong has returned to San Francisco from a trip extending as far east as Boston.

Supt. Stevenson of the Belmont, at Pine Grove, Cal., now closed down, has removed to San Francisco.

J. Boyd, Supt. and Gen. Mgr. Palmer Mountain G. M. & T. Co. of Loomis, Wash., is in Spokane, Wash.

H. Edlin, formerly Supt. War Eagle, Quartzburg, Idaho, goes to Sonora, Cal., as Supt. of the Virtue, near there.

Mr. Davey of London, England, who has been examining the Lezinsky group, near Clifton, Ariz., has gone East.

C. C. Bunker and D. F. Meiklejohn of Amador City, Cal., have returned there from San Francisco.

A. Buckbee of Salt Lake, Utah, is appointed manager of the Cumberland, Silver City, Idaho, vice H. R. Britt, resigned.

F. C. Anderson, representing Fraser & Chalmers of Chicago, Ill., is superintending construction of the new Medler smelter, 3 miles below Clifton, Ariz.

Geo. E. Price, who has been managing mining concessions in the Dutch Guianas for some time past, is on his road home, returning by way of London. Mr. Price writes that is no country for American miners to go to.

Thomas Couch of Montana and California fame has returned to San Francisco from examining mining property in Trinity and Humboldt counties, Cal. He says the properties themselves are all right, but they are almost inaccessible, and that while he is tolerably familiar with bad roads he never saw such poor apologies for roads anywhere as on his recent trip, and that while the lower Trinity region is rich in mineral wealth its inaccessibility is a serious drawback to its development.

H. C. Hoover left San Francisco this week on his return to China, where he has charge of some mining operations. He says that it is not because of any superstition that Chinese are averse to English or American or German mine operators; he says they fully understand and appreciate the value of their mines, but want to keep the product for themselves; and that, as a matter of fact, the Chinese were mining in King Solomon's time and before that as far back as in the reign of Emperor Yu, about 2500 B. C., when commissioners were appointed to examine the mining resources of the country in gold, silver and cinnabar. Doubtless in those days, 4400 years ago, those mining commissioners were classed as mining experts, and probably gave testimony as to extralateral rights, side lines, end lines, etc. Mr. Hoover says throughout the northern Chinese provinces are found everywhere little mounds which when being uncovered are found to be debris of ancient mines, which went down on the oxidized ore till sulphurets or water were encountered, when the operations stopped. He thinks the Chinese a probable field for the American mining engineer, but not an immediately available proposition.

N. W. Beecher of Sydney, Australia, wholesale hardware merchant and importer of iron and steel supplies and tools, says that since the establishment of the steamship line direct from San Francisco to Sydney American products are fast finding a market in Australia, and in some instances they have crowded out English-made goods entirely. "We have begun to irrigate arid land by means of artesian wells, the casing for which is nearly all being purchased in the United States. We are also buying gold mining machinery and general hardware here."

Commercial Paragraphs.

Stephen Rickard is now located at 1727 Stout St., Denver, Colo., in his new assay office.

The Denver branch of the Sullivan Machinery Co. has been moved into more commodious quarters at 431 Seventeenth St.

Tatum & Bowen of Portland, Or., recently furnished the Gold Ridge at Baker City with a 620-gallon, double-acting, duplex, compound sinking pump and an 80 H. P. boiler.

The Canton Steel Co., of Canton, Ohio, have issued a neat little book giving points on mine steel, tempering, etc., and testimonials from pleased customers. It will be sent free upon application to P. P. Bush, 1601 Seventeenth St., Denver, Colo.

M. R. Muckle Jr. & Co., the Philadelphia representatives of Messrs. Westinghouse, Church, Kerr & Co., have removed to their new office, No. 512 Stephen Girard building, No. 21 South Twelfth street, Philadelphia, Pa.

The Crown Gold Milling Co. of San Francisco, Cal., through its president, A. J. Harrell, signed a contract Dec. 7th with F. A. Flindt and S. W. Mosby, lessees of the May Day mine, Tintic, Utah, by which it agrees to install a Crown gold dry concentrating plant, of eighty tons per day capacity, within ninety days from date.

The Paris agent of the Rand Drill Co. reports that all the compressors and drills which were on exhibition at the Exposition have been sold. The large Corliss compound compressor at Vincennes was purchased by the firm of Messrs. J. & A. Niclausse, manufacturers of Niclausse water tube boilers, by whom it is to be used for the operation of pneumatic tools. This is the compressor which supplied the compressed air to all the American exhibits at Vincennes.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s Scientific Press U. S. and Foreign Patent Agency, the following are worthy of special mention:

Separators and Amalgamators.—No. 662,685. Nov. 27, 1900. Ira P. Clarke, Alameda, Cal. This invention relates to an apparatus for separating coarse and fine pulverized material containing valuable metals, with the object of reducing the bulk of the ore-carrying sand to the smallest degree, and to then deliver the graded materials upon separate amalgamating tables or surfaces. It consists of superposed tables, means including convergent shafts and crank pins carried thereby and connected with the tables, whereby the latter are given an oscillatory and gyratory movement. There are chutes through which material is delivered upon both tables, and shaking screens located above the chutes are adapted to separate and grade the material and deliver it independently into the chutes.

Floors, Sidewalks or the Like.—No. 662,597. Nov. 27, 1900. P. H. Jackson, San Francisco, Cal. This invention relates to improvements in fire-proof floors, roofs, sidewalks forming roofs to vaults or rooms beneath, also walls and the like. Its object is to provide an inexpensive fire-proof roof, floor, wall or like construction to resist tensile or lateral pressure. It consists in the combination in a floor, roof, wall or like structure which is subjected to weight or pressure from one side, of cement or concrete forming a body. Plates of sheet metal are embedded in this body, said plates having rectangular openings with the sides parallel with the edges of the sheets and upturned walls surround the openings. The edges of contiguous sheets are overlapped, and the projecting walls of a line of openings of one sheet enter the openings of the other, said walls being afterward folded or interlocked.

Steam Boiler Crown Bar.—No. 663,064. Dec. 4, 1900. Edwin Clay, Wadsworth, Nev. This invention relates to devices for bracing and supporting the crown sheet of steam boiler furnaces. It consists of parallel vertically disposed plates with integral transverse connecting ribs and end plates fitting and adapted to be secured to the exterior shell of the boiler above the crown sheet. Stay rods are pivotally secured at both ends and connect the arch of the boiler with the crown bars intermediate of their length, and bolts pass through the crown sheet and into the transverse ribs of the crown bars.

Bicycle Brake.—No. 663,297. Dec. 4, 1900. A. H. Nield, Coutolenc, Cal., one-half assigned to P. M. Ream of Lovelock, Cal. This invention relates to a brake for bicycles, automobiles, or other vehicles to which such a structure may be applied. It consists of a two part bushing and a corresponding inclosing sleeve with means for clamping them upon the hub interior to the wheel spokes. An annular rim is located exterior to said wheel spokes, with arms extending from the sleeve outwardly, and to this arm the rim is fixed. A pair of fulcrumed levers closable toward each other has shoes adapted to clamp the rim between them, and there is mechanism for actuating said levers.

List of U. S. Patents for Pacific Coast Inventors.

REPORTED BY DEWEY, STRONG & CO.,
PIONEER PATENT SOLICITORS
FOR PACIFIC COAST.

FOR THE WEEK ENDING DEC. 4, 1900.

663,322.—Saw Jointer—G. Y. Anderson, Dyea, Alaska.
663,212.—Gravel Separator—A. Beargeon, Compton, Cal.
663,007.—Gas Generator—C. M. Bridges, S. F.
663,064.—Boiler Crown Bar—E. Clay, Wadsworth, Nev.
663,014.—Corset Cover—Kate A. Deering, Fernando, Cal.
663,068.—Dental Elevator—X. Dodel, S. F.
663,069.—Bleaching Nuts—D. Farrell, San Jose, Cal.
663,074.—Cupsidor—C. C. Finlayson, Bisbee, Ariz.
663,335.—Bottle—J. A. Foster, Tacoma, Wash.
662,926.—Furnace—F. J. Foveaux, Alameda, Cal.
633.077.—Railway Vehicle—P. A. Harte, S. F.
663,170.—Bed Bottom—J. Hoey, S. F.
663,171.—Bed Bottom—J. Hoey, S. F.
663,277.—Lawn Sprinkler—L. Horvath, Los Angeles, Cal.
663,172.—Lifeboat—M. P. Hoy, Tacoma, Wash.
663,173.—Ventilating Boats—M. P. Hoy, Tacoma, Wash.
663,174.—Boat Anchor—M. P. Hoy, Tacoma, Wash.
663,177.—Twyer—G. B. Klink, Tacoma, Wash.
663,178.—Dental Dam—N. Kuns, Santa Monica, Cal.
662,948.—Billiard Game—H. H. Lawrence, Oakland, Cal.
663,349.—Bevel—R. Leonhart, Jr., Fresno, Cal.
662,950.—Thresher—C. A. Long, Pomeroy, Wash.
663,087.—Engine—J. D. McFarland, Jr., S. F.
663,297.—Bicycle Brake—A. H. Nield, Lovelock, Cal.
663,301.—Gas Generator—A. F. Shriver, Arbuckle, Cal.
663.318.—Finger Guard Bar—G. T. Willis, Fresno, Cal.

Recently Declared Mining Dividends.

	Payable.
Daly-West M. Co., Park City, Utah, 25 cents per share, $37,500	Dec. 15
Iron Silver M. Co., Utah, 10 cents per share	Dec. 20
Tomboy M. Co., Colo., 24 cents per share, $72,000	Dec. 14

Books Received.

"A Manual of Assaying," octavo, pp. 88, illustrated, by A. S. Miller, a compilation of excerpts from former publications thereon. Published by Jno. Wiley & Sons, New York City; $1.

Latest Market Reports.

San Francisco, Dec. 13, 1900.

SILVER—Per oz., Troy: London, 29⅞d (standard ounce, 925 fine); New York, bar silver, 64½c (1000 fine); San Francisco, 64½c; Mexican dollars, 50¾c.

COPPER.—New York: Lake, 1 to 3 casks, $17.00 cash; carload lots, 16.75; Electrolytic, 1 to 3 casks, 16.75; carload lots, 16.50; Casting, 1 to 3 casks, 16.62½; carload lots, 16.37½. San Francisco: 18. Mill copper plates, 20c; bars, 22@23c.

LEAD.—New York, $4.30; Salt Lake City, $4.00; St. Louis, $4.20; San Francisco $5.00, carload lots; 5½c 1000 to 4000 lbs.; pipe 6¾, sheet 7½, bar 6c; pig, $4.70 @5.10. London, £16 6s 2d per ton.

SPELTER. — New York, $4.27½; St. Louis, $4.10; San Francisco, ton lots, 5¾c; 100-lb lots, 6c.

ANTIMONY.—New York, Cookson's, 10c; Hallett's, 9½c; San Francisco, 1000-lb lots, 12c; 300 to 500 lbs., 13@14c; 100-lb lots, 15@18c.

IRON.—Pittsburg, Bessemer pig, $14.25; gray forge, $13.50; San Francisco, bar, per lb., 2½c in small quantities.

STEEL.—Bessemer billets, Pittsburg, $19.75; open hearth billets, $22.50; San Francisco, bar, 7c to 12c per lb.

TIN.—New York, pig, $26.25; San Francisco, ton lots, 29c; 1000 ℔s., 30c; 500 ℔s., 30½c; less, 31c; bar tin, ℘ ℔, 35c.

QUICKSILVER. — New York, $51.00; large lots: London, £9 2s 6d; San Francisco, local, $48.00 ℘ flask of 76½ ℔s.; Export, $45.

NICKEL.—New York, 50@60c ℘ ℔.

MAGNESIUM.—New York, $3.00 ℘ ℔.; San Francisco, $4.00.

ZINC.—San Francisco, 5½c; slab, 5¾c; bar, 7c.

BABBITT METAL.—San Francisco, No. 1, 10c.

SOLDER. — Half-and-half, 100-℔. lots, 18.70c; San Francisco, Plumbers', 100-℔. lots, 15.85c.

ASSAY LITHARGE.—San Francisco, 10c ℘ ℔, small lots.

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 30c to 35c.

BISMUTH.—New York, ℘ ℔., $1.60 50-℔ lots; San Francisco, $2.50 to $2.75 ℔ lots.

PHOSPHORUS. — F. o. b. New York 50@60c ℘ ℔.

TUNGSTEN.—New York, ℘ ℔., 95c; San Francisco, $1.15.

FERRO-TUNGSTEN. — New York, 37%, 35c; San Francisco, 65c (60%).

FERRO-MANGANESE. — Pittsburg, 80%, domestic, $85, large lots.

PLATINUM.—San Francisco, crude, $17 ℘ oz.; New York, $18.20 per Troy oz

POWDER.—F. o. b. San Francisco: No. 1. 70% nitro-glycerine, per ℔., in carload lots, 15½c; less than one ton, 17½c. No. 1*, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1** 50%, carload lots, 11¾c; less than one ton, 13¾c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9½c; less than one ton, 11½c. No. 2** 30% carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9, in lots not less than 1000.

FUSE.—Triple tape, $3.60 per 1000 feet; double tape, $3.00; single tape, $2.65; Hemp, $2.10; Cement No. 2, $3.00; Cement No. 1, $2.65, in lots of 3000 feet and up.

CANDLES.—Granite 6s, 16 oz., 40s., 11½c ℘ set; 14 oz., 40s., 10c.

CHEMICALS.—Cyanide of potassium, 98%-99%, jobbing, 32½@33½c ℘ ℔.; carloads, 30@31c; in 10-℔. tins, 40c; sulphuric acid, 66% B, 2c ℘ ℔.; soda ash, $1.60 ℘ 100 ℔s. 58%; hyposulphite of soda, 2¾@3c ℘ ℔.; blue vitriol, 5½@6c ℘ ℔.; borax, concentrated, 7@8c ℘ ℔.; chlorate of potash, 12@13c; roll sulphur, 6c; alum, $1.90@2.00; flour sulphur, French, 2¼@ 2½c; California refined, 1¾ @ 2c; nitric acid, in carboys, 8c ℘ ℔.; caustic soda, in drums, 3@4c ℘ ℔.; Cal. s. soda, bbls., $1.00; sks, 95c ℘ 100 ℔s.; chloride of lime, spot, $2.50@2.60; nitrate of potash, in kegs, 8c; caustic potash, 10c in 40-℔. tins.

COAL. — San Francisco, coast, yard prices: Wellington, $9; Seattle, $7.00; Coos Bay, $5.50; Southfield, $9.00. Cargo lots, Eastern and foreign: Wallsend, $8.00; Brymbo, $7.50; Pennsylvania, hd., $14.00; Scotch, $8; Cumberland, $12; Cannel, $9.50; Welsh Anthracite, $12.00; Rock Springs, $8.50; Colorado Anthracite, $14.50. Coke, $16 per ton in bulk; $18 in sacks.

San Francisco Stock Board Sales.

San Francisco, Dec. 13, 1900.

500 Andes	.08c	300 Ophir	.65c
300 B. & B	.26c	200 Overman	.11c
50 Caledonia	.35c	100 Sierra Nev	.27c
200 Mexican	.32c	100 Y. Jacket	.22c

This Paper not
to be taken from
the Library. ++++

CALIFORNIA
STATE

MINING AND SCIENTIFIC PRESS.

AND PACIFIC ELECTRICAL REVIEW.

Whole No. 2109.—VOLUME LXXXI. Number 25. SAN FRANCISCO, SATURDAY, DECEMBER 22, 1900. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

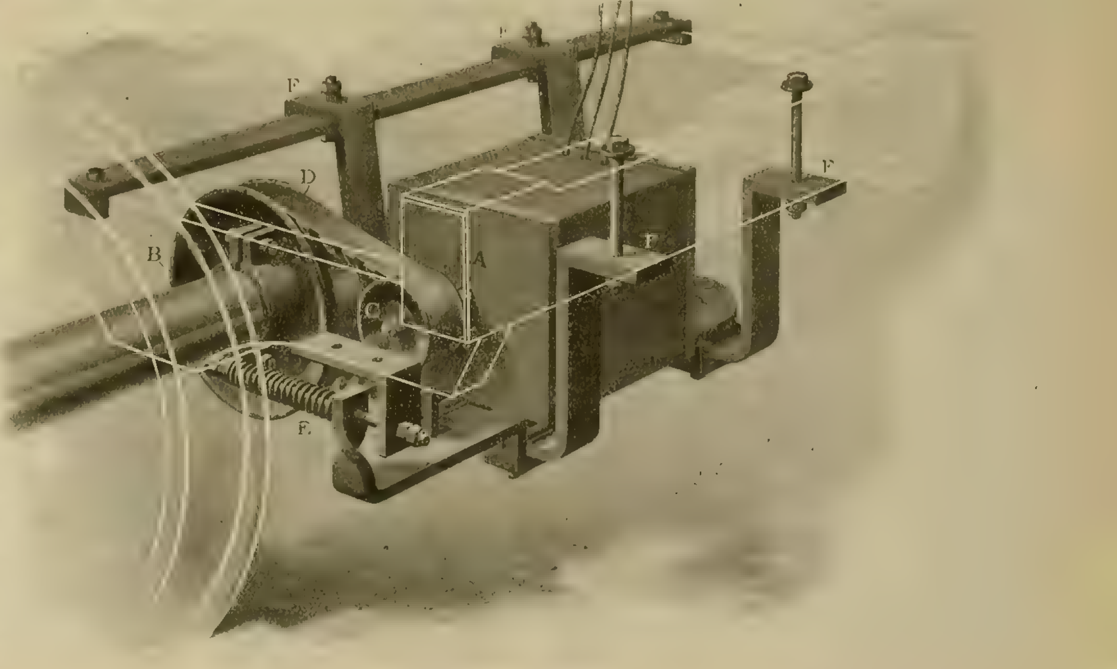
View of Black Hawk, Gilpin County, Colorado, Showing 80-Stamp Mill of Boston & Denver Con. M. & M. Co. (See Page 593)

Train Lighting From Car Axle.

Electricity has added much to the comfort, convenience and safety of modern railway travel. Among such latest contributions is a system of lighting by which each car in a train has its own independent lighting apparatus. A dynamo is placed beneath each car and the rotation of the car axle supplies light. The dynamo is so adjusted that at a speed of fifteen miles an hour it feeds the lamps direct, the superfluous current being stored in a battery for use when the car is stationary. The dynamo maintains a pressure of from thirty-two to forty volts, and is automatically switched into circuit when the speed of the train is fifteen miles an hour, the pressure being so controlled that at all speeds the current supplied to the lamps is uniform. When the car is at rest, and the switch box has switched the dynamo out of circuit, the lights are supplied at thirty volts by the storage batteries. After starting, as the car gains speed the dynamo voltage is built up until it has reached a potential above that of the storage battery and the lamps. The latter are prevented from receiving more than thirty volts by means of resistance in their circuit. The lamps are of sixteen candle power ; the filament is a short, stumpy one, not affected by vibration and consequently long lived.

In transmitting the power from the car axle to the dynamo a flexible frictional gearing is used. In the use of a dynamo in connection with a storage battery the polarity of the dynamo must always correspond with the polarity of the battery. To keep the polarity of the dynamo uniform with the batteries a mechanical device is used, actuated by the armature shaft, which operates to throw a switch when a change in the direction of the movement of the car takes place.

The control of the dynamo at all speeds, so that at a high speed the current will remain normal, is accomplished by the use of a small motor that operates when the dynamo is generating, and, with suitable mechanism, throws resistance in and out of the field coils of the dynamo as the speed increases or diminishes. When the dynamo is charging the storage battery the electromotive force of the battery raises, so that without some method of control the electromotive force would be too high on the lamps. This system maintains a constant electromotive force on the lamps by means of a resistance thrown in the lamp circuit in proportion to the amount of current generated in the machine. The accompanying engraving illustrates and explains the operation. The system is supplied by the Consolidated Lighting & Equipment Co., 120 Liberty St., New York City.



Generator Applied to Car Truck.

A—Dynamo. B—Driving Pulley on Axle. C—Armature Pulley. D—Flexible Gearing. E—Tension Spring. FFFF—Hangers.

MINING AND SCIENTIFIC PRESS.

ESTABLISHED 1860.

Published Every Saturday at 330 Market St., San Francisco, Cal.

ANNUAL SUBSCRIPTION:

United States, Mexico and Canada.......................$3 00
All Other Countries in the Postal Union.......................4 00

Entered at the S. F. Postoffice as second-class mail matter.

J. F. HALLORAN.......................**Publisher.**

Special Representatives:

EASTERN.
E. H. HAVEN.......................150 Nassau St., New York City.
MIDDLE WEST.
CHAS. D. SPALDING.......................153 La Salle St., Chicago, Ill.
INTER-MOUNTAIN.
W. A. SCOTT.......................43 Jacobson Building, Denver, Colo.
SOUTHERN CALIFORNIA.
W. D. CURTIS.......................223 W. Second St., Los Angeles, Cal.

San Francisco, December 22, 1900.

TABLE OF CONTENTS.

ILLUSTRATIONS.—View of Black Hawk, Gilpin County, Colorado, Showing 80-Stamp Mill of Boston & Denver Con. M. & M. Co.; Generator Applied to Car Truck, 590. Gregory Gulch, Gilpin County, Colo., Showing Entrance to Gregory-Bobtail Tunnel, with Jeffrey Electric Locomotive Attached to Ore Train of Boston & Denver Con. M. & M. Co ; Cook Shaft House, Boston & Denver Con. M. & M. Co., Gilpin County, Colo., 593. Mining and Metallurgical Patents, 596. Hull of Dredger in Excavation; Dredger in Correct Position Starting Work; Tailings as They Should be Stacked, 597.

EDITORIAL.—Train Lighting From Car Axle, 590. Condemning Mining Stock Exchanges; Treatment of Silver-Lead Ores; Ore Rates in Colorado; Miscellaneous, 591.

MINING SUMMARY.—598-599-600-601.

LATEST MARKET REPORTS.—602

MISCELLANEOUS.—Concentrates, 592. Consolidations in Gilpin County, Colorado, 593. "Booming" With a "Shooter;" "Orthodox" and "Wild Cat" Oil Propositions; Silvering Copper Plates; The Twentieth Century's Dawn, 594. Important Land Office Decision; Some Questions Answered; Rank in Population and Railway Mileage, 595. Latest Mining and Metallurgical Patents; Science vs. Technology; A Timber Mine, 596. Suggestions on Inland Gold Dredging; A Veteran Prospector's Advice; Very Quick Work; Descent of Man, 597. Personal; Notices of Recent Patents; Catalogues Received; Recently Declared Mining Dividends; Commercial Paragraphs; List of U. S. Patents for Pacific Coast Inventors, 601

CONTEMPORANEOUS comment on the remarkable closeness in the bids on a recent big contract sees in such evidence of collusion and an understanding between the bidders. It does not seem so to us. Knowing that the bids were put in under every condition of genuine competition the incident from our standpoint affords illustration of the exactitude now reached in great manufacturing establishments, and the precise knowledge that enables such concerns to figure so closely on every detail of a large contract, so that when the aggregate of each bid is published the proffers vary very little. In a recent bid for installation of a municipal electric light plant three electrical concerns, each desirous of getting the work, and in genuine competition, bid as follows: $36,031, $35,874.05, $36,865. Under such circumstances the closeness of the bids indicates entire absence of guesswork and exact and detailed knowledge on the part of the bidders of the cost of every item in the proposed work.

IT is not fair, as an Eastern exchange of some standing does this week, to so strongly condemn the mining stock exchanges, or to single out for particular denunciation the bear therein. The effort of the bear to depress prices for the purpose of making money on the decline, is no less reprehensible than the effort of the bull to inflate them that he may make money on the rise. But if the manipulations of both the bulls and the bears were eliminated from any mining stock exchange it would be lifeless. It is within the limits of argument to admit that the death of a mining stock exchange would not wholly discourage legitimate mining, but yet, mining stock investments constitute a certain form of mining, for the buyer of such stocks becomes an owner in the property. It was because of such buying and selling that the biggest and boldest mining development in this country up to that time ever became a possibility. We refer to the Comstock, Nevada, in its bonanza days. Anything that will encourage legitimate mining should be encouraged; anything which tends to discourage it should be discouraged by mining men; but till it is made clear to us that the buying and selling of stock in other business combinations is all right, while such buying and selling of mining stock is all wrong, we fail to find the fine distinction that commends trading in industrials, but condemns trading in stocks of equal value and greater possibilities of profit just because they happen to be mining stocks.

Treatment of Silver-Lead Ores.

In the issue of the 17th ult. was given some discussion of the concentration of silver-lead ores in answer to a question from a Colorado miner, who wrote saying: "The ore is galena, carrying gray copper, which in turn seems to carry the silver. The gangue matter is heavy spar, or barytes. Analysis shows the ore to run: Silver, 19 ounces; lead, 13.7%; silica, 43.9; $BaSO_4$, 23.9. In order to effect separation from the barytes we have found it necessary to grind to 40 mesh. By doing this and concentrating at the rate of 4.25 to 1 we save 99% of the lead, but our tailings assay 17.50 ounces silver. The gray copper and the barytes seem to pass off together. Our neighbors, who have quartz instead of barytes, have the same difficulty in attempting to save the silver."

Like so many other metallurgical matters discussed herein, the problem proffered and the answer thereto have been the subject of several letters, and the way the matter is so discussed is illustrative of how those things appear from different points of view. Three of the letters take the subject up in an off-hand way and airily dispose of it as a small question easily answered. Those letters are apparently from men who believe what they say, but who have not given the subject much consideration.

Noticeably different is the style of comment from men who have made such things the study of their lives. One Colorado miner of prominence, who has grown gray in the practical consideration of such questions, writes from the standpoint of intelligent experience as follows:

"It is very rare indeed that one gets an ore that can be perfectly treated on the ground by one class of treatment. More particularly is this true in concentration. It seems as though the only all around process is that by smelting. No matter how perfect a sulphide an ore may appear to be, I have rarely seen an ore that had not been subject to slight oxidation, and, unfortunately, it seems to be the rule that silver will oxidize a little quicker than any other metal. We know that if zinc and lead are placed together, subject to oxidizing influences, the zinc will oxidize before the galena does. The silver in the ore goes into so many forms that are partially or entirely soluble in water, even in the ores, that seem as though they were ideal for concentration. Of course, we all know that a carbonate and an oxide are very difficult to concentrate and save the values, and, of course, a chloride is practically impossible. I have found some difficulty in making tests on many gold ores. Up to 60% the saving is very close indeed, and beyond that you have to fight it for each per cent. Very often in such cases I have found that the ores carry tellurides of silver and gold, and this undoubtedly accounts for the loss.

"As an instance, I express to you a shovel used in one of the mills here in every day work for shoveling concentrates. You will find, first, that the iron has been replaced by the lead, and then the lead and iron are both being gradually replaced by silver. This is true not alone of this one shovel, but is true of all those that we ever used, and our ore is in many respects a very excellent concentrating ore.

"The general rule when a man makes heavy losses is to explain everything by saying, 'Oh, that goes off in the slimes; can't be saved.' It is a very serious question with me whether that is true or not, and in some instances I absolutely know that it is not true.

"The silver, through this partial oxidation caused by air and water, or by some acid in the ore, absolutely goes into solution in the water.

"The first question, when a double treatment is spoken of, that is usually asked is: 'Well, why not concentrate first and then cyanide or chlorinate the material that carries the values?' I think that in certain instances this might be advisable, but if even part of that stated above is true it is not always advisable. In fact, the more I test ores the more I find that each one must be handled separately. Of course, the ore that your Colorado correspondent describes is theoretically a smelting ore, but I can readily understand that under certain conditions, such as distance from market and other things that might influence one, the ore would be worthless unless it could be treated upon the ground, and I believe that in such cases a double treatment is necessary. Whether it be by cyaniding or any other similar agent, selective in its action upon the precious metals before concentration, or by some other method of chlorination or pan amalgamation after concentration, is a matter that can only be determined by actual experiment with each ore. Almost invariably in concentration the greatest loss occurs not in the coarse tailings, but in the dirty water that is constantly flowing and apparently should have no values in it. This is where the great loss is occasioned. It is to take out this loss that, where possible, I would recommend some treatment before concentration. I have never yet seen the record kept of a concentrator in which the losses of silver or gold were not greater than the loss of the base mineral in which it was supposed to be. But this is arguing in a circle, as we go back to the first proposition.

"When we run across such propositions as this in mining—and they occur very frequently, sometimes in such a degree as to render worthless any particular kind of treatment, and at other times it being only a case of percentages, but not interfering with the commercial application of a process—it is then that we realize how very crude are our efforts and how much the future has in store in the study of this and similar problems.

"In writing you this I am not at all satisfied. I could give instances that have occurred in my experience, and I could prove the problem both ways to any one's satisfaction, both negatively and positively. I think if a man will study long enough on the subject of reduction of ores that in a short time his friends will find him talking to himself on the street. After all, these problems have to be, fortunately, decided commercially, and not scientifically; so, if we make a commercial improvement we can congratulate ourselves, whereas if we are obliged to make a scientific success, in many cases we would have to confess to utter failure."

The last two paragraphs are particularly illustrative of the fact so often noted by the most experienced in this business, that the most one can learn is to find how little, after all, he really knows of a subject to which he may have given years of patient, practical work—work that, too, may have been commercially successful, but from a scientific or even technical standpoint productive of satisfactory results only in a rudimentary way.

Ore Rates in Colorado.

Next month the Transmississippi freight bureau meets at Milwaukee, and, under the head of "unfinished business," takes up a matter of moment to the miners of Colorado. At the Denver meeting of the bureau last September was discussed the question of restoring the standard rate on low-grade ore, which was reduced three years ago. The matter was left for final settlement at the January meeting in Milwaukee. Colorado railroad men have all along rightly ruled in favor of the miner, purely as a business proposition for themselves, for, unlike the California rule of "all the traffic will bear," the Colorado railroads realize that the way to build up profitable and permanent business is to put the ore rate at a point that will give profit with promise of increase in amount, rather than restrict ore shipments by exorbitant rates. Colorado railroads have had much to do with the mineral development of Colorado. In continuance of such fostering policy they should stand as a unit at the Milwaukee meeting next month against the proposed increase. If they do, they will win. The increase would injure Colorado's mining industry by tending to close mines and restricting small mine operators in their shipments. Local business between mining camps and smelters should not be ignored, nor overshadowed by consideration of "through traffic." The Colorado miners are not asking any favors in this thing. They recognize the friendly attitude of the railroads and suggest as a business proposition that the railroads will best serve their own interests by according their local patrons all possible facilities. This is a matter that affects the business of thousands in and out of Colorado who furnish machinery and supplies, and who are thus almost equally interested in seeing that the proposed restoration of the old rates shall not be.

FOR the forty-first time the MINING AND SCIENTIFIC PRESS cordially wishes its readers everywhere "A Merry Christmas."

Concentrates.

A LEAD plummet is recommended for shaft measuring and mine surveying.

THE only known way of hardening aluminum is by alloying it with some other metal.

DYNAMITE is formed by mixing nitroglycerine with some inert substance, which lessens liability of premature explosion.

THE State of Washington is the only American commonwealth having a law making the "salting" of a mine a felony.

GUNPOWDER is prepared by intimately mixing saltpeter; charcoal and sulphur. Upon explosion the reaction is as follows: $2KNO_3 + 3C + S = 3CO_3 + N_2 + K_2S$.

THE product of combustion of nitroglycerine is water, carbon dioxide, oxygen and nitrogen. The reaction is probably as follows: $2C_6H_5N_3O_{18} = 5H_2O + 12CO_2 + O + 6N$.

TO DRILL a hole in glass with an ordinary drill it is only necessary to keep the spot moistened with a mixture composed of twenty-five parts oxalic acid and twelve parts turpentine.

IN a car 10½ feet long, 4½ feet wide and 15 inches high there are 59 cubic feet space. A gangway 8 feet wide at the top, 10 feet at the bottom, and 7 feet high, has an area of 10½ cubic feet.

THE Overland Monthly and the Journal of Electricity, both of San Francisco, in their November issues give excellent illustrated descriptions of the electric installation on the Comstock, Nevada.

BESSEMERIZING copper matte for refining was first used in this country at the smelter of the Parrott Co., Butte, Mont., and now almost entirely supersedes the reverberatory process in large establishments.

THE Guanajuato Con. M. & M. Co.'s properties were described and illustrated in the issue of July 7, 1900. The output is understood to average about $20,000 per month. The office of the company is in New York City.

THE primary function of a lubricant is to reduce friction and wear to a minimum. Friction is expensive, and the cost of a lubricant is of secondary importance to its friction-reducing power. The best is the cheapest.

CONCRETE has been used for lining mine shafts in Belgium and elsewhere in Europe. The cement used was made from blast furnace slag and sandstone. It consisted of 55% sandstone, 12.5% cement and 32.5% broken slag.

THE degree of heat at which scale forms and adheres to steel—that is, does not fall away from the piece when allowed to cool in air—is about 1550° F. It is then a light cherry red; it is yellow at 1825° and at 2200° is white.

ABOUT the best thing to use in tempering drills is a little borax. Wet the tool and sprinkle it on or, if hot, dip the tool into pulverized borax; then heat until the borax flows, and this will be at so low a heat that but a dark red can be seen; then chill.

A SUMP 12 feet in diameter, 25 feet deep, full of water to the top, and water flowing into it at the rate of twenty gallons per minute, would be unwatered in 1½ hours by a pump with a 7-inch end and 14-inch stroke, making seventy-five double strokes per minute, the efficiency of the pump being 72%.

THE only known method of producing auric chloride perfectly free from acid salt is to decompose aurous chloride with water. When gold is heated in chlorine at atmospheric pressure, trichloride of gold is formed and volatilized at all temperatures above 180° C., up to and probably beyond 1110° C.

A BLAST FURNACE which captures and controls the smoke from its charcoal pits, conveying it into stills, would find that an important factor in economy. Each cord of wood contains 28,000 cubic feet of smoke, susceptible of producing 120 pounds acetate of lime, two gallons alcohol and one-quarter pound tar.

LIQUID HYDROGEN is a limpid fluid, clear as water, but of $\frac{1}{14}$ as much specific gravity, so that cork sinks in it as lead in water. It is intensely cold, having four times the frigorific potency of liquid air. Atmospheric air freezes and sinks in it. Liquid hydrogen makes so perfect a vacuum that the electric spark will not pass through.

ALL exhibitors at Paris that have received awards, whether grand prizes, gold, silver or bronze medals, will receive with the diploma a bronze copy of the medal. Exhibitors who obtained an honorable mention will receive the diploma only. Gold or silver medals will be struck for those entitled to them by the Paris mint at cost price.

THE metric system was legalized in the United States in 1866, but its use is not obligatory. A bill is now before Congress prescribing that from January 1, 1902, the metric system of weights and measures shall be the standard in the United States. Public inertia defers the adoption of the system, though its general use is inevitable, it being the most accurate, the simplest and the best.

IT would be a mistake for Colorado or any other State "to use convict labor in developing mineral lands belonging to the State," as it would tend to degrade the miner. For centuries the miner was so degraded, and now that in later years he stands erect and assumes the godlike attitude of freedom and a man, it would ill become an American commonwealth to delegate the work of developing its mining resources to convict labor.

AT the Cariboo mill, Camp McKinney, B. C., the plates are dressed four times every twenty-four hours with a very dilute solution of potassium cyanide and sal ammoniac. The outside plates are scraped every second day, and a full clean-up is made twice a month. Of the total amalgam 68% is saved inside the battery, 13% on the lip plates, and 19% on the apron plates. The amalgam contains 30% bullion, and the bullion has a fineness of .670 gold.

THERE are honest men manufacturing gas engines, just the same as other machinery, and they can be relied upon to tell a prospective buyer whether or not a gas engine is suitable for his particular need. The gas engine manufacturer who understands his business will be able to give some valuable pointers to a possible customer if the latter describes his individual requirements; and if a gas engine is not suitable the gas engine manufacturer would find it better business to tell him so at the start than to make a failure of an installation because of untoward conditions.

ALTHOUGH anhydrous tungstic acid is soluble in water, especially when hot, yet it is scarcely at all soluble in water which contains any portion of acid. It appears to be insoluble in all acids except in hydrochloric and hydrofluoric acids, in which it is very sparingly soluble. Consequently, a dilute solution of hydrofluoric acid will not dissolve tungstic acid readily, if at all. A solution of tungstic acid in hydrofluoric acid would probably be yellow. Tungstic acid is more soluble in a hot solution of any alkali than in a cold one, but heat is not absolutely necessary to cause the solution.

ONE economical method of distributing electricity through a town would be to place dynamos and gas engines at substations and utilize the gas from the street mains for driving purposes. Such a scheme has much to recommend it, but it is doubtful whether any gas company would appreciate it sufficiently to bring down the price of gas to a point at which the experiment could be tried. There was a time when gas companies, by adopting some such policy, could have controlled the future of electricity supply; they missed their opportunity and have had to face a competition, which, with the apparently limitless possibilities before electricity, is bound to become more severe from year to year.

THE Johnson pneumatic cyanide process consists in expressing the water out of the slimes obtained from the mills by means of a filter press, displacing the moisture and soluble cyanocides in the filter cakes formed in the press by cyanide or potassium solution. The press is opened and the cakes of slimes dropped into a vortex mixing vat containing cyanide of potassium solution, which is arranged so that air can be drawn into the vortex, facilitating the working of the cyanide. After the proper amount of cake and cyanide solution have been placed into the mixing vat, the agitator having been previously set in motion, the gold is brought into solution. The slimes are passed through a valve into a second receiver and forced into the leaching press. The gold leaves this press in solution and is run over boxes containing fine zinc, precipitating the gold in a metallic form. The cyanide containing gold that may be left in the filter cakes is displaced by pure water.

A FEW MILES from Pittsburg, Pa., a well has been dug 5532 feet deep. Near Wheeling, W. Va., a well is 4920 feet deep. At Sperenberg, near Berlin, Germany, a hole in gypsum beds is 4559 feet deep. At Schladebach, near Leipsic, salt is taken from a well 6265 feet deep. The Red Jacket shaft of the Calumet & Hecla mine, in the Lake Superior copper district, is a mile deep, and men work in the shaft. Near by, the Tamarack mine has a shaft nearly as deep as the Red Jacket. At Paruschowitz, in Eastern Silesia, there is a well 6700 feet deep. They are still boring; it is the intention to go down 8800 feet. This last is now the deepest artificial hole in the world. At Lieth, near Altona, Germany, there is a hole 4388 feet deep; at Eu, near Strassfurt, is one 4241 feet; at Lubtheen, Mecklenburg, one 3949 feet; at Sennewitz, near Halle, 3644 feet has been reached; at Inowrazlaw, Posen, drills are working at 3624 feet; at Friedrichsane, near Aschersleben, a well is 3543 feet deep. At St. Louis, Mo., is a well 3843 feet deep. Many buildings in several parts of the world are heated with naturally warm well water; the hospital at Grenelle and large factories in Wurtemberg are examples.

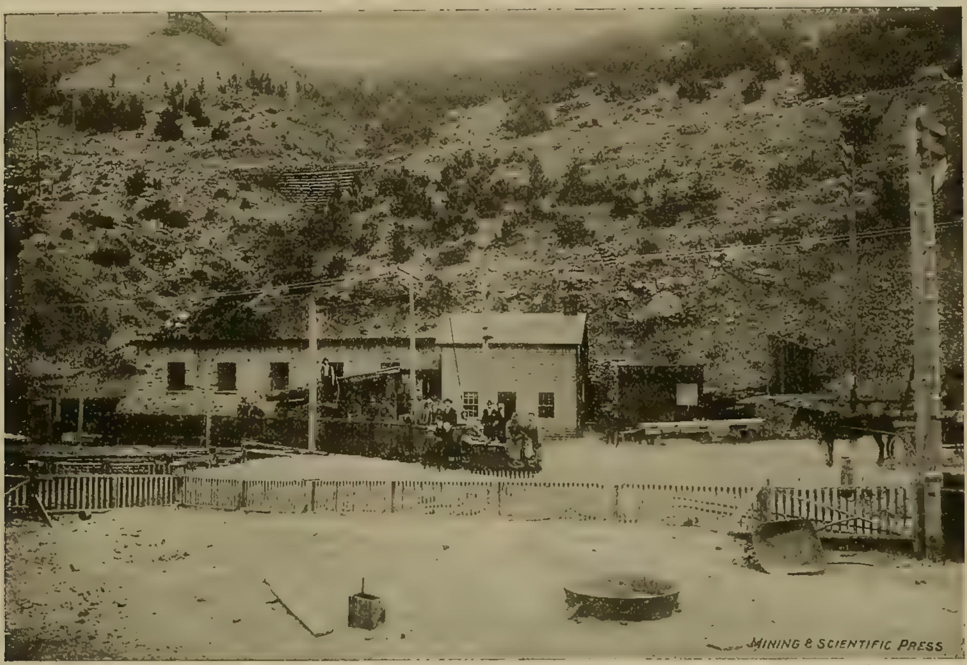
GOLD SCRAP containing platinum is kept apart for separate treatment in minting, as the ordinary methods of refining gold would not be suitable for it. In dealing with a large batch of metal, the sifted filings are digested with nitric acid of specific gravity 1.199 as long as any silver dissolved, a trifling amount of platinum also dissolving as silver platino-nitrite. The metal remaining is weighed and washed with aqua regia, until the silver chloride forming on the surface of the metal prevents further action. The solution of gold is then poured off and the silver chloride removed by treatment with dilute ammonia, when the metal is again in a condition for further treatment with aqua regia. After six alternate treatments with aqua regia and ammonia, the residual metal consists of pure platinum. The acid solution containing the gold is evaporated with excess of hydrochloric acid to drive off nitric acid, until gold chloride crystallizes out. This is then dissolved, and a small amount of platinum removed by adding ammonium chloride, the gold finally precipitated by ferrous sulphate. In one such operation the filings contained 28.05% of gold, 10.56% of silver, 45.46% of platinum and 15.93% of copper. If the metals are really alloyed, it is necessary to fuse with three parts of lead, or, better, of zinc. After granulating the melt, it is easy to remove the zinc by treatment with sulphuric acid, the gold, silver and platinum remaining in a finely divided form suitable for separation by the method already described.

RECORDS of mining locations must contain the name or names of locators, the date of location, and such a description of the claim or claims located, by reference to some natural object or permanent monument, as will identify the claim. No lode claim can be legally located until after the discovery of a vein or lode within the limits of the claim. The object of this provision is to prevent the appropriation of presumed mineral ground for speculative purposes to the exclusion of bona fide prospectors, before sufficient work has been done to determine whether a vein or lode really exists. The claimant should, therefore, prior to locating his claim, unless the vein can be traced upon the surface, sink a shaft, or run a tunnel or drift, to a sufficient depth therein to discover and develop a mineral-bearing vein, lode or crevice; should determine, if possible, the general course of such vein in either direction from the point of discovery, by which direction he will be governed in marking the boundaries of his claim on the surface. His location notice should give the course and distance as nearly as practicable from the discovery shaft on the claim to some permanent, well-known points or objects, such, for instance, as stone monuments, blazed trees, confluence of streams, point of intersection of well-known gulches, ravines, or roads, prominent buttes, hills, etc., which may be in the immediate vicinity, and which will serve to perpetuate and fix the locus of the claim and render it susceptible of identification from the description thereof given in the record of locations in the district, and should be duly recorded. In addition to the foregoing data, the claimant should state the names of adjoining claims, or, if none adjoin, the relative positions of the nearest claims; should drive a post or erect a monument of stones at each corner of his surface ground, and at the point of discovery or discovery shaft should fix a post, stake or board, upon which should be designated the name of the lode, the name or names of the locators, the number of feet claimed, and in which direction from the point of discovery; it being essential that the location notice filed for record, in addition to the foregoing description, should state whether the entire claim of 1500 feet is taken on one side of the point of discovery, or whether it is partly upon one partly upon the other side thereof, and in the latter case, how many feet are claimed upon each side of such discovery point. The location notice must be filed for record in all respects as required by the State or Territorial laws and local rules and regulations, if there be any.

THE substance of the grant made by the Government to the locator of a lode claim is the mineral deposit beneath the surface. Prior to the extraction of the ores, the extent of the deposit to be conveyed can be measured or defined only by surface survey lines, through which imaginary planes are drawn. Such survey lines do not invade the right of exclusive possession and enjoyment of the surface granted by statute to the senior proprietor. Such lines occupy the actual surface space of length or breadth. They are, however, the only practicable means of marking the section of the lode claimed by the junior locator. They mark the exterior boundaries, within which the rights of the junior locator are confined. The extent of his rights within these exterior boundaries is readily ascertained by excluding from the whole that which has already been granted or reserved to others. By this process no right of the senior locator is invaded. By no other process can the junior locator obtain what the law offers him. Therefore, the lines of a junior lode location may be laid upon or across the surface of a valid senior location for the purpose of defining for, or securing to, such junior location underground or extralateral rights not in conflict with any rights of the senior location. The term is not applied to the surface boundaries of portions of a claim which may be patented to different parties. The end lines are voluntary end lines, fixed by the locator of the claim. They are not the lines fixed by an adverse claimant to mark a different and conflicting claim. It will therefore be seen that, while at the surface, one has the right to but a small portion of the vein, as the end lines of the conflicting claims diverge, he upon gaining depth is constantly increasing the length of vein upon which he has the right to work until when the points are reached at which the planes of the conflicting end lines intersect, he gets the full 1500 feet along the course of the vein. In such a case as this, if the law confined the claimant to the interior of vertical extensions of the side lines, there would be little object in taking up the end lines of contiguous claims, as there would be not enough to warrant the expense of opening the property, unless the vein should be very rich, while an outside locator on the dip of the vein could take advantage of his knowledge of the situation and secure rights to a vein passing through his property, indeed, but which he had never discovered at all, and this would conflict with the intent of the law which was to reward the discoverer; and as discoveries are almost invariably made upon the apex, it does this by giving to the owner of the apex the ownership of the vein to any depth.

Consolidations in Gilpin County, Colo.

The accompanying illustrations on this and the front page pertain to present mining and milling operations at Black Hawk, Gilpin county, Colo., encompassing the ground whereon John Gregory in 1859 made the initial discovery of a gold-bearing lode in this State. It is historic ground, for it not only marks the first opening of a fissure vein, but the operation of the first stamp mill and, farther down Clear creek, the first smelter in Colorado. Black Hawk and Gregory hill are, in Colorado history, what Sutter's creek is in that of California. When the gold seeker and adventurer started from the Eastern and Middle States in 1859 and 1860 with wagons adorned with "Pike's Peak or Bust," their real destination was not Pike's Peak, but Gilpin county, whose creek sands carried free gold and whose mountain fissures held paystreaks. The vast ledges of gold-bearing ore which actually did exist in the hills contiguous to Pike's Peak were reserved by destiny till 1892, when the name of Cripple Creek was cautiously announced to a waiting world.



Gregory Gulch, Gilpin County, Colo., Showing Entrance to Gregory-Bobtail Tunnel, With Jeffrey Electric Locomotive Attached to Ore Train of Boston & Denver Con. M. & M. Co.

The discovery of the Gregory lode, the news of which rapidly spread, attracted much interest, Horace Greeley, editor of the New York Tribune, verifying the news by a personal visit to the property in June, 1859. As exploitation and development progressed on Gregory and Bobtail hills, other fissures were opened, principal among which were the Fisk, Bobtail, Mammoth and Cook, and these, with the Gregory, have formed the basis of operations ever since, though until recent years under several distinct ownerships and separate managements. Development on these lodes to the extent of nearly 25 miles of underground workings from the date of the discovery to the present time, the steady production throughout that period, and the extent of ore bodies exposed by more recent and deeper workings, give some conception of the life of a group of mines on such well marked fissures.

Formerly the Gregory–Bobtail, Fisk and Cook each operated with a separate plant of hoisting, pumping and compressor equipment, but whose workings became connected at various points. Within the last four years various consolidations and purchases have been effected whereby the three main groups, with other contiguous ground, all aggregating sixty-seven patented claims, have been brought into one consolidation, under the proprietorship of the Boston & Denver Consolidated Mines & Milling Co. This has been accomplished under the financial management of Melvin P. Dalton, with Clarence K. Colvin as mining engineer, and the ready co-operation of Boston and other Eastern capitalists. With the idea of centralizing operations, the extensive developments underground during the last two years have been so planned as to bring the ore from the various bodies to a common center on each level and ship it out through a main channel. The Cook shaft, 900 feet depth, which is now the center of operations, sinks at a point near the intersection of the main north and south lode with the two main east and west parallel lodes; so that very little dead work has been necessary to reach the ore bodies in any part of the group from this shaft. The latter is three-compartment, well timbered, with two cages operated by a gear and friction hoist, previously described in these columns. Within the shaft house are the boilers and two 4-drill compressors. At the 360-foot level is the loading station, where cars of ore are landed from any level in the mine and transferred to the tramcar track and hauled out through the mill tunnel to the crushing floor of the mill, 4250 feet distant. On the group there are about 15 miles of drifting on the veins; on either the sixth or seventh levels may be seen 11,000 feet of work in ore on a horizontal plane. The most aggressive work now is on the Mammoth vein on the sixth and seventh. In the stope above the sixth, on this vein, I saw five Sullivan air drills at work breaking down ore; one drill was drifting on the sixth. Similar work was in progress on the west end of the seventh level on the Mammoth and the east end of Fisk. For a distance of 150 feet this vein is stoped out between the sixth and seventh, showing the material between walls was 12 to 20 feet wide. On the west end of the Maverick vein were ten men with hand drills stoping above the seventh. On the eighth level the work of drifting west on the Mammoth and east on the Bobtail was in progress. The plan of work in this mine is to drift on the vein on each level, stull overhead and put in chutes every 20 feet; then stope up to next level, letting the broken ore pile up on the stulls as the work proceeds, about one-third of it being drawn through the chutes and hoisted to make room for the work. About 4 feet of solid ground is left at the bottom of each drift. When the stoping is completed to the level above, the broken ore is then drawn out through the chutes for shipment as fast as required. In one stope there are now at least 5000 tons of ore on the stulls and as much more in other stopes. The almost total absence of waste material between the vein walls makes this method feasible, and it reduces the necessity for timber. The Mammoth vein will average 12 feet wide on the sixth and seventh levels. It swells to 30 feet in places and narrows to 6 feet in others. The Bobtail vein averages 4 feet wide, the Maverick 5½, the Cook 5 the Fisk 4 and the Gregory 5 feet.

Cook Shaft House, Boston & Denver Con. M. & M. Co., Gilpin County, Colo.

The ores in general are a copper and iron sulphide, with streaks of quartz that carry free gold. There are no oxidized ores at present working depths. At the crushing floor of the mill the smelting grades are sorted out; this amounts to about twelve tons per day, the milling ore amounting to 300 tons per 24 hours. The smelting ore will carry about 31% silica, the mill concentrates 10%.

The mill, equipped with Blake crushers, eighty rapid-drop, 1000-pound stamps, amalgamating plates, and twenty-four Woodbury concentrators, was erected by the Hendrie & Bolthoff Mfg. & Supply Co., and was illustrated and fully described in the issue of this paper of July 14, 1900. It has been in operation several months, and every feature appears to do very satisfactory work, the concentrate product amounting to seventy tons per day.

The ore car line, 4250 feet long, which extends from the crushing floor of the mill to the 360-foot station of the Cook shaft, first runs 600 feet above ground, thence through 1280 feet of tunnel under Bates hill, thence 400 feet on surface in crossing Gregory gulch, thence through about 2000 feet of the old Bobtail tunnel to loading station at the shaft. The track is 24-inch gauge, with 30-pound rails, laid on 4x6-inch crossbars; it is ballasted and smooth. The four-ton, center-dump cars, capacity four tons each, are hauled back and forth by a Jeffrey electric locomotive, supplied with power by a 67 H. P. generator in the mill, which is transmitted over the line by an 00 wire, suspended at points 25 feet apart. Three cars make up a train, whose work runs as high as ninety-three cars, or 397 tons ore, in nine hours.

Another feature of the big group is the Gregory incline, which starts near the mill, runs at an angle of 24° for 700 feet, thence 1343 feet farther, to the base, at a 38° angle. At the incline's 900-foot station is a duplex, compound pump of 800 gallons per minute capacity. The first 665 feet of this incline is a crosscut, thence on it sinks on the Gregory vein. From the base of this incline a crosscut tunnel runs 800 feet southward to the Fisk, thence tapping the Bobtail lode 460 feet farther at 1300 feet below the surface and 600 feet east of the Cook shaft. The plan is to sink the Cook shaft to and below the level of the Gregory crosscut and connect the two, so as to handle the ore from the Gregory and other mines on the north side of the group, through the main shaft. At present about sixty-five tons per day are hoisted through the incline. In these operations there is no shoveling of ore, it being handled by gravity, electric haulage and automatic feeders; the concentrate product is carried by belt conveyors from the tables to the car on the side track. The entire property is a good example of the economy to be effected by the consolidation of mines, centralizing operations and increasing the tonnage. WASCOTT.

Black Hawk, Colo., Dec. 8.

"Booming" With a "Shooter."

A peculiar feature used in northern California to assist the placer and hydraulic miner is what is known as a "shooter." It consists of an automatic reservoir of various sizes and shapes, that collects all the water not run through the giants or monitors for, say, fifteen minutes, when a valve automatically opens of sufficient size to allow all the water thus collected to escape in five minutes, thus obtaining the use of over 20,000 inches of water for five minutes that 2000 inches has furnished by cacheing it for fifteen minutes; that force of water will carry boulders weighing over 500 pounds through one mile of flume in five minutes. Several hydraulic mines in the northern counties are equipped with one of these shooters. On the Boss & McClary placer mine, Trinity Center, Trinity Co., the shooter box is 20x40 feet square and 6 feet, with an automatic opening of 18 inches by 4 feet. There is a bedrock flume 6 feet wide by 3 feet deep, nearly half a mile long, lined with 9-inch blocks.

It was in northern California that the style of hydraulic mining known as "booming" was first introduced, and has since been most largely in use. It is practiced only along the gulches. These affording but little water, it became necessary that the limited supply be reservoired and properly distributed in order to make it effective in gravel washing. The object is attained by retaining the water in dams and then releasing it suddenly, with a rush or boom. Near the bottom of the dam built for this purpose is left an aperture so large that when opened the water escapes rapidly. Placed on the top of the structure is a small race, through which the water flows when the dam is full, and is discharged into a large wooden box suspended from the end of the sweep, turning on a pivot, and the upper end of which extends to and over the top of the dam. Attached to this end of the sweep is a strip of heavy canvas which, dropping in a fold over the aperture below, keeps it tightly closed when the dam is full. When this stage has been reached the water flowing through the race into the wooden box mentioned soon fills it, causing this end of the sweep to sink and the other to rise, carrying with it the strip of canvas and uncovering the large aperture below, allowing the water to rush out. Meantime, the wooden box, having emptied itself through numerous small holes made for the purpose, this end of the sweep, relieved by its weight, rises, and the other end drops. The canvas falls over the outletting aperture, closing it as before. Then the dam fills again to the brim, and the operation as above is repeated. This plan for handling water is wholly automatic. It takes care of itself and goes on day and night, without any attention on the part of the miner, doing its work as long as the water lasts.

C. A. SARGENT, referring to the necessities for larger improvement in the modern gas engine, takes up only the shortcomings of the gas engine of the four-cycle type in which the piston acts during the first, or forward, stroke, as a pump drawing in the charge of air or combustible mixture; compressing it on the second, or back stroke, completing the first revolution of the crank shaft; performing work during inflammation, the forward stroke of the second revolution and exhausting the burnt products during the back stroke of the second revolution. He suggests that if, instead of taking a cylinder full of combustible mixture as the unit of a fresh charge the engine is designed so that two-fifths or thereabouts of a cylinder full of combustible mixture is sufficient for the average load, there will be much greater range in which the engine may be worked without an appreciable loss in efficiency. As the compression changes only one-half as fast as the cut-off, with a change of load there will be a reserve of power, even if the release is considerably above atmospheric pressure, so long as compression does not go sufficiently high to cause premature ignition. The quicker the expansion of gases the more heat will be turned into work and the less transmitted to the cylinder walls. Therefore if the time of ignition is advanced so that the maximum of pressure takes effect at the beginning of the stroke, the piston speed may be materially increased and the jacket losses minimized.

"Orthodox" and "Wild Cat" Oil Propositions.

In chapter 4 of Bulletin No. 19, "Oil and Gas Yielding Formations of California," issued by the California State Mining Bureau, geological conditions attendant thereon are discussed and the commercial aspect of the problem given considerable prominence. In instancing the fact that the financial risks of prospecting for oil vary greatly, the chapter notes that oil prospecting propositions may be divided into two orders:

First.—The "orthodox" proposition. In this case the prospectors have in view a definite oil yielding stratum, which has proved remunerative in adjacent territory, and from which stratum they expect to obtain their oil. Moreover, they have satisfactory geological evidence in sight that the oil stratum they have in view forms an oil line through the territory they are about to prospect.

Second.—The "wild cat" proposition. In this instance the prospectors have no definite oil stratum in view which has proved remunerative in adjacent territory, or they have not satisfactory geological evidence in sight that an oil yielding stratum, which is known to be productive in adjacent territory, forms an oil line through the land they are about to prospect.

In prospect wells of the first order the least risk is taken where the outcrop of an oil sand, which has proved remunerative in a certain oil field, can be actually traced through the territory to be prospected, and the geological structure of the locality is known.

More risk, however, is undertaken where there is no outcrop of the oil sand, although the strike and dip of a remunerative body of oil sand in an adjacent oil field are known, and the rocks overlying the oil sand can be traced to the territory about to be prospected. When an oil line has been developed on one side of a fold, and an outcrop of oil sand has been discovered on the other side of the fold, propositions to prospect this side must be classed among the more risky "orthodox" propositions.

Most oil mining enterprises which have for their object the development of new territory, especially when operations are conducted at a distance from any known oil field, are "wild cat" propositions. Some idea of the conditions regulating the amount of risk involved in such enterprises may be gathered from the following statements:

The least risky "wild cat" proposition is the case in which the strike and dip of a remunerative stratum of oil sand in adjacent territory have been ascertained, and, although there is no conclusive geological evidence in sight; it is found after carefully platting a map of the territory that, if the stratum of oil sand were extended in the direction of its strike, without any material alteration in the angle of its dip, it would form an oil line across the territory to be prospected. It is a more risky "wild cat" proposition to prospect the side of a fold opposite to that on which an oil line has been developed, in cases where surface indications warrant the assumption that the same sequence of formation exists on both sides of the fold, and yet no outcrop of oil sand has been discovered on the side about to be prospected.

It is a still more risky "wild cat" proposition when a stratum of oil sand has been discovered, concerning which nothing is known except that the sand gives evidence of containing oil, and a well is sunk for the first time to determine whether or not the oil sand contains oil in remunerative quantities.

It is a much more risky "wild cat" proposition where no outcrop of oil sand has been discovered, but where a well has been sunk in a certain formation because it shows some irregular seepages of petroleum or because the formation appears to be similar to that containing a remunerative body of oil sand in other places.

It is well for oil prospectors to study the risk they are about to take before expending money, and care should be taken to control sufficient territory that they may have sufficient room to develop their oil field, in case their venture proves successful. No one should undertake the more risky forms of prospecting unless he can well afford to lose the money to be put into the enterprise.

In California petroleum is found in shales, limestones, sandstones and conglomerates, and in a few instances crystalline rocks are found impregnated with it; but in nearly all of the productive wells the oil is found saturating sandy strata. In this State the folding of the rocks has brought these oil-soaked strata near the surface, and the oil lines, or the lines along which remunerative wells can be obtained, are parallel to the axes of folds, or to the lines of faulting. The oil lines extend in breadth only a certain distance down the limbs of the folds or down the block of tilted strata, which has been isolated by faulting. The lateral extent of the oil line is limited at its upper margin by the outcrop of the oil sand, or by a line of geological disturbance such as a fault, or by the oil sand being brought too close to the surface at the axis of the fold on which the oil line is situated. On its lower margin it is limited by the dip of the formation, which carries the oil-yielding stratum to too great a depth for it to be profitably reached by the drill; or, where the oil sand is struck below a certain depth, it may be found that the water has displaced the oil.

As geologists and oil men know, the dip and strike of the oil sand are of the greatest importance in locating the site of an oil well, and in the case of prospect wells the dip and the strike have to be ascertained from the exposed rocks.

Many people are not familiar with geological terms, therefore it is in order to describe what is meant by the dip and strike of a stratum of rock, and to give simple methods for determining the conditions represented by these terms.

The dip of a stratum of rock is the angle which its surface, when inclined, makes with the horizon. The strike is the horizontal direction in which the stratum of rock extends, and is always at right angles to the dip. Therefore, if the direction of the dip is known, the strike can be readily determined.

The direction of the dip of an inclined stratum corresponds to a line drawn along the inclined surface in the direction of its greatest inclination, and is always at right angles to the strike. (See article by the writer in MINING AND SCIENTIFIC PRESS, Feb. 4, 1899.)

(TO BE CONTINUED.)

Silvering Copper Plates.

There are several methods adopted in the silver plating of copper plates. In one of these methods the plates are silvered by painting the back of the plate with some substance which does not readily transmit electricity, such as paraffine, or a similar substance, and then immersing the plate in a solution of cyanide of silver. Such a solution may be formed by dissolving silver cyanide in cyanide of potassium, or it may be made up by taking a solution containing 1 part of cyanide of potassium to 10 parts of water, adding 1 gram of silver chloride to every 150 c. c. of the cyanide solution. The plates are immersed in such a solution and are connected with the negative (or zinc) pole of a galvanic battery, the positive (copper or platinum) pole of the battery being connected to a silver plate also immersed in the solution. The current gradually decomposes the silver cyanide, and this metal is deposited on the object connected with the negative pole, while the cyanogen liberated at the silver plate attacks the silver so that the solution is always maintained at the same strength. The quantity of silver dissolved from the silver plate is exactly equal to that deposited upon the copper plate.

A very thin silver plating can be put on copper plates by rubbing them with a mixture of 10 parts of silver chloride, 1 part of corrosive sublimate (mercuric chloride) and 10 parts of bitartrate of potash. The silver and the mercury are both reduced to the metallic state by the copper, and an amalgam of the silver is formed which merely coats the surface. The surface to be covered should, in any case, be carefully cleaned by immersing in, or washing with, dilute nitric acid and then washing in water. This last named method is not much, if any, better than the ordinary process of preparing copper plates with mercury and sal-ammoniac.

Verdigris can be prevented by neutralizing any acids contained in the ore with lime, or similar compounds; and should spots of verdigris appear on the plates, they should be scrubbed off with sal-ammoniac or a little cyanide, and the spots rubbed with mercury, preferably containing a small amount of amalgam. It is best never to use cyanide of potassium on silver plates, as it simply dissolves some of the silver and carries it away with the wash water. Permanganate of potassium does not neutralize the effect of cyanide of potassium.

The Twentieth Century's Dawn.

The first people to live in the twentieth century will be the Friendly Islanders, for the date line, as it may be called, lies in the Pacific ocean just to the east of their group. At that time, although it will be already Tuesday to them, all the rest of the world will be enjoying some phase of Monday, the last day of the nineteenth century (December 31, 1900). At Melbourne, Australia, people will be going to bed, for it will be nearly ten o'clock; at Manila, Philippine Islands, it will be two hours earlier in the evening; at Calcutta, India, the English residents will be sitting at their Monday afternoon dinner, for it will be six o'clock; and in London the clock in the tower of the House of Commons will be striking the hour of noon. In Boston, New York and Washington half the people will be eating breakfast on Monday morning, while Chicago will be barely conscious of the dawn. At the same moment San Francisco will be in the deepest sleep of what is popularly called Sunday night, though really the early, dark hours of Monday morning, and half of the Pacific will be wrapped in the darkness of the same morning hours, which become earlier to the West, until at Midway or Brooks Island it will be but a few minutes past midnight of Sunday night.

Important Land Office Decision.

On the 18th inst. Land Commissioner Hermann decided the case of the Kern River, Cal., Oil Company vs. C. W. Clark, from the Visalia, Cal., land district, which was commonly known as the "scrippers' case," against Clark, defeating the claims of the scrippers. The report is an elaborate one and will settle many questions in addition to that which brought it before the land office. Despite its fullness and the many decisions cited in it, it is understood that S. C. Ward, on behalf of the scrippers, will appeal to the Secretary of the Interior.

Clark claimed title to a forest reservation by virtue of two separate selections. The oil company protested that these lands were mineral, and claimed them under mineral locations made prior to the date of these selections. About the time these selections were made it was represented to the land office that the lands in this and a large number of adjoining townships were solely valuable for their petroleum deposits, for which they had been located under the mining laws and for which they were being developed. The survey of the lands over forty years ago made no reference to minerals, and returned the lands as agricultural, and the opinion says the lands remained unclaimed under the agricultural laws until after their location as mineral.

The Commissioner holds that those claiming title to selections under the Act of June 4, 1897, have not done all they are required to do until they have filed proof required, made proof of the publication of notice and the same has been approved by the General Land Office.

Under this ruling the opinion says the land in these sections is yet open to exploration under the mining laws, and that if at this date the lands are shown to be mineral, it defeats the selections. The opinion says: "It does not seem that any question could arise as to who had the best right to this land and to whom the mineral product belongs. Even if no well should be sunk at the date of selections and the mining claimants had rested solely upon the surface discoveries, but were duly proceeding with reasonable diligence to develop the claims, the agricultural claimants would not have been entitled to the land as 'vacant land, open to settlement.'

"If the lands are not distinctly agricultural in character, but, in addition, contain on the surface mineral indications justifying a discreet person to prospect and develop the same, then the affidavit which avers that 'the application, therefore, is not made for the purpose of fraudulently obtaining title to mineral land, but with the object of securing said land for agricultural purposes, so far as the deponent knows,' is not only evasive but misleading, and evidences a motive for acquiring the lands really for mineral and not for agricultural purposes.

"The good faith of the mineral claimants is apparent and conclusive. They seek to obtain, in a proper manner, title to lands under laws solely provided therefor. I do not find the same conditions existing in the case of the agricultural claimant, who seeks to acquire mineral lands under agricultural laws, the lands being admittedly mineral and not agricultural."

From this the Commissioner deduces the following: "At the date of these selections the lands included therein were covered by mining claims and therefore not vacant; that they were known to be mineral and, therefore, were not open to settlement; that the fact that the conditions were not on record in the Land Office did not affect the mineral locators' rights; and the failure of the agricultural claimant to state the facts was a fraud on the Government and the mineral claimants, as the selectors are charged with notice of mineral locations. If any further evidence is needed in support of the above conclusions it is to be found in the special agent's report, made with reference to these particular selections, nor can there be any question of the authority of this office to consider such report in connection with the record in this case."

In previous issues were given the details of the consolidation of the American Smelting & Refining Co. and the Guggenheim smelters. Official announcement is made of the absorption. Stockholders of the former company will be asked to assent to the proposition that the capital be increased from $55,000,000 to $100,000,000; of this amount $15,000,000 to be added to the working capacity of the company. The Guggenheims receive the difference between the $55,000,000 and $100,000,000, less the $15,000,000, which it is proposed to utilize for extra working capacity. None of the new stock will be offered for sale. The stockholders of the smelting company will hold a special meeting after Jan. 1 to ratify the action of the directors.

Some Questions Answered.

What causes zinc shavings to become very brittle and crumble to dust within a few hours after being put in the extractor, and what remedy would you suggest? I suppose that it is sulphur in solution and I have used lead acetate, which seems to prevent the zinc getting brittle quite so soon.

Isabella, Cal.

It is not possible to answer this query concerning the cause of the brittleness of the zinc without an exact knowledge of the composition of the solution; but it is probably due to cyanide of mercury in his solution. This precipitates on the zinc as zinc amalgam and rapidly causes the zinc to become brittle. The fact that the lead retards the brittleness seems to indicate that the latter absorbs mercury and protects the zinc to some extent. He might retort some of the brittle zinc and see whether or no he gets mercury.

(1) If I make a mining location while in the employment of another person or company, can my employer, by law, claim half of said located ground, no agreement to that effect having been made?

In the absence of any agreement, grubstake or otherwise, he can not.

(2) In parting my bead, why is the gold always black before annealing?

Regarding the black color of gold upon parting and before annealing, it is generally believed that such gold is coated with some salts of gold that is reduced to metallic condition by annealing, for before being annealed it will not amalgamate with quicksilver nearly so readily.

(3) Give a method for determining the fineness of gold bullion or dust.

Gazelle, Cal.

There is no method other than assaying to determine the actual fineness of gold.

Some time ago you published the legal code or system of mine bell signals in use in Montana and California. Is there not a similarly ordained set of signals legalized in the State of Colorado, and, if so, will you state what it is?

Breckenridge, Colo.

A State legislative Act authorizes the Colorado Commissioner of Mines to establish a uniform code of signals in all mines using hoisting machinery as follows:

Signals.—1 Bell—Hoist. (See Rule 2.)
1 Bell—Stop, if in motion.
2 Bells—Lower. (See Rule 2.)
3 Bells—Men on, run slow. (See Rule 2.)
7 Bells—Accident. Hoist or lower by verbal orders only.
3–2–1 Bells—Ready to shoot. (See Rule 3.)

Engineer's Signal.—Engineers shall after signal 3–2–1 raise the bucket or cage 2 feet and lower again, and shall remain at his post until final signal is given and command executed.

Rules Governing Signals.—Rule 1.—In giving ordinary signals make strokes on bell at regular intervals. In signals similar to "Ready to shoot" (3–2–1 bells) each bar (–) must take the same time as one stroke of the bell.

Rule 2.—When men are to be hoisted or lowered, give the signal for "Men on; run slow," (3 bells). Men must then get on bucket or cage, then give signal to hoist or lower (1 or 2 bells).

Rule 3.—After signal "Ready to shoot" (3–2–1 bells), engineer must give signal that he is ready to hoist by raising and lowering bucket 2 feet. Miners must then give the signal "Men on" (3 bells), then "spit fuse" get on bucket or cage and give signal to hoist.

Rule 4.—All timbers, tools, etc., longer than the depth of bucket, or placed within a cage, must be securely lashed before being hoisted or lowered.

Rule 5.—Signals to meet local demands and not in conflict with above may be added by individual operators, but the same must be posted in clear and legible form in connection with above code.

Please give in "Concentrates" a formula for the preparation of cadmium boro-tungstate.

Spokane, Wash.

After two weeks' effort, it is not found possible to answer this question.

Suppose a man has a group of adjoining and intersecting claims, and by driving a tunnel he can develop all of them; can he do all the required assessment work by running such tunnel?

Telluride, Colo.

Certainly; if he can prove the above statement and does $100 worth of work for each claim in the manner specified—that is, suppose the Telluride inquirer has six such claims; by doing $600 worth of work in the tunnel he does the required annual assessment work for the whole six; if he have eight claims, $800, and so on. But, in Colorado, he must, to make matters sure, do more. He must "erect a substantial post, board or monument at the mouth of the tunnel, upon which should be posted a notice giving the names of the parties or company claiming the tunnel right; the actual or proposed course or direction of the tunnel; the height and width thereof and the course and distance from the face or point of commencement to some permanent well-known object in the vicinity." Then our Telluride inquirer should make a copy of all this and file it with the clerk and recorder of San Miguel county.

State in "Concentrates" how to locate a mill site and a water right on the same site. The mine is not contiguous thereto, but near by.

Morenci, Arizona.

Section 2337 U. S. Revised Statutes gives the required method of securing a mill site. A water right upon the public domain can not be acquired under the mill site laws.

Please answer in "Concentrates": A located a mining claim in 1893; B made a location in 1894 and overlapped A's ground; A and B filed their notices for record; C made a location on the ground originally held by A after A forfeited his original rights for not doing the annual assessment work. Which one is entitled to the ground originally held by A?

Eureka, Utah.

C has a right to that portion of A's original location not in conflict with B's location.

Through A's patented placer claim runs a creek. A has not located the water and does not use it. Can B locate the water on A's ground and pipe it over A's ground to B's ground and use it for mining purposes?

Newsome, Idaho.

No; not without A's consent.

What is meant by the "mother lode" in California? Give a description of it.

Deadwood, South Dakota.

The ordinarily accepted meaning of the term "mother lode" as used in California conveys the idea of a continuous fissure extending in a northwesterly direction from Mariposa county, and filled with metalliferous deposits. Another idea of it is that it is not a single, unbroken, continuous fissure, but a series of fissures of various lengths and widths, within, and invariably conforming in strike with the sedimentary rocks known as the black or Mariposa slates. To give even a list of the articles written on this subject would take up a page of this paper. Probably the best among the more recent monographs on the subject is "The Mother Lode of California," written for this paper by Ross E. Browne, a two-page article in the issue of Jan. 29, 1898. The finest thing of the kind is the Geologic Atlas of the Mother Lode, just issued by the U. S. Geological Survey. It is beyond praise for correctness and completeness, would be cheap at $25 and can be had by sending 50 cents (exactly that amount) to the Director of the U. S. Geological Survey, Washington, D. C., with request for its receipt.

I know of a deposit of kaolin near here. What is it worth and where could I sell it?

Ashcroft, B. C.

If in considerable quantity, and favorably located, a kaolin deposit might be made commercially valuable. It is found in several places from San Diego, Cal., to the Alaskan line. When graded, washed and ready for market, the best quality is worth about $14 per ton. It is largely used in the manufacture of pottery and china. One of the principal markets for it is at Trenton, N. J. Considerable is imported, cheap, as ballast, and there seems little to say in encouragement of our British Columbia correspondent.

(Other recent questions are answered in "Concentrates," page 592.)

Rank in Population and Railway Mileage.

The following table shows the rank of the various States as regards population and miles of railroad operated within their borders:

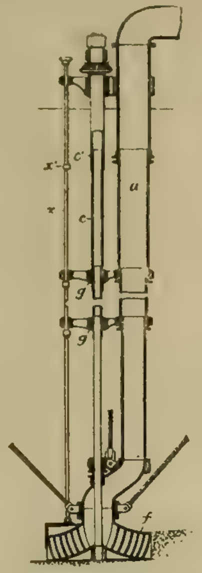
States.	Population.	Mileage.	States.	Population.	Mileage.
New York	1	7	Maryland	26	39
Pennsylvania	2	2	Nebraska	27	14
Illinois	3	1	West Virginia	28	32
Ohio	4	5	Connecticut	29	44
Missouri	5	9	Maine	30	34
Massachusetts	6	33	Colorado	31	16
Texas	7	3	Florida	32	20
Indiana	8	11	Washington	33	25
Michigan	9	8	Rhode Island	34	49
Iowa	10	4	Oregon	35	36
Georgia	11	13	New Hampshire	36	43
Kentucky	12	23	South Dakota	37	26
Wisconsin	13	12	Oklahoma	38	47
Tennessee	14	21	Indian Territory	39	40
North Carolina	15	19	Vermont	40	45
New Jersey	16	31	North Dakota	41	29
Virginia	17	18	Dist. of Columbia	42	50
Alabama	18	17	Utah	43	37
Minnesota	19	10	Montana	44	24
Mississippi	20	28	New Mexico	45	35
California	21	15	Delaware	46	48
Kansas	22	6	Idaho	47	41
Louisiana	23	30	Arizona	48	38
South Carolina	24	27	Wyoming	49	42
Arkansas	25	22	Nevada	50	46

Mining and Metallurgical Patents.

Patents Issued December 11, 1900.

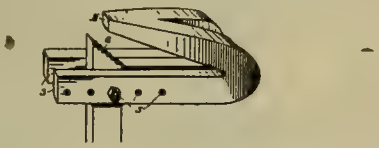
Specially Reported for the MINING AND SCIENTIFIC PRESS.

HYDRAULIC PRESSURE DREDGING MACHINE.—No. 663,497; F. Hoffman, Siegersdorf, Germany.



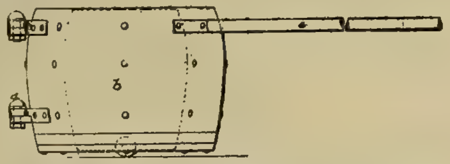
In a pressure dredging machine, combination with elevating tube, turbine at lower end of tube to loosen and force upward through tube solid matter, curved shield party surrounding turbine and vertically adjustable independently of turbine to regulate inflow of water to turbine, means to rotate turbine.

PIPE WRENCH.—No. 663,567; P. Frichette, Sheridan, Cal.



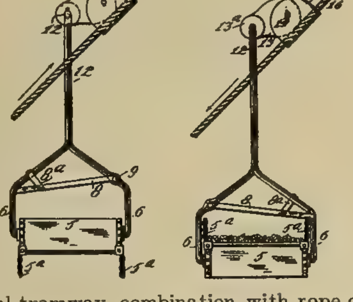
Pipe wrench consisting of single integral bar folded midway upon itself to form converging jaws, bar split from point commencing near outer end of folded portion to form two straight parallel sides separated from each other, provided with adjusting holes, lever fulcrumed between separated sides having end adapted to compress pipe into folded portion of bar whereby pipe has independent contact upon separated sides and third point of contact on overhanging folded portion.

CRUCIBLE SHAKER.—No. 663,676; J. Illingworth, Newark, N. J.



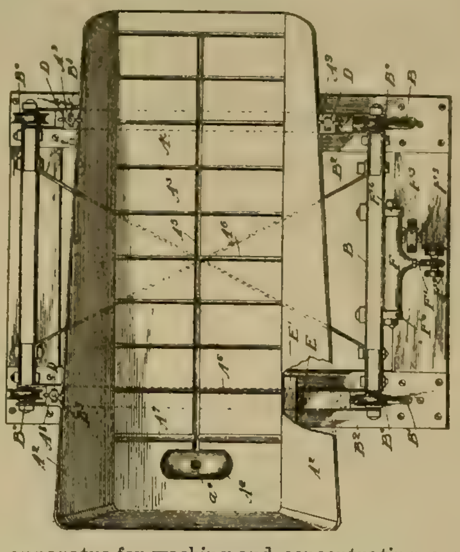
Improved crucible shaker, comprising pair of hinged jaws having handles, arranged at free ends of jaws, opposite hinged ends, handles being adapted to be brought to lie near together when jaws are closed to faciliate shaking of jaws and crucible therein, jaws being hollow semicircular parts filled with a non-conductor of heat and having interior lining of metal.

AERIAL WIRE ROPE TRAMWAY.—No. 663,817; J. H. Montgomery, Denver, Colo.



In aerial tramway, combination with rope or cable and suitable carrier, of shoe, lever connecting shoe with pendent arm of carrier, and arranged to grip cable automatically, suitable means mounted on stationary support and lying in path of portion of lever, whereby extremity of lever connected with pendent is raised sufficiently to release cable, allowing latter to travel through shoe which remains stationary.

GOLD MINING OR PLACER MACHINE.—No. 663,717; C. Barwick, Denver, Colo.

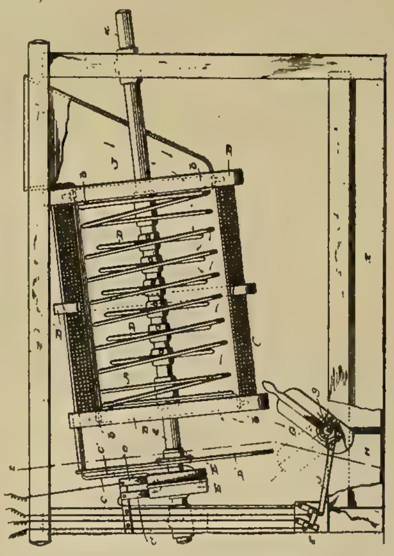


In apparatus for washing and concentrating ores, combination with reciprocating frame, of concentrating pan provided with closed end and open end mounted transversely of frame, and set at an inclination downward from open end; well or pocket in bottom of pan near its closed end, longitudinal channel in bottom leading to well or pocket; transverse channels leading to longitudinal channel; perforated lugs on side edges of pan, screw-threaded bolts mounted in frame and engaging perforated lugs; coiled springs interposed between lugs and frame, and surrounding bolts; thumb nuts engaging ends of bolts for adjusting inclination of pan upon frame; stops permitting of vertical adjustment of pan, but preventing lateral movement thereof with respect to frame.

PROCESS OF PRODUCING SOLUTIONS OF ZINC CHLORIDE.—No. 663,759; C. Hoepfner, Frankfort-on-the Main, Germany.

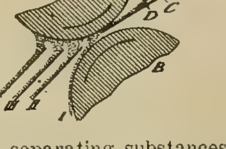
Reacting upon an oxide or insoluble salt of zinc in presence of water with sulphurous acid to form soluble zinc bisulphite, precipitating from bisulphite so obtained insoluble monosulphite of zinc, treating latter with chloride of an alkali metal to form zinc chloride.

MAGNETIC ORE SEPARATOR.—No. 663,760; A. Johnson, Moline, Ill.



In magnetic separator, combination of solenoid composed of plurality of oppositely wound coils arranged within solenoid but out of contract with inner circumference thereof and adapted to be magnetized by induction, means for making and breaking circuit through coils of solenoid.

MAGNETIC SEPARATOR.—No. 663,764; E. Kreuser and H. E. Langguth, Mechernich, Germany.



Apparatus for separating substances of different magnetic susceptibility, consisting of two magnets arranged one above other, upper one comprising rotatable cylindrical magnet, pivoted inclined slide or chute having no magnetic susceptibility, lowermost end of slide or chute being projected between magnets into center magnetic field at point of least distance between magnetic surfaces, spring arranged to hold lower end of slide in yielding contact with upper rotatable magnet.

Science vs. Technology.

A great deal of harm is done to technical progress by scientific cant. According to scientific cant, nothing that is technical is scientific. Science is only concerned with phenomena, and not with their useful application. If you experiment with 37 grammes of steel in a porcelain crucible, or in a tiny electrical furnace, with a standardized platinum pyrometer and a spectroscope, you are doing scientific work; but if you work with a ton in a converter, this is merely technical—though you will be patronizingly told that your work may throw some light on scientific questions. No scientific man will deny in words that the probable ultimate use to man is the criterion of value of a scientific discovery; but at the same time the tacit assumption is that anything technical is unscientific. The common type of scientific man thinks his knowledge of necessity includes all technical knowledge; but he cannot for a moment believe the technologist's knowledge may include his. The result of this sort of scientific priggishness is that technology is discouraged, and made out to be less important than it is, while unimportant work is exaggerated as to its value. Pure science, as it is called, is considered something much higher than applied science. This is the wrong way round. The terms are misapplied to begin with. One kind of knowledge is not purer than another. What is called pure science is really merely the raw material, and the raw material has to be worked up by the engineer for the use of man. Which is higher, the raw material or the finished product? In the case of ordinary raw material, such as iron, it is produced intelligently, with the view of being worked up; that is to say, it is produced for a given purpose. The scientific man does not work intelligently in this sense. He produces raw material without knowing or caring whether it can be worked up, just as the insect produces silk. If anything, he prefers what cannot be worked up. The sperm whale sometimes produces ambergris, and also produces other matter, but we do not admire the sperm whale because he unintelligently produces what is sometimes valuable when worked up. This view of pure science is so unconventional that few readers will agree with it; but it may be largely true all the same. One idea is that it is beneath the dignity of a scientific man to apply anything to technology. If he finds out a new phenomenon he should read a paper on it, but it is below his dignity to take out a patent. One form of hypocrisy in connection with this is the pretence that the scientific man works entirely for love of science. He has no wish to advertise himself or bring his name forward. If one scientific man says, in the interests of pure science, that he has done something which another man claims, there is generally a very acrimonious dispute—all in the interest of pure science, and not at all in those of advertisement. The worst of it is that the purely scientific man does not confine himself to his pure science, but considers that his knowledge covers all applied science ex officio, and the public unfortunately shares his view.—The Engineer.

A MINE, the product of which is timber, is noteworthy. A mine of this sort is to be seen in Tongkin, China, where, in a formation of sand, at a depth of from 14 to 20 feet, a deposit of the stems of trees, which thousands of years ago must have existed as an extensive forest, but eventually became buried by an earthquake or other similar phenomenon, has been opened and is now being mined through gangways. The timber in no way forms any kind of coal, but is in good condition, a fact to be attributed to the large proportion of resin which it contains, and to the sandy nature of the ground in which it lies. The Chinese work the mine methodically, and use the timber for sculptural purposes, coffins, troughs, etc. The stems have a diameter of 3 feet, are 45 feet long, and appear to be a kind of fir.

COUNTY CLERK WALKER has received a letter from J. R. Heaston, Indianapolis, Ind., who says that in 1860 he located sixty mining claims in this county, and wants to know whether his title is still good. He says he has great faith in our mines. His faith must be sublime to suppose his title good to lodes located forty years ago and abandoned all that time. We fear Mr. Heaston has been equally negligent in his study of the Bible, or he would have been aware that faith without works is dead.—Georgetown, Colo., Courier.

REFERRING to the illustrations in the article on inland dredging on page 597, Fig. 1 shows the dredger working inside the pit; Fig. 2 shows the manner of enlarging the pit. The lines a, a, designate the width of the new face. The lines b and c represent new faces. The successive movement of the dredger is indicated by arrows.

Suggestions on Inland Gold Dredging.

Written for the MINING AND SCIENTIFIC PRESS by A. C. ETESON.

To those who are interested in gold dredging a few suggestions on the practical working of a dredger may be of value. The following observations are based on my own personal experience.

The dredger of which I am writing is of a continuous-bucket type, operated from the shore with five steel lines—one head line, two bow side lines and two stern side lines.

Each of these lines is wound on a separate drum in the winch, which is operated by one man, so the position of the dredger can be changed in a few seconds.

No spuds being used, the dredger works on the head line and so gains all the advantage of its resiliency. The gravel, after leaving the buckets, passes through a revolving screen. The gold, sand and fine gravel are washed out and pass over special tables, where the gold is caught, the fine gravel and sand passing over the stern. The coarser gravel, after leaving the screen, is elevated and dumped behind the dredger.

The dredger under consideration is an inland proposition, operating some 4000 feet from the river. An excavation 80x90x10 feet was first dug, into which the hull of the dredger was placed. This excavation was then filled with water (Fig. 3) and the machinery placed on board.

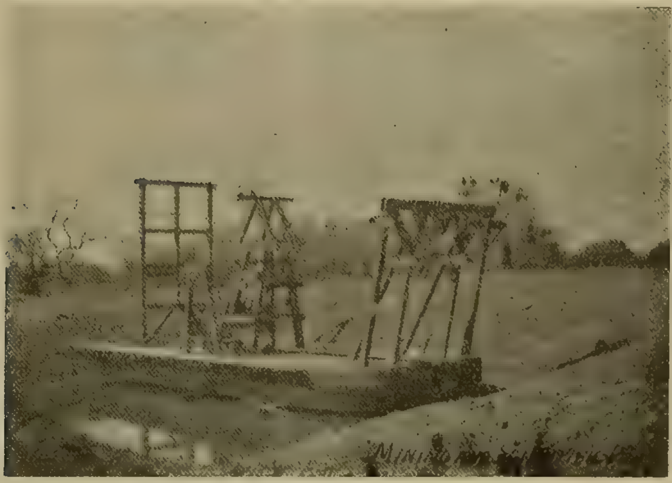


Fig. 3.—Hull of Dredger in Excavation.

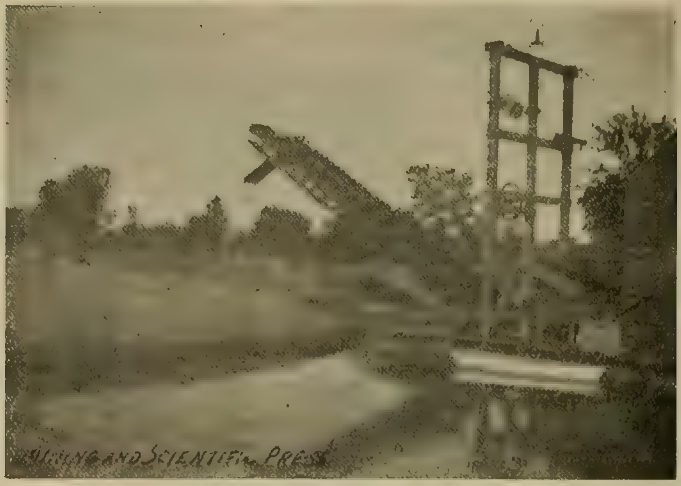


Fig. 4.—Dredger in Correct Position Starting Work.

The boat was then ready for operation. The first important point when the boat commences operations is the opening out of the face, or bank, to be worked.

If commencing in rich ground, there is a tendency to open out the face too rapidly, with the result that you get in difficulty with your tailings. First, place the dredger on one side of your face, as far back as possible (Fig. 4), so as to allow the tailings to be dumped on the bank behind. The tailings should be so dumped that, on the completion of the cut, they present one even line, and not a series of peaks (Fig. 5), for by this means you economize tailings space.

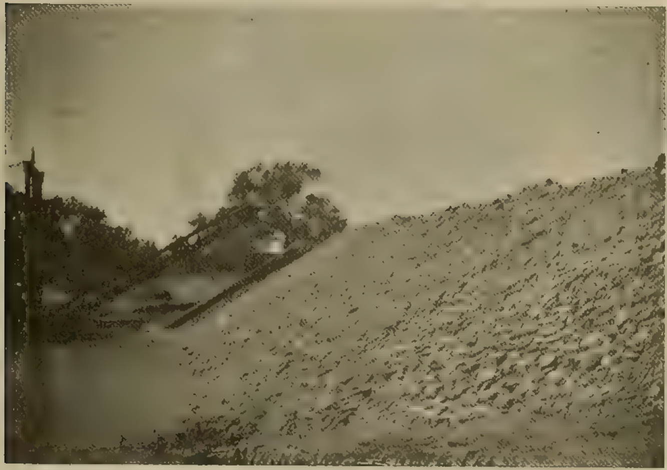


Fig. 5.—Tailings as They Should be Stacked.

Too much care can not be taken in keeping the sand and fine gravel from the sluices back. This can be done with brush, sacks or lumber.

Continue working in the same position till you have no more tailing room; then move over a few feet toward the open water, and repeat the operation till you have worked across the face. Great care should be taken always to keep the boat at right angles to the face, so as always to keep a full boat's length between the face and tailings. In ordinary digging there are only two exceptions to this rule, viz: working a corner or opening out the face, to which I shall refer later. One should not endeavor, under ordinary circumstances, to work down to bedrock under five or six cuts, or open out the face till bedrock is reached. By the time bedrock is reached, there is more tailing room, and now, if necessary, is the time to open out.

The following is the method of working a corner: (See Fig. 1.) When the dredger is within about half a boat's breadth of the port side of the face, move the stern over as far as possible to port, so that the tailings dump on or close to the port bank. Now, as you work with your ladder to port, pull the stern gradually over to starboard, until, when the ladder is on the extreme end of the face, the tailings will have filled up the gap behind. Now pull ahead and start on a fresh cut, and, as your ladder works to starboard, the stern gradually works to port, until when the ladder is about half the breadth of a boat from the port side, the tailings will be dumped on the port side of your tailings pile. Now pull the stern over till the boat is at right angles to the face and you will find that your tailings will be dumping on the starboard side of the new line of tailings.

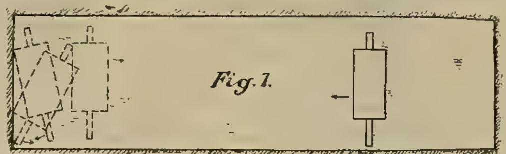


Fig. 1.

Work squarely across the face.

The starboard corner is worked in a similar manner to the port.

To open out a face: (Fig 2.) This is done in much the same way as working a corner, the only difference being that you have to work at a greater angle to your face to enable you to dig out the side. Suppose that you are opening out to port: To get your buckets in a position to do so, you will have to pull your stern well to starboard. Now you will find the farther you pull your stern to starboard the farther the tailings will dump from the tailings pile; this might fill up your floating space and would get in your way when you squared up and worked across your face. To prevent this the following method should be employed:

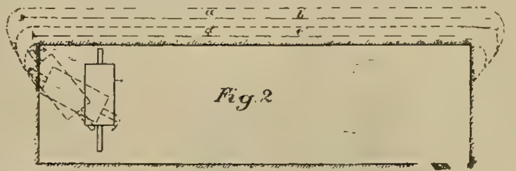


Fig. 2

When you have pulled the stern around sufficiently to enable you to open out, if the tailings are dumping over the tailings pile, let the boat back as far as possible, so that the tailings dump on the tailings pile. Then pull the bow into the bank and open out according to your judgment and the amount of tailing space. Then gradually pull ahead and at the same time pull the stern in to port. Make the tailings dump or the tailings pile when you are once more square again. You will not have a square corner to your face, but a rounded one; the greatest width of your face will not be across the face you are working but a little behind, so that in opening out you do not open out on the cut you are making, but some few yards behind it.

Continue this operation on either end of your face and you will find that, with care, you will always have clear water from end to end of your face.

A VETERAN prospector's advice to locators of mining claims is to follow the vein by sinking incline shafts on the outcroppings in at least four places along its course, after running open cuts at intervals to determine whether the vein is continuous and holds out in breadth and value a few feet below the surface. After the vein has been prospected by the foregoing mentioned methods in at least four different points, assays of the rock will show whether the vein grows richer in one direction or carries uniform values. There is no other way by which the ground can be shown up so thoroughly, and the ore taken out will often go a long way toward paying expenses. Even if the ore is not rich enough to pay for shipment, it is always evidence of the value of the rock in the vein and is a tangible, self-evident thing to show a prospective investor. Again, shafts, vertical or incline, that follow the vein, will show up any changes in the ore and give a large amount in sight. Thus, four shafts 50 feet wide down in a ledge 4 feet wide would expose 1680 square feet on the vein. A tunnel driven 200 feet through rock to cut the vein would expose but the section, the height and width of the tunnel, say, 100 square. To expose a large area drifting must be done, and such drifts can be run with better discrimination at the foot of a shaft that has followed the ore. If indications of water are found in sinking, and the prospecting of the vein, as described, demonstrates that its value warrants the outlay in labor, and the ground is situated so that the water can be drained to a depth of 200 or 300 feet by tunneling, then the latter is advisable, as it is obvious that draining a mine through a tunnel is far more economical than performing that work with surface pumping plants.

Very Quick Work.

On the line of the Chicago & Erie railroad, it had been found advisable to replace bridge No. 30, an old iron structure of 150 feet span, with a new steel structure 151½ feet long. The necessary changes in the masonry made it necessary to trestle the track and take down the old bridge. This was done and the new bridge was erected at the side of the trestle. When all was ready the trestle was taken down and the new bridge was moved over into place. The following is a time record of the various stages of the work:

Got use of track at 11:55.
Rails off bridge at 12:00.
Trestle down and all clear at 12:10.
Started to move the bridge in at 12:12.
Bridge moved over at 12:35.
Bridge lowered down upon the seats and a 42-foot approach girder raised to the surface of the new bridge at 1:10.
Rails laid on bridge and spiked up ready for traffic at 1:15.

The weight of the new bridge is 191,000 pounds. No trains were delayed in making the change.

AT the recent congress of German anthropologists at Halle, Prof. Klaatsch of Heidelberg read a paper contending that, as the result of several years' investigation, the alleged descent of man from apes was no longer maintainable. His conclusion was based on the construction of the bicephalous muscle of the upper thigh. The professor incidentally contended that it was a mistake to regard man as the most perfectly developed mammal in all respects. His limbs and teeth do not show any high degree of development, and he is only superior to other animals by his extraordinary brain development.

MINING SUMMARY.

Specially reported for the MINING AND SCIENTIFIC PRESS.

ALASKA.

One thousand pounds of ore from the Gleaner, on Taku arm, near Skaguay, arrived in Victoria, B. C., on the 17th inst.; it is estimated that it will return $12,000, or $12 to the pound.

This year's yield of Nome and Klondike is expected to aggregate $25,700,000, divided as follows: Klondike, $21,300,000; Nome, $4,400,000.

The mines on Admiralty Island are shipping ore to the Tacoma, Wash., smelter.

"Those who believe that the sea washes up the gold on the beach at Nome are laboring under a wrong impression. The sea concentrates the gold which is carried down to the tundra and beach by the mountain streams. As for the bedrock, which has deluded so many persons, that is a false bottom, the true bedrock being in some places 30 feet below the false bottom," M. J. David says, who has been working in the Nome district.

Teller City, the new town on Port Clarence bay, though only about six months old, seems destined to rival Nome within the next year or so. It has a land-locked harbor, the only one in Alaska on Bering sea north of Dutch Harbor. It is said that 1200 people are wintering there.

ARIZONA.

COCONINO COUNTY.

Twenty-five men are working on placer claims near Lee's Ferry. An Eastern company will put in a dredger on the Colorado river next spring.

COCHISE COUNTY.

The Greene Con. M. Co. will put in a long-distance telephone line from Naco to the Canoneas, a distance of 35 miles.

GILA COUNTY.

At Troy, the Davis shaft on the Ninety-one, down 190 feet, is being sunk to the 300-foot level; three eight-hour shifts are working.——The Band B. shaft on the Last Chance is being sunk to connect with the Davis shaft at the third level; two shifts are working.——The Black Warrior Copper Co., Amalgamated, has fifty men working on the Black Warrior.——A hoist will go in on the Black Copper soon and work will be pushed.

A strike of gold-silver-lead ore is reported made near Dripping springs.

GRAHAM COUNTY.

A new 10-stamp mill is going in in the Carlisle district, near Duncan.——A 6-foot vein of sulphide ore is reported opened up on the Stewart group, near Clifton.——The Fort Bowie M. Co. is pushing work on its property near Fort Bowie; a cyanide plant will probably be put in next spring.

Hitchcock & Faull will soon begin work on copper properties below San Carlos.

MARICOPA COUNTY.

The Wild Horse M. Co , capital $2,000,000, is incorporated at Phœnix.

MOJAVE COUNTY.

K. St. Charles has men taking out ore at the Midnight, at Kingman; a whim is used for hoisting.

The new belt for the Merrimac mill, at Chloride, is in; the mill is running on ore from the Minnesota.——The machinery for the Tennessee mill will soon be in place; No. 2 shaft will be sunk to the 500-foot level.——The Mollie Gibson has resumed; shaft will be sunk to 300-foot level; drifting will then begin.——The Elkhart Co. has resumed operations.——Work on the Minnesota and Connor shafts of the A. & P. M. Co. is progressing.——The New England & Arizona M. Co. will put in machine drills in the Sheeptrail and Homestake mines, Kingman.——The Oro Plata is closed down temporarily.——Work on the Gem and C. O. D. mines will resume after Jan. 1st.

Mensch & Davis are running a tunnel in the north end of Wallapai mountain.

YAVAPAI COUNTY.

G. W. Hull is pushing work on the Jerome, at Jerome.

The Verde Queen smelter, at Jerome, Supt. King, is turning out one ton of bullion per day.——Sinking is in progress on the Little Daisy, Supt. Powers.——On the Eclipse group, in Cherry Creek district, work is progressing with good results.——A 4-foot ledge is opened up on the Joe Dandy, of the Orissa group, adjoining the Eclipse.——A new shaft will be sunk on the United Verde mines; the new furnace will be of 400 tons capacity.——Good ore is taken from the Black Warrior in Grapevine district.——The Cobre Grande litigation is settled; the Greene people will take the stock at or nearly at par, which is $2.50, and will pay cost of litigation.——The International Financial Co., of New York, is pushing work on its group, in Black canyon, 8 miles south of Jerome; the company will drive a 200-foot tunnel.

The Venture Hill M. Co. has bought the 101, 102 and 103, near Jerome.——The Amalgamated G. & C. M. Co., operating the Kicker, in Big Bug district, will equip the mine with air drills and will push work.——The shaft on the Rebel, adjoining the Kicker, is down 400 feet.

YUMA COUNTY.

Supt. Mudesbach is pushing work on copper properties 18 miles northeast of Tyson.——The main shaft on the La Fortuna, at Fortuna, is down 995 feet.

CALIFORNIA.

AMADOR COUNTY.

The Muldoon at Jackson is bonded to G. F. Dyer of San Francisco.

The shaft on the Peerless, Jackson, is down 550 feet; Supt. Jackson. Two 250 H. P. compressors and a 60-stamp mill will go in on the Fremont next spring.

The new engine at the Central Eureka, Sutter Creek, is in, and ten stamps are dropping.——Operations on the Bay State, at Plymouth, will begin March 1st.——Supt. Downs of the Bunker Hill M. Co. reports the shaft unwatered and retimbered 700 feet; 100 feet more remain to be retimbered, sinking and drifting will resume.——The Gwin clean-up for November is said to have been $46,000.

Supt. W. Dennis is pushing work on the Free American, 6 miles east of Sutter Creek; sinking is in progress on the Tucker shaft.

The State Supreme Court this week confirmed the recent judgment of Judge Nichols in the Argonaut-Kennedy case in favor of the Argonaut.

A crosscut to cut the main ledge is run on 400-foot level of the Mutual, Sutter Creek, S. R. Porter, Supt.

BUTTE COUNTY.

A new drilling machine goes in at the Continental dredger, near Oroville.

Supt. Anderson, of the Feather River Oil Co., now drilling near Oroville, reports striking gas at a depth of 65 feet.

CALAVERAS COUNTY.

Work on the Big Horn, at San Andreas, is progressing.——Harrington & Vandel have leased gravel diggings in Chili gulch.——The Mountain King, at Hodson, is closed for the winter.——Seventy-five men are working on the Wright & Lane dam, near Hodson.——The Pocket (quartz and gravel) on French hill near Mokelumne Hill, is leased to Mr. Ogden, of Redding, for ninety days.——From 155 assays on ore from east vein in the South Carolina, of the Melones Con. M. Co., at Robinson's Ferry, Supt. Ralston, an average of $3.36 per ton was obtained.——The Golden Crystal, at West Point, is bonded to L. Lee; work will be pushed.——New machinery will shortly go in on the New Lightner (gravel) near Copperopolis.——Work on the Big Bonanza, Angels, is temporarily suspended on account of water; larger pumps will be put in and work resumed.——The tunnel on the Addison is in 85 feet.——Work on the Defender, West Point, is resumed under Supt. and owner, F. B. Joyce.——The tunnel on the Mahala, at Rich Gulch, has opened up a good sized vein at a depth of 230 feet.——J. Levaggi, of Plymouth, has bonded the Acme, near West Point.——The Oriole, at Angels, is closed down until larger pumps are put in.——The 26-inch pipe, which will feed the wheels at the Cross shaft powerhouse is in.

There are 179 feet of water in the Oriole, at Angels.——The Gold Cliff has resumed.

W. B. Lake will soon begin work on his placer tunnel near Eho; pipes and monitors are in.——Work on the Lost Boy is being pushed by Supt. U. J. Hussey; hoisting plant is in, and sinking in progress.

The Buffalo Con. M. Co. is pushing work on its group on the Royal mine lode, in Salt Spring Valley.

EL DORADO COUNTY.

At the Hart Con., near Georgetown, work on the new mill and building goes on.

HUMBOLDT COUNTY.

The Newberg mill, near Fortuna, is closed down for the winter.

INYO COUNTY.

The 6-stamp mill of the Mineral Hill M. & M. Co., at Ballarat, is running.——The King Con. M. Co. will probably put in a mill.——The Ratcliffe is closed down; it may be sold soon.——Ore from the Tuber is reported to run $25 to the ton.

The Inyo G. & C. M. Co., at Inyo, is shipping ore.

KERN COUNTY.

The Arcola Oil Co., operating on 1, 11-24, at Sunset, struck oil at a depth of 650 feet recently; the well is producing 500 barrels oil per day.——The Golden Gate Oil Co. has struck oil sand in its well on 34, 12-24.——The Occidental Oil Co., on 2, 11-24 is putting in new tanks.——The Monarch Oil Co. has completed two wells, and pumping same.

The Mt. Diablo Oil Co. will begin drilling in the Midway on section 26, 32-23, near Bakersfield.——Chanslor & Canfield will put in two rigs in the Midway and begin drilling.——The well on the Senator is down 1123 feet, the deepest in the Kern river district.

C. L. Buckingham of Denver, Colo., has prepared plans for a 50-ton mill for the Exposed Treasure G. M. Co., at Mohave, which will be provided with stamps, amalgamating plates, cyanide equipment and concentrating tables, the power to be supplied by gasoline engines. Mr. Buckingham will supervise the construction.

The Lida, in Rosamond district, near Mojave, is reported sold to Los Angeles men for $100,000.

LOS ANGELES COUNTY.

The Westlake Oil Co. is drilling on Nos. 42, 43 and 44, at Los Angeles.——The California Standard Oil Co. has completed its No. 3 well; it is producing seventy-five barrels oil per day.——Well No. 4, of the Uncle Sam Oil Co., is down 200 feet; over 100 feet of oil is in the well.——The College Oil Co. has completed twenty wells, and is drilling on No. 21.——The Yukon Oil Co. has begun work on another well near Nob Hill.——Shirley & Co. are drilling on No. 6 in Belmont park.——Phelps & Co. have completed their No. 2 well.——The Union Jack Oil Co. has put in machinery on the No. 3, and is drilling.——Well No. 2 of the Union Petroleum Co., corner of Ramona and Alpine streets, Los Angeles, is producing.

The St. Louis Oil Dev. Co. is drilling on St. Louis street in Boyle Heights, Los Angeles; the well is down 400 feet.

The Reliance Oil Co. will drill two wells on its Welcome street property.

MADERA COUNTY.

A Huntington mill is to be placed on the Five Oaks, or McFarland, mine, adjoining the Waterloo.

The new mill on the Magnet mine is running, likewise the Standard and Mud Springs mills.

The Boulder mine, near the old Zebra property, is said to show good ore.

Gold, Dec. 16.

MARIPOSA COUNTY.

Work is being pushed at the Virginia mine and mill, at Coulterville; 30 men are employed.

NEVADA COUNTY.

The Julia, Grass Valley, is reported bonded to San Francisco men; 300 feet of drifting will be done.

Thirty stamps are dropping at the Gaston Ridge; fifty men are employed.

The tunnel on the Inskip, Gold Run, is completed.——The shaft at the Three Stars, Ophir, E. J. Kendall Supt., is down 1100 feet; sinking is in progress.——The Houchin & Dixon is shipping ore.

W. J. Britland is pushing work on the old Anderson (quartz), at Selby Flat; ore recently ran $42 to the ton.

The old Constitution, near Rough and Ready, will be put in shape to resume.

The Orleans M. Co. of Grass Valley district has levied an assessment of 3 cents per share, delinquent Jan. 19.

PLACER COUNTY.

The Hidden Treasure Gravel M. Co., Supt. C. D. Akers, has 175 men employed; 500 cars of gravel are taken out daily from the blue and white channels; in the former a 1200-foot gangway is run; a 32-foot shaft is sunk; latter is supplied with an electric hoist; a 700-foot upraise up channel is being made; a new 10 H. P. electric motor to run blower is in.——W. Muir has men working on the Sacramento (gravel), at Forest Hill.——The tunnel at Peckham hill is in 100 feet.——The tunnel on the Sellier, at Bath, is in 800 feet; a new mill will go in soon; Washington G. M. Co., owners.——F. A. Elster has leased the Trafton (gravel), at Yankee Jims.——C. Lovell is running a bedrock tunnel on the St. George.——Parmelee Bros. are pushing work on the Bishop, at Last Chance.——The tunnel of the El Dorado (drift) is in 3000 feet.——The undercurrent, 1½ miles from the mouth of Greenhorn, 4 miles from Colfax, is completed.

SAN DIEGO COUNTY.

Drilling on the Monarch is resumed.——The San Diego County well is down 660 feet.

SAN JOAQUIN COUNTY.

The Victor G. M. Co., capital $250,000, is incorporated at Stockton.

SANTA CRUZ COUNTY.

A coal vein 12 inches wide was opened this week by the Cardiff Co. at Love creek, 15 feet from the mouth of the tunnel.

SHASTA COUNTY.

Additional stamps will be dropping soon on the American.——Watson & Brown are working the Halcyon with good results.——Weil & Malm have bonded the Fox & Espy group, on the east fork of Clear creek. The ore runs $9 gold, $28 silver and over 7% copper per ton.

The machinery for the Shasta Con. Oil Co., Redding, is on the ground. Construction work will be pushed. The plant consists of a 36 H. P. boiler, a 23 H. P. engine, belting, drilling bits, etc.

V. Fox and others are pushing work on the Shafter, at French Gulch.——A strike is reported on the Martha Washington. Ore is being sacked for shipment.——Operations on the old Milkmaid will resume. The shaft will be pumped out.——Pierson & Dryar, leasing the old Washington, are running 100 tons of ore through the old Washington mill.

SIERRA COUNTY.

C. H. Molter is working the Strassner (quartz), 2 miles south of Poker Flat.——Operations at the Twin Eagles, at Gold Point, are resumed; ore is being taken out and mill will soon run; J. S. Wilbur, Supt.

The Independence, on Wolf creek, near Downieville, is being pumped out.——The mill at the Triple Pocket, in Slug canyon, is running.

SISKIYOU COUNTY.

Work is progressing on the Trapper copper mines, in the Yellow Buttes.——New giants are in at the Beaudry South Fork mines, near Callahan.——H. Miller is pushing work on the Bonanza group.——Two giants are working night and day at the Red Hill (hydraulic), in Salmon River district.——An 8-inch vein of good milling ore is reported opened up on the LeRoy and Godfrey (quartz).——Two giants are running steadily on the Salmon River (hydraulic).——S. R. Gardner, lessee of the Hull Gulch placer, in Quartz Valley district, is hydraulicking on the property.——The Morrison & Carlock is running steadily.——Werst Bros. have begun operations on the South Park (gravel), near Cecilville.

An arrastra is in on the Barrington, near Callahans.

SOLANO COUNTY.

The St. Johns (quicksilver), at Vallejo, is reported bonded to a new company.

TRINITY COUNTY.

A new giant is in at the La Grange, near Weaverville.

TUOLUMNE COUNTY.

On the Nonpareil, Big Oak Flat, drifting is in progress on the 150-foot level.——At the Longfellow an additional ten stamps will go in; the cyanide plant is running.——The Riverside, at Columbia, is temporarily closed down while new machinery goes in.——High-grade ore is reported opened up in a crosscut on the 400-foot level of the Dreisam.——The 10-stamp mill at the Silver King, Sonora, is running.——Supt. F. Vassalo Jr. is pushing work on the Tug of War, at Columbia.——Electric power may be used in the mines at Big Oak Flat.——Doyle & Oakes have bonded the Darrow, at Rawhide.——The 10,000-foot pipe line to the site of the new 100-stamp mill that will be erected at the Shawmut next spring is about completed.

Work on the Barry, at Carters, is resumed.——Sinking is resumed from the 900-foot level of the Providence.——In the east crosscut on the 200-foot level of the Laurel $30 ore is reported opened up.

Cerro Gordo Union, W. F. of M., No. 39, has called a strike of the employes in the Longfellow and Nonpareil mines, at Big Oak Flat, claiming that the management has cut the pay of the employes.

VENTURA COUNTY.

The Western Union Oil Co. is down 1600 feet on its property on the Carreaga ranch, near Santa Paula.——The Whittier-Fillmore Oil Co. has struck oil at a depth of 620 feet.——In Timber canyon the Empire Oil Co. has completed its No. 9 well. The latter is producing twenty barrels of oil per day.——The Windsor Oil Co. has resumed drilling in Timber canyon.——Langdell, Rowan & Newmark are down nearly 1400 feet, with a 5⅝-inch hole, on Sulphur mountain.——The Whidden Double Oil Co. is down 150 feet on well No. 4 on the Bracken tract. No. 3 is yielding seventy-five barrels of oil per day.——The Home Oil Co., operating on the Hobson tract, south of Santa Paula, struck oil sand recently at a depth of 400 feet.——It is thought that Ventura may be chosen as the site for the largest oil refinery on the Pacific coast, which will be built as a result of the sale of the Pacific Oil Co. to the Standard Oil Co.

YUBA COUNTY.

The plans for the construction of restraining barriers along the Sierra foothills, for which the State and Federal Governments have made large appropriations, may now be carried out under the terms of a decision this week by Attorney-General Ford. Under the California Debris Commission Act of 1897 an appropriation of $250,000 was made, and Congress set aside a like sum for the purpose, making a total of $500,000 in all. The plans of the Federal engineers engaged called for an expenditure of $800,000, and the State Board of Examiners, being restricted in its jurisdiction to plans involving an outlay of no more than $500,000, feared to lend its approval to the plans. The attorney-general calls attention to the fact that a subsequent Act of Congress provides that the Federal engineers may proceed with the work to the extent of $500,000, leaving the remainder in abeyance, awaiting further action of Congress or the State Legislature, and declares that the plans and specifications for this expenditure of $500,000, afterwards submitted, may properly receive the approval of the State Board.

COLORADO.

BOULDER COUNTY.

A strike of high-grade tellurium ore is reported in the Gladiator, near Jamestown.——The shaft on the Fourth of July, in Arapahoe Peak district, is sunk to the 240-foot level. The Nellie Bly mill, at Magnolia, is to resume; a new roaster is going in; capacity 80 tons per day; Heresey M. Co., of New York, owners.——The shaft on the India is down nearly 180 feet; an additional 100 feet will be sunk.

The Ruby mill, Ward, will soon run on ore from the Silent Friend.——The B. & M. Co. will overhaul and put the old Boston mill in shape to run.——The Big Five Co. is pushing work on the Dew Drop. The Silver Lake M. Co. is putting in a shaft house, ore bins, etc.; machinery will go in as soon as building is completed.——The B. & M. Co. recently made a strike on the 600-foot level of the B. & M.——Sinking is in progress on the 600-foot level of the Superior.——The tunnel of the Leviathan M. Co., being driven into Left Hand mountain, is in 700 feet.

The Wood Mountain M. Co. is down 900 feet on the No. 1, and 1000 feet on the Franklin, at Wall Street; the company will, after January 1st, continue the crosscut, now in 1500 feet, to cut the Joe vein.——C. W. Carlyle is pushing work on the Wall Street group; thirty men are employed.——A new plant, shaft house and ore house are in on the Gold, G. A. Blaisdell, manager; shaft down 100 feet, and drifts east and west are being run at that depth; sinking will continue to 200-foot level.——On the Sugar Loaf, the shaft is down 220 feet; a 250-foot tunnel is run on the 100-foot level; Supt. L. R. Johnson.——The Lucky Star is shipping steadily; shaft is down 320 feet, with levels run at 100, 150, 200 and 300 feet; drifting east and west is progressing on the 300-foot level.——The tunnel on the Concord is in 175 feet.

Conger & Wannamaker, operating wolfram mines, near Nederland, have produced $5000 within the last two months.

CLEAR CREEK COUNTY.

Two shifts are working on the Oro Verde, at Yankee, and Manager Goodyear is pushing work.——The 8x8-foot tunnel on the Mayflower is in 150 feet; it is expected to cut the Puritan vein at the 800-foot mark; electric drills are being used; water is being piped from St. Mary's lake for motive power.——Roberts Bros. are putting the Micawber tunnel in shape to resume operations.——The lessees on the Sierra Nevada intend to begin shipping ore soon.——The Ninety-four Tunnel M. Co. has put in a pipe line from the lake to the new mill.——The tunnel on the Lombard will be driven several hundred feet during the winter.——Sinking is in progress on the Cumberland; shaft, now down 50 feet, will be sunk to 150-foot level.

Arrangements are being made to resume operations in the Atlantic-Pacific tunnel, Georgetown; retimbering of tunnel and putting in of a new plant will probably be done first.——The Clear Creek M. & Reduction Co., capital $500,000, is incorporated.——A 12-inch ledge of galena is reported in the Red Oak.

The tunnel on the Hansborough, Georgetown, is in 400 feet; it will be continued to cut the Cliff vein, from 450 to 500 feet distant.——Ore running $40 to the ton is reported opened up in the Cashier.——Work on the Kelly tunnel is progressing.

A company is formed to work the Abeel property, on Covode mountain, near Empire.

The Red Oaks Co. will push work on the new tramway, at Georgetown, upon arrival of the cable.—The Bismarck is shipping regularly.

The Griffith, Georgetown, is reported sold to H. P. Tweed of Denver for $60,000; work will be pushed.——J. Connors & Co. are sinking on the Mineral Chief.

CUSTER COUNTY.

The November pay roll of the Bassick, at Silver Cliff, was $18,000.

FREMONT COUNTY.

All departments of the new Union mill at Florence are completed and running.

The Portland cement works, 8 miles east of Florence, are temporarily closed down; operations may resume Jan. 1st.

GILPIN COUNTY.

A new hoisting plant will be put in on the Fish group, on Montana hill, near Pine creek.

GUNNISON COUNTY.

Three shifts are working at the Enterprise, at Italian mountain. The ore is being shipped to Aspen.——W. Miller is pushing work on the Yukon, in Taylor gulch.——It is estimated that the tunnel on the Little Lily, now in 175 feet, will have to run another 50 feet before striking ore.——At the Star three shifts are working.—— The new furnace for the smelter at Placita is going in.——The new West Mountain compressor, at Pitkin, is in.——The tunnel on the Gold Links, now in 60 feet, will be driven an additional 100 feet.

HUERFANO COUNTY.

The Western M. M. & Ref. Co. is incorporated to work oil lands near Walsenburg.——Near Muddy, the tunnel being run into Mount Blanca is in over 800 feet; thirty-five men are employed. Work is being pushed on the Scantic, on Carbonate hill.

JEFFERSON COUNTY.

F. R. Carpenter and others have started work on the new smelter at Golden.

LAKE COUNTY.

After the expenditure of nearly $200,000 on the Adams, Maid and Wolftone lease, for hoisting, pumping and milling equipment and putting the underground workings in good condition, this group, which is under a 10-years lease to the A. M. & W. Leasing Co., is now ready to begin operations on a considerable scale, both in production and development. The group comprises three distinct properties, with a deep shaft on each, and after Feb. 1st next the Mab mine, which adjoins on the north, will become a part of the main group, all under the management of S. D. Nicholson. The underground workings are all connected and the Wolftone shaft will be the center of operations. The hoist, boilers and gallows frame here have been previously described. A dynamo has been put in to supply light to the mines and the top premises. The water is handled by two Knowles duplex, triple-expansion pumps—one at the 700 and the other at the 1000-foot station. At present 1000 gallons are being handled. At each pump station the water is bulkheaded and connected with the pumps by a 12-inch suction pipe. At this shaft the sulphide ledge was struck at depth of 700 feet. The present depth is 1100 feet and sinking continues, with the idea of entering a contact at greater depth. A sinking pump follows the work down, handling the increasing flow of water.

Within the last few months the A. M. & W. management has equipped a concentrating mill on the premises, which at present is handling eighty tons of ore per day. This ore, while it comes from the Wolftone proper, comes through the old Adams shaft. Three mills crush the ore to a uniform mesh, the material being separated by hydraulic sizers, the coarser and heavier passing direct to six Wilfleys, the slimes passing to six cone-shaped settlers provided with overflow gates; the settlings run through to other concentrators there being one table under each settler. The overflow from the settlers passes to a series of settling boxes, where a final slime product is obtained. A vibrating conveyor delivers the concentrates from the tables to the shipping bins. By this method of separation two products are obtained, viz.: a lead-iron with small per cent of zinc and a purely zinc product, which runs about 45% of that metal. A Bartlet table is being added to make further concentration tests.

Leadville, Dec. 15. WASCOTT.

MESA COUNTY.

The Western Slope C. M. & S. Co. is pushing work on the Nancy Hanks, in Unaweep district, 12 miles from Whitewater.——The Unaweep C. M. & M. Co. has put in a new hoist on the Mollie Brooks and expects to ship ore.

OURAY COUNTY.

At the Virginius mine and Revenue tunnel of the Caroline M. Co. the shaft, which starts near the breast of the 7500-foot tunnel, has reached a depth of 650 feet, and the intention is to sink to 1000 feet depth, which it is expected will take it into the quartzite. This shaft starts on the hanging wall side of the Virginius vein, cuts through the latter at 550 feet depth, and the work is now in foot wall. Stations have been cut 200 feet apart and it is the intention later to crosscut from each station to the vein. Present depth of this shaft gives a vertical depth on the vein of 4000 feet. The steady production of about 200 tons per day for the past few years has come from above the level of the Revenue tunnel, and so far as can be seen the same general character of ore is maintained from the upper workings down to the point where the tunnel shaft cuts through the ore body. In the shaft above described a cage will soon be operated by a 100 H. P. electric hoist, which has been ordered. About 100 gallons of water per minute comes in, which is handled by an electrically operated station pump.

L. Chelders is developing the Black Diamond group, in Yankee Boy basin, near the foot of Mt. Sneffels. He is uncovering some large bodies of low-grade iron-lead-silver ore.

Sneffels, Dec. 18.

Manager West of the new Home smelter expects to start Jan. 1st.

SAN JUAN COUNTY.

Work on the development tunnel on the Estes Wire Works properties, in Eureka gulch, near Silverton, is suspended for the winter.——The Sioux M. Co., Eureka, will put in a mill next summer.——Manager T. Kane is pushing work on the Hercules, Silverton. The mill is running steadily and is turning out two carloads of concentrates daily.——Strayer Bros. are driving a 300-foot crosscut on the Sentor, on Mineral creek.

The Silverton smelter is putting through from 85 to 100 tons of ore daily.——The Champion No. 2 is shipping ore to the smelter.——The new trackage and air pipe are in at the Fairview, on Sultan mountain.——The North Star–Dives–Shenandoah Co. is pushing work on its property on Solomon mountain.——The crosscut on the Keystone, in Poughkeepsie gulch, near Eureka, is in 80 feet.

J. F. Melvin has leased the Emerald, on Anvil mountain, near Silverton.——The Idaho is shipping regularly.——Good ore is being taken from a drift on 800-foot level of the Washington.——A 3000-foot crosscut is being run on the Mountain Lion, between Red Mountain and Ironton.——The Ben Butler, San Juan Chief and Little Maud, at Mineral Point, are being worked by the L. B. Jackson M. Co; L. B. Jackson, manager.——The crosscut on the Prairie, now in 700 feet, will be driven an additional 400 feet.——Stoping is in progress on the Evening Star, in Mastodon gulch; the main tunnel will be driven 150 feet to tap the ore body.——The Yukon mines and mill are running day and night under Supt. A. A. Lamont.

SAN MIGUEL COUNTY.

At Ophir, Greig & Jarrett are pushing work on the American-Frenchman group.——The Four Metals Co. is shipping ore.——The Butterfly is producing 1500 tons ore per month.

The last report from the Tomboy, at Telluride, shows work done, as follows: Drifts on vein, 2401 feet; raises, 1103 feet; crosscuts, 152 feet; shaft sinking, 109 feet; it is said that there are 50,000 tons of ore in sight over the 300-foot level.——The Adams G. M. Co., capital $100,000, is incorporated to work the Thomas group, in Bear Creek basin.——A controlling interest in the Waverley, Cripple Creek, is bought by W. R. Foley and others; a new plant will go in, and sinking on the Strong vein will be pushed.——The Golden Wedge, on Raven hill, has passed into control of the Mary Jane Co., recently incorporated. —— Three-ounce ore is said to have been opened up recently on the 200-foot level of the Home, on Beacon hill.——Consolidation of the Doctor, Jack Pot, Ingham, Morning Glory and Nugget properties, on Raven hill, Cripple Creek, is reported; capital, $3,000,000.——The Bison, south of Altman, has suspended operations, owing to inflow of water.——The Eagle Sampling Co. will put on another shift; storage bins will be enlarged.——A new vein is opened up on 344-foot level of the Kimberley, Cripple Creek.——A Cincinnati Co. is driving a tunnel into the north slope of Pike's peak, 3 miles southeast of Lanter; machine drills are used; mouth of tunnel is above timber line at an altitude of 11,000 feet.

Work on the Silver Bell at Ophir is progressing; operations on a large scale will soon begin.——On the Staatsburg, 200 feet of drifting is completed; 100 feet additional will be done.——An electric drill will go in at the Deadwood; the tunnel will be driven between 700 and 900 feet.——A tram and milling plant may go in on the Gertrude soon.

SUMMIT COUNTY.

Bulkley Bros. have organized the New Robinson M. & S. Co., the purpose of which is to reopen and operate the old Robinson mine, near the town of Robinson, which was a great producer in former years. The property comprises a group of seventy-five acres. It possesses large bodies of low-grade iron pyrite ores, carrying gold and silver. Shipments now amount to fifty tons per day of lead ore, which comes from another section of the property, whose ores are of a different character. Plans are being made by them to erect a one-furnace smelter on the ground.

Robinson, Dec. 18.

TELLER COUNTY.

Cone & Robinson of Canyon City have sold the Doctor mine, on Raven hill, to A. E. Carlton and associates, the latter having organized the Doctor-Jack Pot Con. M. Co., which effects a consolidation of the Doctor, Jack Pot, Elizabeth Cooper, Ingham and other properties on Raven hill. The capitalization of the new company is $3,000,000, being 3,000,000 $1 shares. Holders of Jack Pot stock and that of other properties in the consolidation will get a certain proportion of the new stock issue. This is an important group; it is contiguous to the Work group. The directors of the new company are A. E. Carlton, W. P. Bonbright, J. H. Hobbs, H. E. and F. M. Woods and A. M. Stevenson.

Cripple Creek, Dec. 18.

Spratt Bros., leasing the Brownlee & Milliken block of the Kimberley, Cripple Creek, have made air-pipe connection with the compressor on the El Paso adjoining.——A new plant will go in on the Little Diamond, on Battle Mountain; at a depth of 40 feet, $60 ore was recently opened up.——Stattler & Baer, leasing the Snowy Range, on Raven hill, recently made a 20-ton shipment of two-ounce ore; drifting is in progress.——The 20-foot ore body recently opened up in the Ophelia tunnel is cut from third level of Burke & Frye's lease on north end of the Mary McKinney, other levels will be extended to the shoot.——A recent 11-ton shipment from the Iron Clad, on Iron Clad hill, returned $62 to the ton.——A crosscut is being run on the 90-foot level of the Woodman, on Rosebud hill, to tap the Mary Nevin vein.

IDAHO.

ADA COUNTY.

E. H. Levy will build a sampling plant in Boise; it will include a smelter of small capacity, a stamp mill of ten tons daily capacity, and a small chlorination and cyanide plant.

BLAINE COUNTY.

The new 20-stamp mill for the Hattie, Hailey, will be built this winter; the mill site is being graded and lumber is arriving.

BOISE COUNTY.

The mines at Pearl, 25 miles north of Boise City, are reported producing $50,000 per month.

The American Girl (quartz), 8 miles northeast of Idaho City, is bonded to the War Eagle Co.; a tunnel will be run on the property.

A 400-foot crosscut tunnel is being driven on the Sam Johnson group, near Quartzburg, recently bought by the Dixie M. & S Co.——A self-discharging arrastra is completed on the Present Need; a tunnel is being run to tap the ledge at a depth of 400 feet.

CANYON COUNTY.

Near Payette a 750-foot tunnel will be run to drain 2 miles of the Payette river, to work the gravel beds; a gasoline engine, two sets of drills to be run by electric power and a dynamo will go in; twenty men will be put on at first.

CUSTER COUNTY.

The Yankee Fork group (quartz), Estes mountain, near Hailey, is reported sold to C. N. Thayer of Boston, Swift of Chicago and others for $100,000.

Instead of cleaning out the old shaft, the Lucky Boy M. Co. will sink a new 200-foot shaft on the Lucky Boy at Custer.

IDAHO COUNTY.

Work is under way on fifty claims on Buffalo Hump. The Buffalo Hump Co. will put in thirty additional stamps and concentrating tables; 100 men are employed; shaft on the Big Buffalo is down 250 feet; drifting and stoping are in progress on the 200-foot level; shaft on the Vesuvius is down 150 feet.——The Wise Boy, near Callender, has six men working.——The Boston & Buffalo–Idaho Co. will put on more men at the St. Louis and the Mother Lode No. 2 and will push work; it is reported that new machinery will go in on the St. Louis and that a 150-foot shaft will be sunk.

The Little Giant, at Warren, recently sold to the Idaho Little Giant M. Co. for $100,000, has fifteen men working; an air compressor and two concentrators are in; ten stamps are dropping; W. H. Hill, manager, J. J. Bennett, Supt.——Work on the Silver King is being pushed; ten men are employed.——The Rescue is being put in shape for a run.——Tilson, Matthews & Myers are pushing work on the Iola.

OWYHEE COUNTY.

The Pauper M. Co. will begin operations on the Pauper, at Silver City, Jan. 1st; the shaft, now down 525 feet, will be sunk to 700-foot level.——There are 500 men mining in the vicinity of Dewey.

SHOSHONE COUNTY.

Gillilland, McNall & Oxley are pushing work on their placers near Delta; two booms are running night and day.——H.

W. Fehling is running his boom steadily with good results.——Busen & Brooks are working a portion of the Myrtle.——Maher & Tozier are putting in a flume and ditch in American gulch.——Output in tons of mines at Gem is given as follows: Morning 800, Frisco 800, Standard 500, Crown Point 200, You Like 280; about 1100 men are employed, divided as follows: Frisco 325, Standard 300, Crown Point 125, Morning 350; the deepest shaft is on the Frisco—2200 feet.

The Murray D. Co. has bought the Mother Lode near Murray; a new mill will probably go in next summer.

The Mullan M. Co. has resumed work on the Lucky Friday, 4½ miles east of Mullan.

The Cœur d'Alene M. Co., capital $200,000, is incorporated at Wardner.——The Ruth M. Co. will work the Ruth, near Wallace, through the winter.

WASHINGTON COUNTY.

The Boston & Seven Devils M. Co. will push work on its copper properties in Seven Devils district next year.

MICHIGAN.

HOUGHTON COUNTY.

The new stamp mill at the Quincy, Houghton, is running; daily capacity, 1500 tons ore.

MONTANA.

DEER LODGE COUNTY.

The Bell, Diamond Mountain, Consolidated and the Green Mountain, at Anaconda, have resumed operations; about 1500 men are employed.

MADISON COUNTY.

W. J. Miller is working the Uncle Sam, on Mill creek, near Sheridan.——The Centennial Toledo Co. will sink a 100-foot shaft on the Centennial Toledo, at Brandon.——The Keynote will begin shipping ore soon.——The Watsega M. Co. will sink a new shaft on the Watsega, at Rochester; it will also equip mine and mill with electric lights.

SILVER BOW COUNTY.

Work on the B. A. & P. tunnel to the Gagnon will be completed Feb. 1.——The new Wyoming–Broadway electric line, Butte, will be running Jan. 15. Ore traffic will be on from 10 P. M. to 8 A. M.

NEVADA.

ESMERALDA COUNTY.

An 18-inch ledge of rich sulphuret ore is reported opened up on the Wilson at Pine Grove.

EUREKA COUNTY.

A recent shipment of eighty and one-half tons of ore from the Rocco-Homestake, at Eureka, returned $2682.15 (net), or $33.32 per ton.

HUMBOLDT COUNTY.

It is locally reported that additional smelters and a new mill will be erected at Golconda by the Glasgow & Western Co., Manager Stalmann.

J. T. Reid is shipping nitre from his beds near Lovelock to the American Nitre Co., Berkeley, Cal.

LINCOLN COUNTY.

The Green Monster, Supt. Wilkinson, is shut down.

Since the Los Angeles & Salt Lake R. R. is an assured fact, prospectors are looking over the country on the proposed line of the road. Some very good copper ores are being found, especially in southeastern part of Inyo county and northeastern part of San Bernardino county, California, and north of Las Vegas valley, Lincoln county, Nevada.

The plant built by the Mineral Union Co. at Goodsprings for the lixiviation of copper ores by the "Ammonia Process," under the direct supervision of the inventor of the process, Professor H. Hirsching, will be sold next month under attachment by C. A. Beck. Bowen & Green have incorporated as a stock company. So far, copper properties have held the attention of investors; now lead properties are being bonded. Messrs. Smith & Bybee have bonded two lead properties to Los Angelenos.

Goodsprings, Dec. 19.

The Horseshoe, at Fay, is shipping gold cyanides to Salt Lake.

LYON COUNTY.

H. R. Case, representing a Denver company, is sampling tailings in the Douglass reservoir below Sutro; should tests prove satisfactory, the company will probably handle the tailings on a large scale.

STOREY COUNTY.

At the Gould & Curry, Virginia, the day and night shifts are laid off owing to a contemplated change in the management; ore in hand will be crushed, and a clean-up made.

Repairs are being made in the perpendicular shaft of the Belcher, Virginia.——The south drift from the upraise, 100 feet above drain-tunnel level, on the Justice, is in 64 feet.——At the Challenge-Confidence-Imperial repairs are made in the surface tunnel: the new air compressor is in, and it will run soon; crosscutting will soon resume.——The old Monte Cristo, near Six-mile canyon, is reported leased to J. Graham and others.

The west crosscut on 1800-foot level of the Con. California & Virginia is in 30 feet; on the 1950-foot level the winze in the old north drift is down 10 feet; 120 cars of ore running on a basis of $65 78 and 78 cars of ore running $22 03 were extracted during week ending Dec. 15th.——The Burning Moscow tunnel is in 175 feet.——The west drift in the Sutro tunnel (1700-foot level) is in 247 feet.——The west crosscut on the Central tunnel level of the Mexican is in 226 feet.——The Hale & Norcross tunnel is run 1912 feet.——On the Sierra Nevada, the south drift, started from the northwest drift at a point 387 feet from shaft, is in 30 feet; west drift on the 1600-foot level is cleaned out and repaired for 680 feet from shaft.——In the Chollar the main north drift on 900-foot level is cleaned out and repaired for 336 feet.——The south drift from main tunnel of the Potosi is in 216 feet; all workings are now lighted by electricity.——At the Silver Hill, the northwest drift is in 123 feet.——During the week ending Dec. 15, 100 tons of ore from stopes on 325-foot level were milled at the Gould & Curry, which returned $4.57 (coin value) per ton.——West crosscut No. 9 on 425-foot level of the Best & Belcher is in 89 feet.——On the Utah, surface tunnel No. 2 is in 788 feet; face in hard porphyry.

Electricity was substituted for steam power in the carpenter shop of the Chollar, Virginia, on the 13th inst.——Electrical machinery will go in on the Nevada by Jan. 1st.——At the recent delinquent sale of the Con. Cal. & Va. M. Co. only 2500 shares out of 216,000 shares were sold for non-payment of the assessment.

The Gould & Curry, at Virginia, is turned over to the new managers, Douglass & Shaw.

WASHOE COUNTY.

W. H. Jackson, of the Jumper, Olinghouse gulch, recently shipped thirty tons of high-grade ore to the Selby Smelting & Lead Works, San Francisco.——W. C. Williams contemplates a mill on the Gold Ledge.——Wadsworth Mill Co., Wadsworth, will put in two Kinkeads and a 5-stamp mill.——Three carloads of ore from the Reno Star, at Reno, recently returned $7760.67.

WHITE PINE COUNTY.

The Chainman mill, at Ely, is being put in shape to run. A combined amalgamation and cyanide process will be used. Twenty-five men will be employed.——W. Lawlor has men running a tunnel in Egan canyon, near Ely.

The first shipment of ore from the Jumbo group, 80 miles from Oasis, was recently made to Salt Lake, Utah; assays show 40% lead and 4.5 ounces silver per ton.

NEW MEXICO.

DONA ANA COUNTY.

The Lead Queen and Lead King mines, in the San Andreas mountains, near Tularosa, recently sold to the Salinas Peak M. Co. of Chicago for $100,000, are shipping ore.——R. Y. Anderson & Co. have resumed operations on the Ben-Nevis group.——Goodwin Bros. are working copper properties near San Andreas.——A new hoisting plant is going in on the Copper Bar at Organ. Work will be pushed.——In the breast of the 500-foot tunnel on the Flor de Mayo, Good Fortune canyon, in the San Andreas mountains, 35 miles west of Tularosa, a 3-foot vein of ore running $100 to the ton is reported opened up; Tipton Copper Co. owners, Manager W. S. Becker.

COLFAX COUNTY.

A new dredging plant will soon begin operations near Elizabethtown.

The Black Copper, at Elizabethtown, is closed down until the mill is up.——The Golden Era M. & M. Co. is pushing work on its new mill in Big Nigger gulch. There are eight coal mines in this county, employing 527 men, and turning out 399,206 tons of coal yearly, valued at $602,107.

GRANT COUNTY.

The San Jose Concentrating Co. will increase the capacity of its plant in Gold gulch from twenty-five to sixty tons daily. A new hydraulic sizer and two Bartlett tables are in.——P. T. McGrath of Silver City, Colo., has made the last payment on the Comanche group at Burros and will organize a company to work it.——The Pinos Altos M. Co. at Pinos Altos is sinking the Gillett shaft, now down 800 feet, to the 1000-foot level.——M. Waterbury of the Golden Giant M. & M. Co. of New York is pushing work on the Golden Giant and Mammoth properties. Twenty-five men are employed. The shaft of the Golden Giant, now down 450 feet, will be sunk to the 600-foot level, while the shaft on the Mammoth, down 300 feet, will go to the 500-foot level. The erection of a 40-stamp mill is postponed until sinking is completed.——The Deming M. & M. Co. at Deming is pushing work on the Maggie M., in Shingle canyon.

SANTA FE COUNTY.

A strike of high-grade gold ore is reported made in Madera canyon, near Algodones.——Work is progressing on the Maceo. A concentrator will be put in next spring.——Work on the new smelter at Algodones is under way.

SOCORRO COUNTY.

The Navajo M. Co., Pino, Cochiti district, projects a new mill on the property.

TAOS COUNTY.

The Copper King at Red River has resumed.——Work is progressing on the Black Copper.

The new June Bug mill at Red River, an amalgamation plant, with crushers, is expected to begin operations Jan. 1.

OREGON.

BAKER COUNTY.

Arrangements are about completed for a resumption of operations on the co-operative property near Sumpter.——A stamp mill is projected for the Carrol B., Pleasant Valley.——A 600-foot tunnel will be driven on the Diadem, Baker City.——The case of Finnegan vs. the Golconda M. Co. for $21,000 damages is decided in favor of defendants.——A ledge of ore running 15% copper is opened up on 60-foot level of the Free Silver at Mineral.——A 6-foot ore body is opened up in the 700-foot tunnel of the Golden Star at Baker City.——Work on the Jerome group on Little Beaver creek, near Alamo, will be pushed during the winter.

The Oregon Placer & Power Co. has put in new giants and pipe on the Griffith placers, near Baker City, and will push work on latter.

A strike of ore assaying $33.20 is reported made on the Leo, at Sumpter.

GRANT COUNTY.

The shaft on the Red Boy, at Granite, is down 500 feet; a new hoisting plant is in; 20 stamps are dropping and more will be added soon; 100 men are employed.

A strike of good ore is reported made on the Mayflower, near Susanville.

The shaft on the Red Rock group at Gold Center, near Granite, down 85 feet, will be continued to the 300-foot level; at this depth crosscutting and drifting will be done.——Work on the crosscut tunnel on the Buffalo, at Granite, is being pushed; Supt. R. T. Cox.

The Scandia M. & Tunnel Co. has ordered drills and an air compressor, and will begin work on the 3000-foot Aldrin tunnel which will penetrate Quebec hill, near Granite.

Work on the Quartz Gulch placer, near Canyon City, will resume soon.

JOSEPHINE COUNTY.

Supt. W. D. O'Brien is pushing work on the Old Channel, at Six Mile; three giants are in operation.——C. H. Parks operating the Golden Wedge, at Galice, reports a 5-foot ledge at a depth of 100 feet; mine was formerly known as the Hutchins-Kramer.——The Rocky Gulch placer has suspended operations temporarily on account of scarcity of water.——Reed & Larrabee of Helena, Mont., are pushing work on their quartz property on Forest creek, near Galice; a mill may be put in soon.

UNION COUNTY.

The Bird's-Eye group, near Sanger, is bonded to A. Freeman of Dallas, Texas.

SOUTH DAKOTA.

LAWRENCE COUNTY.

The Homestake Co. is credited with intention to build a large cyanide plant at the mouth of Bobtail gulch, near Central City, to treat tailings from the Caledonia, Deadwood, Terra and Father De Smit mills; the two latter are now being put in shape to run.——The Boston & South Dakota, in Blacktail gulch, is closed down for the purpose of building a 150-ton cyanide plant.

UTAH.

BOX ELDER COUNTY.

A recent week's run at the Century, Park Valley, returned a $1000 gold bar; Supt, D. H. Lynch.

Supt. P. H. Lynch is pushing work on the Century, at Park Valley.

IRON COUNTY.

A new reduction mill may be put in on the Ophir at Stateline, Manager F. H. Lathrop.

JUAB COUNTY.

Supt. Underwood is pushing work in the Carissa & Spy, consolidated; sixty men are employed.

Work on the Ridge & Valley, at Tintic, is resumed; the shaft, now down 600 feet, will be sunk to 800-foot level; drifting will then begin.——The Ajax is again running after a temporary shut down caused by fire.——Forty men are working on the Grand Central; ore is being shipped.

A tunnel is started on the Sultana group, West Tintic.

Ore from a cavity recently opened up between the 700 and 800-foot levels of the Mammoth, at Tintic, Manager Bamberger, assays fifty-nine ounces silver, $2.40 gold, and 3.7% copper per ton.——Four cars of ore from the Star Con., Manager Packard, recently returned $2266.42.

Shipments of ore from Tintic district for week ending Dec. 15 are as follows:

	Cars of ore.
Mammoth	17
Carissa	8
Crand Central	6
Ajax	1
Centennial Eureka	33
Godiva	2
May Day	3
Gemini	17
Humbug	1
Tesora	6
Swansea	5
Star Consolidated	4
Total	103

PIUTE COUNTY.

The shaft on the Park, of the Park G. M. Co., at Marysvale, is down 250 feet; crosscutting is in progress on this level.

SALT LAKE COUNTY.

The new concentrator of the Butterfield M. Co. at Bingham, is running.——Work on the Homestake and Eldora claims at Alta is being pushed.——The new working and drain tunnel on the Old Telegraph, now being driven from mouth of Bear Gulch, is in 200 feet; it is expected to cut the foot wall in 850 feet, at a depth of 500 feet.

On the New Sensation at Big Cottonwood, an ore body is reported opened up in the tunnel.——Good ore is opened up in the old Congress tunnel of the Winnemuck, Bingham, which, until recently, has lain idle for twenty years. The Dewey mill is running on a 200-ton lot of ore from the old Damphool tunnel of the Midland group.——The West Mountain M. & M. Co., operating the Kansas group in Freeman gulch, Bingham, is taking out good ore from Kansas shaft No. 1; ore shows 1½% copper, 9.7% lead, 225.2 ounces silver, and $1.20 gold per ton.——By Jan. 15th the Provo canyon electric plant will be supplying Bingham mines and mills with electric power.——Upon inauguration of electric power into Bingham, the Fortune and Shawmut mills will probably start up.

A vein of galena, one-half foot thick, yielding 20% lead, 3% copper, and from six to ten ounces silver to the ton, is reported on the York, at Bingham, owned by the York M. Co.

The Silver Shield, Bingham, will ship several cars of crude ore and concentrates the end of this month.——By the end of 1901, it is thought probable that the United States Co. will have a 500-ton smelter running.——The Last Chance mill is turning out about five tons of concentrates daily.——The tunnel on the Admiral Schley, Nos. 1 and 2, is running through ore, which assays 4% to 6% copper, eight ounces silver and $2 gold per ton.——Supt. Dugan is pushing work on the Little Cottonwood tunnel, now being driven to cut the I. X. L. and Jersey Blue vein.——Fifteen men are employed at the Shawmut on development work.

SUMMIT COUNTY.

Machinery for the new King sampler, at Park City, is arriving, and construction work will be pushed.——A station is being cut on 1600-foot level of the Ontario.——Following are shipments of ore from Mackintosh sampler for week ending Dec. 15:

	Pounds.
Daly-West	1,192,000
Silver King	967,000
Anchor concentrates	518,000
Ontario	209,000
Total	2,886,000

It is locally reported that the Centennial Eureka M. Co., Eureka, may buy the Eureka Hill, which adjoins the Centennial Eureka on the north; the Eureka Hill is equipped with steam hoist, a 100-stamp combination mill, etc.

TOOELE COUNTY.

The new concentrator on the West Argent at Stockton is running successfully; manager F. R. Ball.

UINTAH COUNTY.

The smelter at Vernal is running steadily. Operations at the Dyer were temporarily suspended recently, owing to a strike of employes.

WASATCH COUNTY.

The Josephine M. Co., capital $125,000, is incorporated to work the Sunflower and other claims in Elkhorn district.

WASHINGTON.

FERRY COUNTY.

Returns from a second shipment of ore—fourteen tons—from the Morning Glory, Republic, give $405 per ton, or a total of $5670. The ore was taken from the 200-foot level. A shipment of ore from the 250-foot level will be made soon.——The Copper Queen M. & S. Co., capital $50,000, is incorporated.

On the Flag Hill, Republic, 4 feet of ore is opened up in the north drift from the tunnel level. Work on the drift south from the winze will resume soon.

The Mountain Lion, Republic, is crosscutting for the main ledge; shaft will be sunk to 625-foot level.——The Quilp will probably begin shipping 100 tons of ore weekly; freighters ask $10 per ton.

Supt. J. L. Harper of the Hawkeye, on Lambert creek, near Republic, reports the shaft down 149 feet; a station is being cut on that level preparatory to crosscutting the ledge.

During November 223 feet of drifting was done on the Mountain Lion, Republic; a crosscut tunnel on the 425-foot level was run to cut the ledge.——At the Quilp an 8x15-foot raise is run.

Supt. M. Hodges of the Princess Maud is drifting on the 300-foot level.——The Quartz Cap has resumed.——The shaft on the Silver Dollar is down 70 feet; the ledge is drifted on 40 feet.——The Republic mill is running steadily.——Ore from the 285-foot level of the Butte & Boston, Republic, shows $17.60 gold and $6.12 silver per ton, or a total of $23.72 per ton. ——H. L. Neville is pushing work on the Chespa–Blue Jay; the old shaft is down 85 feet; a new shaft is being sunk.——Near Keller, drifting from the 50-foot shaft on the Umatilla is in progress.——Development on the Manila shows a continuation of the high-grade ore body recently opened up.

OKANOGAN COUNTY.

The Success G. M. & M. Co., H. M. Curry manager, will push work on its property on Æneas mountain, near Loomis, during the winter.——A strike of ore assaying $73.22 per ton ($69 being copper) is reported made at a depth of 120 feet in the Methow, on Methow river, 6 miles from Winthrop.

WYOMING.

FREMONT COUNTY.

Manager B. N. Tibbals will sink on the Carissa, at South Pass.——J. Boyland has men working on the Burr at Lewiston.——The Home Development Co. is organized at South Pass to work the Independence group, near there.

FOREIGN.

AFRICA.

A company will be formed to work the new gold fields recently found in South Kordofan, in the Soudan.

BRITISH COLUMBIA.

A new seven-drill compressor and extra machine drill will go in on the Snowshoe, near Phœnix.——At Deadwood, a new forty-drill compressor is in place on the Mother Lode; high-grade ore is reported opened up on the 300-foot level.——The British Columbia, in Summit camp, is shipping 250 tons ore per day.——On the Giant, Rossland, stoping is in progress. ——At the New St. Elmo, the north drift is in 60 feet, south 325 feet; two shifts are working; cost of drifting per foot, including air superintendence, etc., is $14.——Progress is reported on the new Le Roi mill.——The War Eagle shaft, now down 1195 feet, will be sunk an additional 55 feet. ——The winze on the Evening Star is down 296 feet; crosscutting is in progress. ——A pump station is being cut in the Josie claim of the Le Roi No. 2.——The shaft on the Rossland Great Western is down 645 feet.——A diamond drill will be used on the Big Four.——On the Northern Bell the crosscut tunnel is in 270 feet.——The Iron Mask is shipping ore.

It is reported Guggenheim & Sons, of Antofagasta, Chili, have contracted to buy $1,000,000 worth of reduced silver-lead ore from the St. Eugene Con. M. Co., of Moyie.

The Tamarac, at Ymir, is shipping forty tons of ore daily.——The North American M. Co. will resume work on its properties near Ymir.

The British Columbia C. Co. will put in a new three-drill compressor on the No. 7, near Greenwood.——The British Columbia (Rossland) & Slocan syndicate is putting in a seven-drill 16x24 compressor, and three 3½ hand drills on the Snowshoe.

During November the mines of Kootenay and Yale produced 57,500 tons of ore.

The Metropolitan group, comprising the San Francisco, Chicago, Boston, New York, Montreal and Fairview claims, in the Lardeau, 9 miles from Ferguson, is reported sold to C. W. McCrossan, of Duluth, Minn.——The winze on the Evening Star is down 304 feet.

Twenty-three tons of ore from the I. X. L., Rossland, recently shipped to the Northport, Wash., smelter, returned $7840.

The O. K., Rossland, is bonded to J. S. Baker, managing director of the I. X. L., adjoining. Work will be pushed on both properties.——During the week ending Dec. 15 the following shipments of ore from mines at Rossland were made:

	Tons.
Le Roi	4173
Center Star	2112
Le Roi No. 2	31
Iron Mask	135
Giant	22
Spitzee	22
Total	6495

The Minnesota Silver Co. is running its mill at New Denver; it will turn out a car of high-grade concentrates daily.——Work on the Two Friends is being pushed; ten men are employed.——One hundred men will be employed at the Ivanhoe, Slocan.

A new 20-drill, duplex, Canadian Rand drill air compressor will go in on the Snowshoe, at Phœnix. A temporary 8-drill, straight line compressor will be used until the new plant is in.

The smelter at Nelson is running steadily.——Ore is opened up in the Queen Bess, at Slocan.——Work is being pushed on the Roylston, near Nelson.

The Rossland Bonanza M. Co. is pushing work on the Bonanza, on St. Thomas mountain, 18 miles north of Rossland. An adit is being run on the vein. Ore from the latter assays $34.20 per ton.

MEXICO.

A. B. Adams of Copalquin, Mexico, and W. F. Maginnis of Minnesota will put in a mill on the Palmarito (silver), Sinaloa.

NICARAGUA.

C. J. Corey, writing from Cape Gracias, reports considerable activity in mining on the Waunks and Pis Pis rivers; on the Bonanza, near Great Falls, on the Pis Pis river, over 200 miles from Cape Gracias, a mill is going in; two arrastras are running on the Constancia; it is said that this mine has produced $150,000 in the last four years; gold from these mines brings from $15 to $16 per ounce in New Orleans; an export duty of 10% is charged; a mining claim is 450x600 feet.

ONTARIO.

It is reported that a $300,000 iron smelter will be built in Kingston next year.

Personal.

W. Babcock of Utah is in New York.

H. Simons of Iowa Hill, Cal., is in San Francisco.

F. Wilson of the Inyo G. & C. M. Co. is in Inyo, Cal.

M. Johnson, Pres. Mazeppa G. M. Co., is in Stent, Cal.

J. Edwards, of Salt Lake, Utah, goes to Phœnix, Ariz.

T. F. Cole has resigned as manager of the Mass Con. M. Co.

Walter Bunce is now Supt. Bachelor mine, near Ouray, Colo.

G. Lavagnino has returned to Salt Lake, Utah, from Europe.

Herbert Lang has returned from El Paso, Texas, to Oakland, Cal.

J. A. Eades, of Soldier Summit, Utah, has returned there from Colorado.

Thos. Brown has been elected Supt. Columbus mine, Mariposa Co., Cal.

P. F. Whirlow, of San Francisco, takes charge of the Angels, Cal., mine.

G. E. Morse, Pres. Swayne M. Co., Jacksonville, Or., is in Cleveland, Ohio.

O. A. Cecil, assayer Jumper, Stent, Cal., has returned there from Nebraska.

T. L. Huddleson has returned from South America to Salt Lake City, Utah.

Manager Waterhouse of the Golden Trout M. Co., Oroville, Cal., is in Boston, Mass.

W. H. Hill, general manager Last Chance M. Co., Trinity, Cal., is in the East.

W. Maitland, Supt. Nash Deep Gravel mine, Weaverville, Cal., is in San Francisco.

J. Morris is appointed Supt. Mountain Lily, Columbia, Cal., vice M. Page, resigned.

C. Brockington, Supt. Orleans, Grass Valley, Cal., has returned there from San Francisco.

D. McVichie, Supt. Bingham C. & G. M. Co., Bingham, Utah, has gone to Bland, New Mexico.

R. Truman, general manager Ray Mines, Ltd., has returned to Florence, Ariz., from New York.

C. L. Buckingham, a millwright of Denver, Colo., is on a business trip through Arizona and California.

G. K. Fischer, Supt. Construction of the Highland Boy smelter, Bingham, Utah, is in New Mexico.

E. L. Redding is appointed assistant general manager of the Occidental Development Co. of Colorado.

W. W. Thurston, Supt. Lone Jack and Homeward Bound mines, Grass Valley, Cal., leaves for Pennsylvania.

Manager Stalmann of the Glasgow & Western M. Co., Golconda, Nev., has returned there from New York.

A. P. Lewis, Pres. Imperial C. M. Co. and Royal C. M. Co., Frisco, Utah, has returned there from Chicago, Ill.

F. R. Brown, the former foreman, succeeds T. C. Mayon in the superintendency of the Apollo mine, Unga, Alaska.

A. Buckbee is appointed manager Cumberland, at Silver City, Idaho, owned by the Virtue Con. M. Co., of Montreal, Canada.

L. D. Godshall is resident manager Kurtz–Chatterton C. M. Co., and Supt. construction Boston–Wyoming Smelter, Encampment, Wyo.

Bela Kadish, of Baker City, Or., has been offered the superintendency of the smelter at Northport, Wash. The position carries with it a salary of $10,000 a year.

F. T. Freeland of Aspen, Colo., has been appointed general manager Frisco Con. M. Co., Ltd., Gem, Idaho. He has selected G. Ehrenberg assistant manager and A. D. Marshall mine foreman.

W. A. Dennis, for many years Supt. Mountaineer M. & M. Co.'s property, Nevada City, Cal., who, on account of ill health, was compelled to resign one year ago, has again regained his health. On Oct. 1st Mr. Dennis again took charge of the property.

J. H. Hammond says he will sink the main shaft of the Independence mine, Cripple Creek, Colo., to 1400 feet. The deepest shaft in Teller Co., Colo., is now about 1200 feet. The Independence dividends will be cut down 75%, making them $488,000 for the year.

Commercial Paragraphs.

The Vulcan Iron Works Co. of Seattle, Wash., have moved out of their old location to new enlarged quarters.

The Hooper Pneumatic Milling Co. has removed its offices from Baltimore, Md., to 519 W. 30th St., New York City.

McFarlane & Co., Denver, Colo., have made some special types of crushers, rolls, filter presses and other equipment for the Geijsbeek Pottery Co., whose plant for the manufacture of pottery and porcelain ware will soon be completed at Golden, Colo.

The Mine & Smelter Supply Co., Denver, Colo., have made satisfactory tests of the efficiency of the Durkee lightning drill, which is electrically operated, and have decided to manufacture and sell same, having recently sent out a number of that type to mines in Colorado and Arizona.

During the past ten days the Robert Aitchison Perforated Metal Co. of 303 Dearborn street, Chicago, have closed a contract with one of the large thresher manufacturers of the northwest for their season's supply of perforated metals; they have also closed a contract for over sixty thousand square feet of perforated steel for malt machinery. They write: "Business is very good and the outlook promising for its continuing in this way."

Recently Declared Mining Dividends.

	Payable.
Acacia M. Co., Colo., $15,000	Dec. 15
South Godiva M. Co., Utah, $2 per 1,000 shares, $480	Dec. 15
Silver King M. Co., Utah, regular 50 cents per share, $75,000; extra 66⅔ per share, $100,000. Total, $175,000	Dec. 24
Isabella G. M. Co., Colorado, 1 cent per share, $22,500	Dec. 22
Modoc G. M. Co., Colorado, 1 cent per share, $5000	Dec. 15
Nugget G. M. Co., Colorado, $9910	Jan. 15
Zoe G. M. Co., Colorado, $7500	Dec. 25
Homestake M. Co., South Dakota; regular 25 cents per share, extra 25 cents per share; $105,000	Dec. 26
Rocco-Homestake Co., Nevada; 1½ cents per share, $4500	Jan. 10
Gwin Mine Development Co., Cal., 25 cents, $25,000	Dec. 18

Catalogues Received.

In the usual superb style of the Westinghouse Co.'s trade treatises comes a monograph on motor-driven duplex air compressors as built by the Westinghouse Air Brake Co., Pittsburg.

List of U. S. Patents for Pacific Coast Inventors.

REPORTED BY DEWEY, STRONG & CO.,
PIONEER PATENT SOLICITORS
FOR PACIFIC COAST.

FOR THE WEEK ENDING DEC. 11, 1900.

663,597.—Brake—H. C. Behr, S. F.
663,558.—Eyelet Setter—S. W. Burtchaell, S. F.
663,733.—Milk Bottle—C. E. Crane, Seattle, Wash.
663,603.—Reversing Gear—J. E. Doak, S. F.
663,567.—Pipe Wrench—P. Frichette, Sheridan, Cal.
663,544.—Pipe Cutter—J. S. Hill, Los Angeles, Cal.
663,574.—Face Steamer—W. C. Keithly, S. F.
663,551.—Street Sweeper—J. C. McCollum, Los Angeles, Cal.
663,586.—Burglar Alarm—Jennie Simoni, S. F.
663,792.—Cherry Pitter—E. H. Skinner, Springbrook, Or.
663,837.—Gas Purifier—A. C. Swain, S. F.
653,646.—Filter—A. J. Tait, Oakland, Cal.
33,712.—Design—W. F. Clark, S. F.
33,691.—Design—J. Ewing, S. F.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s Scientific Press U. S. and Foreign Patent Agency, the following are worthy of special mention:

Revolving Cylinder Engines.—No. 663,087. Dec. 4, 1900. James D. McFarland, Jr., San Francisco, Cal., one-half assigned to John Bruckman, same place. This invention relates to an engine in which cylinders are mounted radially with relation to an axis about which they are revoluble, and the piston rods on said cylinders are connected with a second shaft which is eccentrically placed with relation to the first named shaft, whereby a reciprocation of the pistons in the cylinders is produced by their revolution around the two centers. It consists of a series of radially disposed cylinders having closed ends, a wheel, a central shaft with relation to which it is turnable, and with the rim of which wheel the cylinders are connected. A second shaft is eccentrically located with relation to the first shaft and has inlet and outlet passages for the propelling medium. Hollow piston rods extend through stuffing-boxes in the inner heads of the cylinders and have independent passage therethrough communicating respectively with the cylinder chambers upon opposite sides of the piston. Rings inclose the supply shaft and with these rings the hollow piston rods connect. A sleeve is interposed between the rings and the shaft and has slots which coincide periodically with the passages in the shaft and thus lead to the hollow piston rods whereby the propelling medium is alternately admitted and exhausted from opposite sides of the piston.

Bed Bottoms.—No. 663,171. Dec. 4, 1900. John Hoey, San Francisco, Cal. The object of this invention is to overcome the difficulties hitherto experienced in the bed bottoms constructed of an elastic woven netting stretched upon a framework, and this is done by dividing the strain between the end rails and the side rails. This is effected by using a series of cables extending from one side rail to the other and having endwise elasticity, with means by which the tension of these cables can be increased by drawing the central portions of two contiguous cables towards each other transversely of their length. The bed bottom consists of a rigid rectangular frame, a fabric connected with the end bars of the frame, and unconnected with the side bars thereof, means for reducing the strain of the fabric upon the end rails and dividing said strain between the end rails and side rails, consisting of elastic cables extending transversely across from one side rail to the other beneath and in contact with the central portion of the fabric whereby the tension of said cables acts upon the frame at right angles to the tension of the fabric. Means are provided for connecting the transverse cables in pairs so that the cables of each pair may be drawn toward each other and their tension increased, with means for connecting one pair of cables with the other.

Pipe Wrenches.—No. 663,567. Dec. 11, 1900. P. Frichette, Sheridan, Cal. This invention is an improvement in pipe wrenches, and consists of a single integral bar folded about midway upon itself to form converging jaws, and split from a point near the outer end of the folded portion to form two straight and parallel sides separated from each other. These sides are provided with adjusting holes and a lever having a corrugated and beveled end, is fulcrumed in either of the holes so as to compress the pipe between itself and the two separated sides and the folded portion which forms the final point of contact. Thus clamped, a sufficient purchase may be brought upon the lever to easily turn the pipe in either direction.

BURGLAR ALARM DOOR LOCK.—No. 663,586. Dec. 11, 1900. Jennie Simoni, San Francisco, Cal., one-half assigned to W. K. & I. C. Hays of same place. The object of this invention is to provide an independent movable device which can be placed in contact with a closed door within the room and mechanism carried by the device which will be operated by any pressure applied tending to open the door. It consists of a spring-actuated alarm with a locking device, a base plate upon which this is carried with fixed points adapted to rest upon the floor, a slidable rod having a point adapted to rest against the surface of the door and an angular ring having its opposite sides pivoted to the base plate, said ring carrying a detent upon one edge which engages and normally retains the alarm out of action. An incline upon the opposite side is in line with the slidable shank of the movable point, so that any movement of these parts disengages the detent and sounds the alarm.

TRANSMITTING AND REVERSING GEAR.—No. 663,603. Dec. 11, 1900. J. E. Doak, San Francisco, Cal., one-half assigned to Wm. Leviston, same place. The object of this invention is to provide a simple transmitting and reversing gear for engines. It consists of a driving shaft, a driver fixed thereto, a sleeve having its major axis in the direction of the length of the shaft, and loosely mounted thereon, a second driver on the sleeve, a transmitter adapted to occupy the space between the two drivers and mounted in the plane of the axis of one of them; a means for disengaging or engaging the transmitter with the two drivers, a clutch member fixed to the driving shaft, a second clutch member rigid with the opposite end portion of the sleeve and a unitary mechanism whereby the clutch is engaged or disengaged simultaneously with the disengagement or engagement of the transmitter with the drivers.

◆

Latest Market Reports.

◆

SAN FRANCISCO, Dec. 20, 1900.

SILVER—Per oz., Troy: London, 29⅝d (standard ounce, 925 fine); New York, bar silver, 64c (1000 fine); San Francisco, 64c; Mexican dollars, 50¾c.

COPPER.—New York: Lake, 1 to 3 casks, $17.00 cash; carload lots, 16.75; Electrolytic, 1 to 3 casks, 16.87½; carload lots, 16.62½; Casting, 1 to 3 casks, 16.62½; carload lots, 16.50. San Francisco: 18. Mill copper plates, 20c; bars, 22@23c.

LEAD.—New York, $4.32½; Salt Lake City, $4.00; St. Louis, $4.20; San Francisco $5.00, carload lots; 5½c 1000 to 4000 lbs.; pipe 6¾, sheet 7½, bar 6c; pig, $4.70 @5.10. London, £16 2s per ton.

SPELTER. — New York, $4.27½; St. Louis, $4.10; San Francisco, ton lots, 5¼c; 100-lb lots, 6c.

ANTIMONY.—New York, Cookson's, 10c; Hallett's, 9¼c; San Francisco, 1000-lb lots, 12c; 300 to 500 lbs., 13@14c; 100-lb lots, 15@18c.

IRON.—Pittsburg, Bessemer pig, $13.25; gray forge, $13.50; San Francisco, bar, per lb., 2.65c in small quantities.

STEEL.—Bessemer billets, Pittsburg, $19.75; open hearth billets, $21.50; San Francisco, bar, 7c to 12c per lb.

TIN.—New York, pig, $25.50; San Francisco, ton lots, 29c; 1000 ℔s., 29¼c; 500 ℔s., 29½c; less, 30c; bar tin, ℘ ℔, 35c.

QUICKSILVER. — New York, $51.00; large lots: London, £9 2s 6d; San Francisco, local, $48.00 ℘ flask of 76½ ℔s.; Export, $45.

NICKEL.—New York, 50@60c ℘ ℔.

MAGNESIUM.—New York, $3.00 ℘ ℔.; San Francisco, $4.00.

ZINC.—San Francisco, 5¼c; slab, 5¾c; bar, 7c.

BABBITT METAL.— San Francisco, No. 1, 10c.

SOLDER. — Half-and-half, 100-℔. lots, 18½c; San Francisco, Plumbers', 100-℔. lots, 15½c.

ASSAY LITHARGE.—San Francisco, 10c ℘ ℔, small lots.

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 30c to 35c.

BISMUTH.—New York, ℘ ℔., $1.60 50-℔ lots; San Francisco, $2.50 to $2.75 ℔ lots.

PHOSPHORUS. — F. o. b. New York 50@60c ℘ ℔.

TUNGSTEN.—New York, ℘ ℔., 95c; San Francisco, $1.15.

FERRO-TUNGSTEN. — New York, 37%, 35c; San Francisco, 65c (60%).

FERRO-MANGANESE. — Pittsburg, 80%, domestic, $85, large lots.

PLATINUM.—San Francisco, crude, $17 ℘ oz.; New York, $18.20 per Troy oz

POWDER.—F. o. b. San Francisco: No. 1. 70% nitro-glycerine, per ℔., in carload lots, 15¼c; less than one ton, 17¼c. No. 1*, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1** 50%, carload lots, 11¾c; less than one ton, 13¾c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9½c; less than one ton, 11½c. No. 2** 30% carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9, in lots not less than 1000.

FUSE.—Triple tape, $3.60 per 1000 feet; double tape, $3.00; single tape, $2.65; Hemp, $2.10; Cement No. 2, $3.00; Cement No. 1, $2.65, in lots of 3000 feet and up.

CANDLES.—Granite 6s, 16 oz., 40s., 11¼c ℘ set; 14 oz., 40s., 10c.

CHEMICALS.—Cyanide of potassium, 98%-99%, jobbing, 32½@33½c ℘ ℔.; carloads, 30@31c; in 10-℔. tins, 40c; sulphuric acid, 66% B, 2c ℘ ℔.; soda ash, $1.60 ℘ 100 ℔s. 58%; hyposulphite of soda, 2¾@3c ℘ ℔.; blue vitriol, 5½@6c ℘ ℔.; borax, concentrated, 7@8c ℘ ℔.; chlorate of potash, 12@13c; roll sulphur, 6c; alum, $1.90@2.00; flour sulphur, French, 2¼@2½c; California refined, 1¾@2c; nitric acid, in carboys, 8c ℘ ℔.; caustic soda, in drums, 3@4c ℘ ℔.; Cal. s. soda, bbls., $1.00; sks, 95c ℘ 100 ℔s.; chloride of lime, spot, $2.50@2.60; nitrate of potash, in kegs, 8c; caustic potash, 10c in 40-℔. tins.

COAL. — San Francisco, coast, yard prices: Wellington, $9; Seattle, $7.00; Coos Bay, $5.50; Southfield, $9.00. Cargo lots, Eastern and foreign: Wallsend, $8.00; Brymbo, $7.50; Pennsylvania, hd., $14.00; Scotch, $8; Cumberland, $12; Cannel, $9.50; Welsh Anthracite, $12.00; Rock Springs, $8.50; Colorado Anthracite, $14.50. Coke, $16 per ton in bulk; $18 in sacks.

OILS.—Linseed, pure, boiled, bbl., 86c; cs., 91c; raw, bbl., 84c; cs., 89c. Deodorized Stove Gasoline, bulk, 14½c; do., cs., 20½c; 86° Gasoline, bulk, 21c; do., cs., 27c; 63° Naphtha or Benzine, deodorized, in bulk, per gal., 13½c; do., in cs., 19½c; Lard Oil, Extra Winter Strained, bbl., 70c; cs., 75c; No. 1 bbl., 50c; cs., 55c; Neatsfoot Oil, coopers' bbls., 60c; extra bbls., 65c; cs., 60c; No. 1 bbl., 52½c; cs., 57½c.

◆

San Francisco Stock Board Sales.

◆

SAN FRANCISCO, Dec. 20, 1900.

200 B. & B.	24c	150 Ophir.	61c
100 C. C. & V.	$1 40	200 Savage	15c
200 H. & N.	18c	200 Union Con	21c

ALPHABETICAL INDEX TO ADVERTISERS.

(—) Indicates every other week or monthly advertisements.

PAGE.

A
Adams, W. J. 14
Ainsworth & Sons, Wm. 14
Aitchison Perforated Metal Co., Robert 15
Akers, Wm. A. 14
Allis Co., Edward P. 5
American Copper Mining & Extraction Co. 1
American Diamond Rock Drill Co. 9
American Injector Co. 1
American Oil and Refinery Co. 17
American School of Correspondence 1
American Steel & Wire Co. 10
Ames, A. T. 7
Atlas Pipe Wrench Co. 11

B
Baird & Co., Henry Carey 17
Baker, F. D. 1
Baker & Hamilton —
Balliet, Letson 14
Barnhart, Geo. W. 18
Bartlett & Co., C. O. 1
Bell, J. 14
Bell, Newton M. 16
Benjamin, E. H. 14
Birch & Co., W. H. 16
Boesch Lamp Co. —
Bradley Pulverizer Co. 4
Braun & Co., F. W. 7
Breitung, E. N. 1
Bretherton Hot Blast Smelting Co. 3
Brownell, J. S. —
Bucyrus Dredge 5
Bullard & Breck 1
Bullock Mfg. Co., M. C. 9
Burlingame & Co., E. E. 14
Burt Mfg. Co. —
Burton, Howard E. —
Butters & Co., Ltd., Chas. 14

C
California Anti-Caloric Co. 5
California Perforating Screen Co. 15
California Vigorit Powder Co. —
California Wire Works 19
Canton Steel Co. 9
Cary Spring Works 10
Colorado Iron Works Co. 2, 3
Colorado Midland Railway 15
Colorado & Southern Ry. 15
Compressed Air Machinery Co. 12
Cons. St Gothard Gold Mining Co. 1
Copper King, Ltd. 10
Cory, C. L. 14
Crane & Co. 5
Crown Gold Milling Co. 6
Cuplin, P. P. 5

D
Davidge & Davidge 14
Dearborn Drug & Chemical Works 13
Denniston's San Francisco Plating Works 11
Denver Engineering Works 15
Denver Fire Clay Co. 13
Denver & Rio Grande R. R. 17
Detroit Lubricator Co. 16
Dewey, Strong & Co. 12
Doble Co., Abner 9
Donaldson & Co., A. M. 1
Dow Pumping Engine Co., Geo. E. —
D. S. M. 1

E
Eby, Jno. D. 11
Electric, Railway & Mfrs. Supply Co. 1

PAGE.
Elkins, John T. 14
Ericsson Telephone Co. 1
Eureka Co. 1
Eureka Con. Drift Mining Co. 17
Evans & Co., C. H. 3
Excelsior Redwood Co. —

F
Fairbanks, Morse & Co. 4
Falkenau, Louis 14
Ferris, John W. 1
For Sale 1
Fowler, G. C. —
Fraser & Chalmers 15
Frue Vanning Machine Co —
Fulda's Planing Mills. —

G
Garratt & Co., W. T. 3
Gates Iron Works 8
General Electric Co. 3
General Photo-Engraving Co. 11
Gibson, Chas. B. 14
Globe Engineering Co. 3
Globe Iron Works 11
Gold & Silver Extraction Co. of America, Ltd. 13
Goodell, Albert I. 14
Goodyear Rubber Co. 13
Gould & Curry Silver Mining Co. 17
Griffin, Frank W. 5
Gutta Percha Rubber & Mfg. Co. —

H
Haff, Edward L. 14
Hallidie Ropeway 19
Hamilton Mfg. Co., Wm 18
Hamilton, W. H. W. 14
Hanks, Abbot A. 14
Harrigan, Jno. 14
Harvey, F. H. 14
Hayden & Co., J. M. 13
Heald's Business College 17
Hendrie & Bolthoff Mfg. & Supply Co. 2
Hendy Machine Works, Joshua 7
Hercules Gas Engine Works 18
Heyl & Patterson 6
Hirsching, H. 13
Hoskins, W. 13
Hooper & Co., C. A. —
Hug, D. 2
Hunt, A. M. 14
Huntington, F. A. 8
Huntley, D. B. 14

I
Independent Assay Office 14

J
Jackson Drill & Mfg. Co. 9
Jackson, Geo. G. 5
Jackson Machine Works, Byron 15
Jeanesville Iron Works Co. 13
Jeffrey Mfg. Co., The 16
Jessop & Sons, Ltd., Wm. 9
Jewett, Daniel G. 14

K
Kent Mill Co. 12
Keuffel & Esser Co. 13
Keystone Driller Co. 9
Knight & Co. 12
Koppel, Arthur 18
Krogh Mfg. Co. 3
Kyle & Co., T. D. —

PAGE.
L
Lallie, J. S. J. 14
Leffel & Co., James 12
Leschen & Sons Rope Co., A. 4
Lexow, Theodor 9
Leyner, J. Geo. 9
Link-Belt Machinery Co. 11
Lloyd, Benj. T. 1
Luckhardt Co., C. A. 14
Ludlow-Saylor Wire Co. 5
Lunkenheimer Co. 16

M
Macdonald, Bernard 14
Madison, Bruce & Sellers 11
Main Belting Co 11
Mandell, Frank C. 14
Mariner & Hoskins 13
Marion Steam Shovel Co. 18
Marshutz & Cantrell —
May Day Gold & Silver Mining Co. 17
McFarlane & Co. 18
Meredith, Wynn 14
Mershon, James R. T. 1
Mine & Smelter Supply Co. 8
Miners' Assay Office 14
Montgomery Machinery Co., J. H. 11
Moore & Co., Chas. C. 8
Morris, H. D. & H. W. 1, 6

N
National Consolidated Mining Co. 17
National Iron Works —
Nevada Metallurgical Works 14
New Process Raw Hide Co. —
Nicholson, Hudson H. 14
Novelty Mining & Milling Machinery Co. 4

O
Ogden Assay Co. 14
Oregon Railroad & Navigation Co. 15
Oriental Gas Engine Co. —
Orleans Mining Co 17
Otis, McAllister & Co. —

P
Pacific Coast Machinery Co 3
Pacific Coast Smelting & Refining Works 10
Pacific Tank Co. 17
Paraffine Paint Co. 5
Parke & Lacy Co. 9, 19
Paul, Almarin B. 14
Pelton Water Wheel Co 12
Penberthy Injector Co. 16
Pennington Sons, Inc., Geo. W. —
Perez, Richard A. 14
Peterson, L. 16
Phillips & Co., Alvin 13
Pneumatic Cyanide Process Co. 13
Postlethwaite, R. H. 14
Powell Co., Wm. 16
Price & Son, Thomas 14

Q
Quick, Jno. W. 15

R
Rand Drill Co. 9
Rank, Sam'l A. 14
Reckhart, D. W. 14
Richards, Jno. 1
Richards, J. W. 14
Rickard, Mr. Stephen 14
Risdon Iron Works 2
Robins Conveying Belt Co. 11
Roebling's Sons Co., John A. —

PAGE.
Roessler & Hasslacher Chemical Co. 13
Runkle, H. E. 1

S
San Francisco Novelty & Plating Works 15
San Francisco Pioneer Screen Works 15
Schaw, Ingram, Batcher & Co. 11
Schilling & Sons, Adam 18
School of Practical Mining 14
Selby Smelting & Lead Co. 8
Shaw, Willis 9
Shepard & Searing 15
S. H. Supply Co. 1
Silver King Mining Co. 17
Silver State Electric Co 1
Simonds, Ernest H. 14
Simonds & Wainwright 14
Situations Wanted 1
Smidth & Co., F. L. 17
Smith & Co., Francis 1, 18
Smith & Thompson 13
Smooth-On Mfg. Co 11
Snedaker, James Angus 14
Star Drilling Machine Co. —
State Ore Sampling Co 1
Stevens, Ralph E. 14
Stillwell-Bierce & Smith-Vaile Co. 1
St. Louis Sampling & Testing Works 13
Strout & Son, W. H. 14
Sullivan Machinery Co. 9

T
Tatum & Bowen 18
Taylor Iron & Steel Co. 16
Taylor & Co., John 13
Thomson & Boyle Co. 8
Trenton Iron Co. 16
Truax Mfg. Co. 10
Tyler, S. W. 14

U
Union Gas Engine Co. 6
Union Iron Works 19
Union Photo-Engraving Co 5

V
Van Der Naillen, A. 14
Van Dieren, Hermann J. 13
Van Slooten, Wm. 14
Van Wagenen, Theo. F. 14
Volger, Wm. B. 11
Vulcan Iron Works 12

W
Walter, R. J. 14
Wanted 1
Water Supply Association 1
Weber Gas & Gasoline Engine Co 18
Weigele Pipe Works —
Western Chemical Co. 16
Westinghouse Electric & Mfg. Co. 10
Wetherill Separating Co. 13
Wigmore & Sons, John 8
Wimmer, Geo 15
Witte Iron Works Co. 18
Wohler, Bartning Suc's 4
Wolff & Zwicker Iron Works 13
Wood, Henry E. 13
Woodbury, Geo. E. —
Wynkoop, W. C. 14

Y
Yawger, I. C. 9

Z
Zeller, Geo. A. 1

This Paper One Year, 52 Times, $3, POSTPAID TO ANY PART OF NORTH AMERICA.

SITUATIONS WANTED.

Position as superintendent of gold mine wanted by a Mining Engineer who has had 11 years' practical experience in mines, mills and cyanide plants in California and abroad. Has his own assay outfit. Address M. E. M., Mining and Scientific Press.

YOUNG MINING AND MECHANICAL ENGINEER desires position. Technical and practical training. First-class mine and land surveyor. Neat and accurate draughtsman. Six years' experience. Accustomed to handling men. No objection to office work. Excellent references. Address E. N., this office.

Mining engineer with ten years' experience in copper and lead mining, milling and smelting, desires to secure position as superintendent or manager of developing or producing property in this country or abroad. Good assayer, surveyor and bookkeeper. Address "Montana," care of Mining and Scientific Press.

WANTED.—A position as superintendent for a mining company by a man of 16 years' practical mining experience; understands mining and milling (amalgamation, concentration and leaching); good assayer and accountant; would accept a subordinate position if good; references. Address "Advertiser," 1225 Webster St., Oakland, Cal.

A position as Superintendent or Mining Foreman. Have had 25 years of practical mining experience in California and Mexico, and have had the handling of large forces of men. Can go through any kind of ground. Am a first-class all round miner. Best of references. Address D. E. F., care of Mining and Scientific Press.

CHEMIST AND ASSAYER, with experience in draughting, bookkeeping and typewriting, desires position as assayer or assayer and bookkeeper in mine or as secretary to mining engineer or mine official. Has fair literary and scientific education. Experience in the preparation of reports, prospectuses and catalogues. Excellent moral character and good health. For further particulars, address E. R. M., care Mining and Scientific Press,

Engineers, Firemen, Machinists and Electricians: New 40-page pamphlet containing Questions asked by Examining Board of Engineers. Sent free. GEO. A. ZELLER. Publisher. ST. LOUIS. MO.

WANTED.

WANTED. — INFORMATION ABOUT ANY mine or mining camp where there would be an opening for a store.

Address A. H., this paper.

WANTED.—For a large mine in California, a technically educated mining engineer with practical experience in the working of large mines and the handling of men. Must be a man of energy, character and a first class all round miner. Address "AJAX," care Mining and Scientific Press.

Annual Meeting.

The Regular Annual Meeting of the Stockholders of the CONS. ST. GOTHARD GOLD MINING COMPANY will be held at the office of the Company, 113–114 Crocker Building, San Francisco, California, on THURSDAY, the 10th day of January, 1901, at the hour of 2 o'clock P. M., for the purpose of electing a Board of Directors to serve for the ensuing year, and the transaction of such other business as may come before the Meeting.

Transfer Books will close on MONDAY, December 31, 1900, at 3 o'clock P. M.

B. N. SHOECRAFT, Secretary.

Office—113–114 Crocker Building, San Francisco, California.

OIL!

JAMES R. T. MERSHON,
BROKER,
537-538-539 Parrott Bldg.,
SAN FRANCISCO, CAL

Dealer in Legitimate Oil Stocks Only.

Write for a prospectus of the fields. Mailed gratis.

OIL!

Big Vein Cyaniding Ore IN MONTANA.

Over 12 feet wide; values $5 to $30, gold and silver. Mine can be developed cheaply by tunnels to depth of 600 feet. Many improvements; 1500 feet work done; buildings up, and good road; timber and water. Prospect for a big mine seldom equaled. Lease and bond on favorable terms. D. S. M., care this office.

WE BUY very rich Ores, Dental Scraps, Tellurium Ores, Mill Wastes, Jewelers' Sweeps, Gold Retorts, Old Iron Retorts, Base Amalgam, Quicksilver, Amalgamated Plates, Gold and Silver, Old Slags.

A. M. DONALDSON & CO.,
ASSAYERS AND WASTE PRODUCT SMELTERS
1661 Larimer St., Denver, Colo.

Donaldson's Assayers' Slag Hammer { 1 lb. .... $1.10; 1 lb. 3 oz. $1.25 }

BENJAMIN T. LLOYD,
STOCKS, BONDS AND MINES.

Have immediate customers for well-developed Gold and Copper Properties.

P. O. Box 608, SALT LAKE CITY, UTAH.

AUTOMATIC SAMPLING
Mill Plans, Cyanide, Concentration, Smelter.
F. D. BAKER, Mech. Engr., DENVER.

FOR SALE.

SILVER PLATES.

A small quantity of good second-hand plates for sale. H. D. & H. W. MORRIS, 194 Crocker Building, San Francisco, Cal.

Two Second-Hand PUNCHING MACHINES, SUITABLE FOR PIPE MAKING.

FRANCIS SMITH & CO., 46 Fremont St., San Francisco, Cal.

STAMP MILL FOR SALE.

Ten 1000-pound stamps; Challenge feeders; amalgamating plates; pulleys, etc. Ready for immediate shipment and convenient for inspection. Address "Stamp Mill," P. O. Box 52, Auburn, Cal.

FOR SALE.

Developed Silver-Lead Mines and Prospects, Parral and Santa Barbara Districts of Mexico.

The coming greatest camp in the Republic Correspondence solicited

H. B. RUNKLE, El Paso, Texas.

GUARANTEED MINING STOCK FOR SALE.

Excellent chance for profit, no chance for loss. Best of references and standing. For particulars, if you wish to purchase,

— ADDRESS —

E. N. BREITUNG,
MARQUETTE, MICH., or WASHINGTON, D. C.

Gold Gravel Mining Dredger.

FOR SALE.—The Shovel Dredger "Plu us" lying in the Feather river, 4 miles below Oroville.

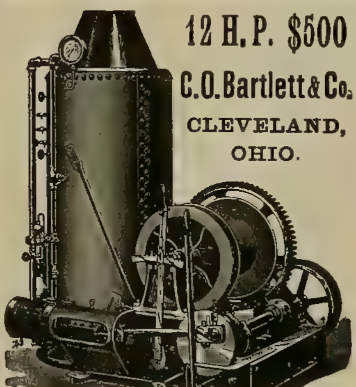
In a bank not exceeding 10 feet above the water line this dredger can handle 1400 cubic yards a day at a cost of 7¼ cents a cubic yard, and can dig 20 feet below the water line.

For further particulars, apply to JOHN W FERRIS, 320 Sansome St, San Francisco, Cal

Second-Hand Mining Machinery and Supplies OF ALL KINDS.

Send for Catalogue.

THE S. H. SUPPLY CO.
22nd and Larimer Sts., DENVER, COLO



12 H.P. $500
C.O. Bartlett & Co.,
CLEVELAND, OHIO.

WATER RAISED
500-FEET
WITH
CENTRIFUGAL PUMPS.
Better efficiency and half the cost of Piston Pumps

WATER SUPPLY ASSOCIATION,
22 California St.
SAN FRANCISCO.
Circulars Sent.

THE GARDINER
COPPER LEACHING PROCESS.

RAPID, CHEAP AND EFFECTIVE.

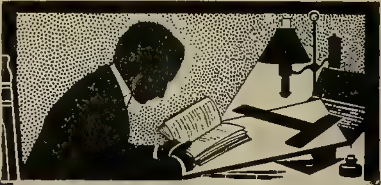
All kinds of copper ore treated, except strictly sulphides.

Send for illustrated prospectus. Address

The American Copper Mining & Extraction Co.,
DENVER, COLO.

Quicksilver

—FOR SALE BY—
The Eureka Company,
OF SAN FRANCISCO.
ROOM 1, - - 320 SANSOME STREET,
SAN FRANCISCO.



For the purpose of quickly introducing and demonstrating the superior merits of its courses, the Trustees of THE AMERICAN SCHOOL OF CORRESPONDENCE have voted to award a

FREE SCHOLARSHIP

IN STEAM, ELECTRICAL, MECHANICAL, MARINE OR LOCOMOTIVE

ENGINEERING,

Including a complete course in MECHANICAL DRAWING, to a few well-recommended, ambitious men in each manufacturing plant in the United States.

The holders of these FREE SCHOLARSHIPS will be asked to answer any inquiries as to the benefit and value of the instruction and also recommend the School to their friends, thus establishing an endless chain of enthusiastic students who will advertise the School more thoroughly than tons of printed matter or an army of agents. Application blank on request (mention MINING AND SCIENTIFIC PRESS).

American School of Correspondence,
(CHARTERED BY THE COMMONWEALTH OF MASSACHUSETTS.)
BOSTON, MASS., U. S. A.

The State Ore Sampling Co.

DENVER, COLO.

We buy Gold, Silver, Lead, Copper, Bismuth, Uranium, Wolframite, Cobalt, Molybdenite and Antimony Ores. We have modern sampling mills, also test ore for the new processes of ore reduction.

Our long experience in the market enables us to obtain the highest prices for all marketable ores. Write for our "Reference Book." Send analysis of your ore for prices and information.

BAILY & MONNIG, Managers.

ELECTRICAL REPAIRING.

THE SILVER STATE ELECTRIC CO.,
1517 Nineteenth Street, **DENVER, COLO.**
ARMATURE AND FIELD WINDING.
ELECTRIC MACHINERY.
Telephone Work. Repairs Our Specialty.
Agents Le Valley Carbon Brush. Telephone 1249.

THE ERICSSON SWEDISH
TELEPHONES
HAVE BEEN IN USE OVER 20 YEARS.
THEY ALWAYS TALK. GIVE THEM A CHANCE TO TALK TO YOU.
CATALOGUES FREE.
ERICSSON TELEPHONE CO
20 WARREN ST. NEW YORK, N.Y.

Electric, Railway and Manufacturers' Supply Co.

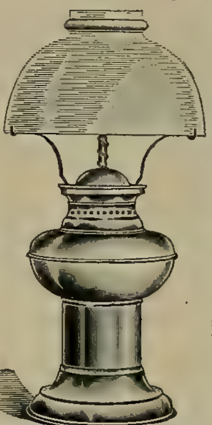
RAILWAY SUPPLIES AND ELECTRICAL SPECIALTIES.

Pacific Coast Agents : : : : : : : : :
ERICSSON TELEPHONE COMPANY.

WE CARRY FULL LINE OF ABOVE GOODS.

543 MISSION ST.,
SAN FRANCISCO, CAL.

Solar Acetylene Lamps.



NO COMPLICATED MECHANISM to corrode.

No Valves or Screws.

No Joints or Washers to Leak.

Only Three Parts to Entire Lamp.

NO GREASE, SMOKE, OIL, TROUBLE OR ODOR.

Only ¾ cent per hour.

BURN SIX HOURS. Steady, intense, pure, white light. Safer than kerosene or gasoline lamps, for if this lamp is overturned it goes out.

A FINE READING LAMP.

Agents Wanted.

PRICE, (*without Shade*) **$4.00**
Hanging Lamp, $6.00

MINERS' ACETYLENE HAND LANTERNS.

BULLARD & BRECK,
Dept. M, 131 Post St., San Francisco, Cal.

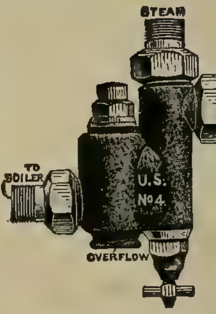
U
S

The Drip-Cock

is an exclusive feature with our Injector. It prevents freezing, starts with lower steam, enables you to draw hot water when Injector is working, and gives many other points of advantage to the

U. S. AUTOMATIC INJECTORS

over all others. Our little "Engineers' Red Book" covers 500 points of interest to every engineer and tells all about our Injectors. Write for one.



AMERICAN INJECTOR CO.,
Detroit, Mich., U. S. A.

WEST COAST OF MEXICO.

WÖHLER, BARTNING Suc's, Mazatlan (Sinaloa), Mex.

Bankers, Importers, Exporters and Commission Merchants.

Representatives and Agents of the principal Mining Companies in the State of Sinaloa and the dependencies of the Pacific coast in the States of Durango, Chihuahua, Sonora, Lower California and Jalisco.

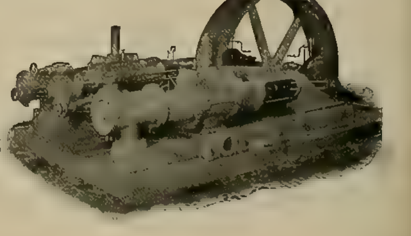
ORE BUYERS AND EXPORTERS. - MINING SUPPLIES.

Figure 152 represents our DUPLEX STEAM ACTUATED

AIR COMPRESSOR.

Steam Cylinder Outboard and Detachable.
Can be run as a Power Machine also.

We also build Steam and Power Pumps for Mines
If interested, address
THE STILWELL-BIERCE & SMITH-VAILE CO.,
276 Lehman St., DAYTON, OHIO, U. S. A.



CALIFORNIA STATE

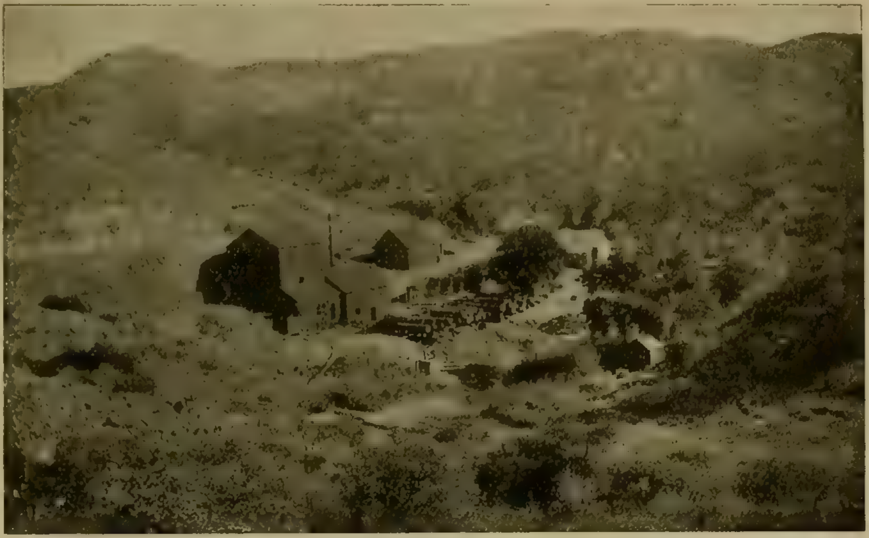
This Paper not to be taken from the Library. + + + +

MINING AND SCIENTIFIC PRESS.
AND PACIFIC ELECTRICAL REVIEW.

Whole No. 2110.—VOLUME LXXXI. Number 26. SAN FRANCISCO, SATURDAY, DECEMBER 29, 1900. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

Hand Power Drill.

Herewith are three views of a hand power drill, Fig. 1 the drill in position for vertical boring, Fig. 2 in position for boring at an angle, Fig. 3 as used in exploring a proposed dam site on the Gila river, Arizona. The drill weighs, set up, 200 lbs., size of bit $1\frac{9}{16}$ ins., size of core 1 in., capacity 350 ft. It may be run by hand power or small engine. J. B. Lippincott, U. S. G. S., in a report of the work of one of these drills, as shown in Fig. 3, says that fifty-two holes were sunk, a total of 3254.2 feet, at a cost of $8030, average per foot $2.46. They are made by the American Diamond Rock Drill Co., 120 Liberty street, New York.


Fortuna Mining Co.'s Mill, Agua Dulce, Baja California.

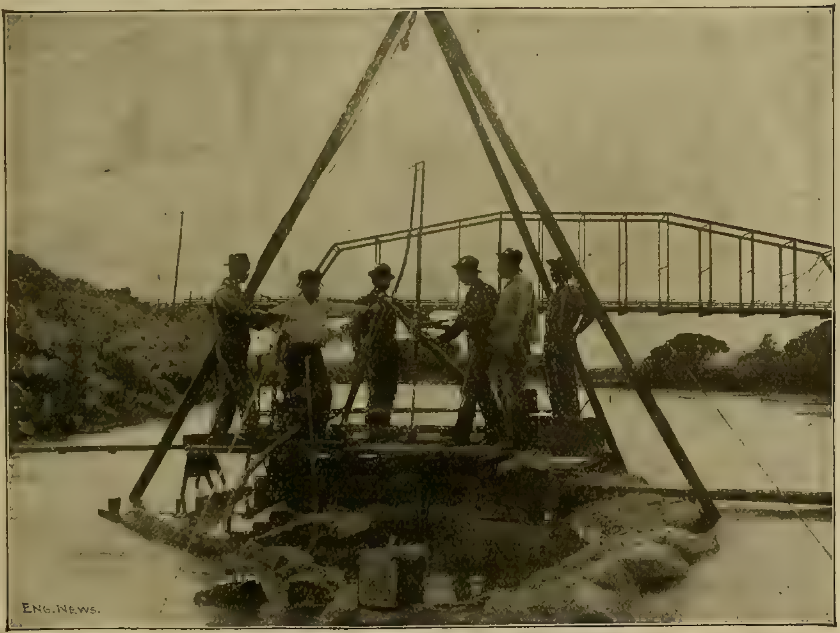


Fig. 3—Exploring a Proposed Dam Site.

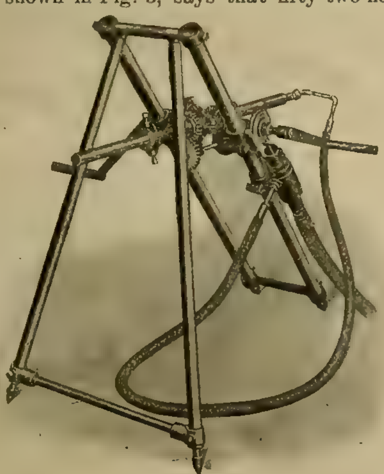


Fig. 2.

Baja California.

Extending through nearly ten degrees north latitude lies the narrow, barren peninsula of Baja or Lower California, which, though discovered nearly 400 years ago, is still largely unexplored. It is fairly rich in mineral wealth, which is being slowly developed. The country offers little inducement to the American miner. The largest mining enterprise in the peninsula, the Compagnie des Boleo, of Santa Rosalia, is a European concern, producing considerable copper, transacting all its business with France. That company has spent several million dollars, employs nearly 3000 men, and in all its appliances is fully abreast of the times in all the requirements of modern mining methods. The Ybarra Co. is a California concern that has invested considerable money and made extensive development. Jacalitos is 50 miles from Ensenada, and 100 miles from San Diego, Cal. The engravings on the extreme right portray the hoist, dump and stamp mill of the Alemana mine, owned and operated by the Trinidad Mining & Milling Co.

Fifty miles east of Ensenada, in the Saragossa district, is the property of the La Fortuna G. M. & M. Co. An engraving of the company's mill appears above.

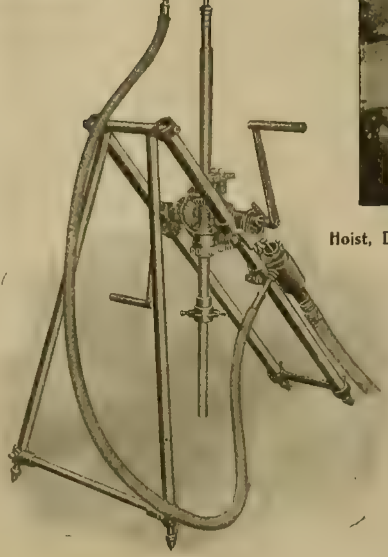
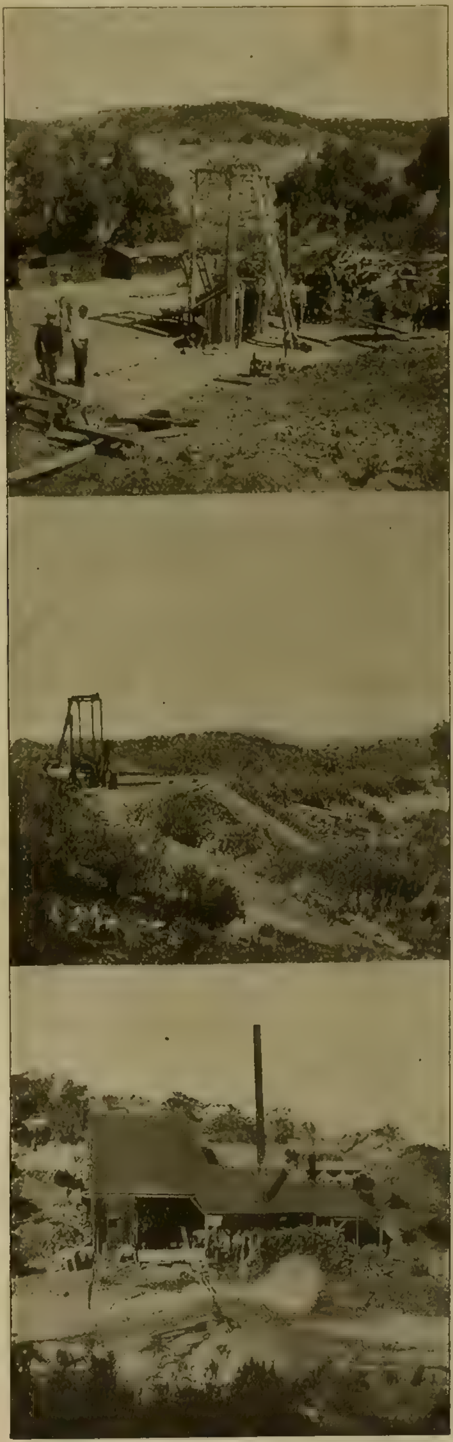


Fig. 1.


Hoist, Dump and Stamp Mill of the Alemana Mine, Jacalitos District, Baja California.

MINING AND SCIENTIFIC PRESS.

ESTABLISHED 1860.

Published Every Saturday at 330 Market St., San Francisco, Cal.

ANNUAL SUBSCRIPTION:
United States, Mexico and Canada....................$3 00
All Other Countries in the Postal Union.................4 00

Entered at the S. F. Postoffice as second-class mail matter.

J. F. HALLORAN.......................Publisher.

Special Representatives:
EASTERN.
E. H. HAVEN.......................150 Nassau St., New York City.
MIDDLE WEST.
CHAS. D. SPALDING.................153 La Salle St., Chicago, Ill.
INTER-MOUNTAIN.
W. A. SCOTT.....................43 Jacobson Building, Denver, Colo.
SOUTHERN CALIFORNIA.
W. D. CURTIS.................223 W. Second St., Los Angeles, Cal.

San Francisco, December 29, 1900.

TABLE OF CONTENTS.

ILLUSTRATIONS.—Fortuna M. Co.'s Mine, Agua Dulce, Baja California; Jacalitos District, Baja California; Exploring a Proposed Dam Site; Hand Power Drill; Hoist, Dump and Mill of the Alemaria Mine, 603. Mining and Metallurgical Patents, 606. Diagram Illustrating Method of Determining Dip of Exposed Strata; Diagram Illustrating Method of Determining Strike of Oil Sand Stratum; Diagram Illustrating Method of Determining Dip of Oil Sand Stratum, 608. Elevator Sluice, Pat Goggins Mine, Ralston Divide, Placer Co., Cal.; Evans Elevator, Pat Goggins Mine, Ralston Divide, Placer Co., Cal., 609. Plan View and Horizontal View of the Occurrence of Gold in Snake River, 610.
EDITORIAL.—Hand Power Drill; Baja California, 603. The End and Beginning; Notable Electrical Transmission; Great Inventions and Discoveries; Miscellaneous, 604.
MINING SUMMARY.—611-612-613-614.
LATEST MARKET REPORTS.—615
MISCELLANEOUS.—Concentrates, 605 Mining and Metallurgical Patents, 606. New Methods for the Extraction of Copper and Zinc, 607. "Orthodox" and "Wild Cat" Oil Propositions, 608. The Burlap Process; Ralston Divide, Placer County, Cal., 609. Electric Power Transmission 153 Miles; Gold in Snake River Gravel Bars, 610. Personal; Notices of Recent Patents; List of U. S. Patents for Pacific Coast Inventors; Recently Declared Mining Dividends; Commercial Paragraphs, 614-615. Index to Volume, 809-810-811-812.

PROBABLY the most noticeable result of the electrical exhibit at the Paris exhibition will be the standardization of the systems of generating electricity, on the lines suggested editorially in this and other technical journals, and the more universal use of the three-phase alternating current at from 2000 to 6000 volts.

◆

THE building of the Los Angeles & Salt Lake Railroad will be a big factor in the mineral development of the section traversed by the new line. It is a region of great mineral wealth, but its inaccessibility has always worked against its development. Already Los Angeles complains of a scarcity of mining men and prospectors, many of the latter having started to locate claims along the supposed route.

◆

THERE were about thirty great inventions and discoveries during the century now closing that deserve especial mention as being in the front rank of scientific progress: railroads, steamships, the telegraph, the telephone, lucifer matches, gas illumination, electric lighting, photography, anæsthetics, antiseptic surgery, conservation of force, germ theory of disease, organic evolution, the antiquity of man, the glacial epoch, the Roentgen rays, the spectroscope, the Bessemer process, the periodic law in chemistry, cell theory and embryology, the modern printing press, vortex theory of matter, the nebular theory, the uses of dust, the molecular theory of gases, the cyanide process, the cotton gin, the sewing machine, petroleum, electric power, modern mining methods.

◆

DURING the year the U. S. Government has had a new plan in operation for the first time, whereby a saving of about $65,000 was made in the manner of refining at the several U. S. mints. It is necessary to mix a certain percentage of silver with gold in refining it, usually about two parts of silver to one of gold, as with the excess of silver the acid acts freely, dissolving all the silver. From the beginning till 1900, the U. S. mints used their own silver over and over again in this process, gaining nothing either in profit nor in quality of the work. This year the Government mints were authorized by law to do refining for individual customers as well as for its own coinage, provided that the charges do not exceed the actual cost of the work. The Treasury Department lowered the scale of charges for refining silver, for the first time since 1880, so as to attract silver held by private parties, and thus get what it needed for its gold refining with compensation therefor.

The End and Beginning.

This is the last issue of this paper in the nineteenth century. Next Saturday's issue—No. 2111—will be the first one of the twentieth century. The essence and spirit of the century closing has been the rise of science; this great adjustment of industrial conditions will tend to still further widen individual opportunity in the coming century. It is the end and beginning—the end of a century of great progress, the beginning of an era of greater development. The century has been a great one for the United States, expanding from 5,000,000 feeble residents on a strip of Atlantic coast to 77,000,000, dominating a continent, foremost in all victories of peace or war, potent in discovery and master of the world's forces. In the beginning of this century the past seemed narrow, the future grew broader, the horizon widened; now, on the threshold of the twentieth century, the achievements of the past hundred years, great though they have been, seem but the indications of what awaits humanity.

The inventive mind, the scientific research, the enterprise of the daring, the chance for individual advancement, the perfection of modern machinery, the precision and economical result of modern mining methods, are among the forces and attributes that have made this century able to make its successor heir to so rich a legacy of organized industry, advanced knowledge and perfection of method and mechanism.

At the base of all this lies mining and scientific progress; the scientific miner is the man who, beyond all others, has made the nineteenth century the greatest of all those periods of time since time first began to be so measured. In this country, especially, mining—the basic industry of the nation—has created commonwealths, populated vast regions, developed their resources and contributed its quota to making the United States the commanding power of the planet. Upon the basis of scientific mining is reared the nation's industrial and commercial prosperity. Bullion is the blood of business, and the product of the pick and drill circulating in the nation's financial veins has vivified every fiber of material life. The miner is the great creator of eternal wealth. Unlike other forms of evanescent riches, the miner's product takes on the attributes of immortality and lives forever through the centuries, shedding a luster on the passing years and sustaining innumerable succession of enterprises in Time's course. The miner and prospector are the avant couriers and sustainers of civilization; they carry the gospel of development across mountain and desert, and beyond the frozen northern seas they hold aloft, full high advanced, the flag of progress, and with unequaled sublimity of self-reliance they lead wherever hope sweeps on with flashing finger pointing to the golden goal.

Let circumstance oppose them,
  They bend it to their will;
And though the flood o'erflows them,
  They dive and stem it still.
Let lower spirits linger
  For hint or beck or nod,
They only see the finger
  Of an onward urging God.

All hail and honor to the prospector, the miner, the scientific searcher, the metallurgist, the man in any and every capacity who makes and maintains the pre-eminence of the mining and scientific development of the century, and for him may the star of victory ever glitter in the strife!

◆

ABOUT the best advertisement of this paper's merits and value to miners, mill men, metallurgists, mining engineers, electricians and machine workers everywhere is the index on pages 809, 810, 811 and 812 of this issue. Over 1500 references are there made to articles and items of the greatest practical value to any one in any way directly or indirectly connected with the mining industry, which have appeared in the 81st volume of this paper, of which this is the 26th issue. Two such volumes every year furnish about 3000 such references, profusely illustrated, the latest and best in the mining world, sent postpaid to any part of North America every week, as issued, for $3. Gratified subscribers yearly write to the effect that the $3 that brings them 52 issues of such a paper is their best paying investment proportionate to the amount so paid.

Notable Electrical Transmission.

California has several notable electric transmission plants whose magnitude has attracted universal attention. In the State of Washington, in the northwestern corner of the Union, is an electric transmission system deserving of notice. A brief account of the successful transmission of electrical energy thereby, a distance of 153 miles on Nov. 13, 1900, is given in this week's issue. Several previous references have been made to the work as it progressed.

The plant is at Snoqualmie Falls, Wash., where the Snoqualmie river has a vertical drop of 270 feet, giving an available energy of 35,000 H. P. All the electrical machinery, together with the water wheels, is installed in a large chamber directly under the tail race tunnel that extends to the river below the falls. Impulse wheels on horizontal shafts and aluminum wires for transmission are among other notable features, beside a submerged concrete dam built across the river, which raises the low water elevation of the river 6 feet at the intake.

There are four electrical generators, each of 1500 K. W. capacity, each weighing about 100,000 pounds. They are of the revolving armature type, delivering a three-phase current at 1000 volts, 7200 alternations, the normal fuel load current being 1000 amperes per phase. The armatures are 96 inches diameter, speed 300 revolutions per minute, the peripheral velocity being thus almost 1½ miles per minute. Without load the generators require a field current of ninety-five amperes at ninety volts; with full non-inductive load, 100 amperes to maintain the same electro-motive force. It is calculated that in these armatures about 4,500,000 foot-pounds of energy is stored at 300 revolutions per minute, the stored energy in a single revolving armature equaling the electrical output of that armature at full load in four seconds.

In the transformer house at the head of the shaft the current is received at an initial voltage of 1000, and, passing into the step-up transformers, is raised to 30,000, the nominal voltage of transmission. Cables of twisted aluminum wire carry the 1000-volt current from the switchboard to the transformer house; the conductors running first to the step-up transformers, and thence to a second switchboard controlling the transmission lines. A high-tension plug-board in the transformer house permits any desired combination of transformers and circuits. Similar plug-boards are arranged at Renton, Seattle and Tacoma, and it was by the use of those plug-boards that the combination was made last November, as described elsewhere in this week's issue, that made possible the circuit from the power house at the falls to Seattle, back to the falls, thence to Tacoma, and again back to the falls—an entire distance of 153 miles.

The circuits are all of stranded aluminum cables, this being, so far as known, the first instance of the use of this metal in such long-distance transmission, though aluminum cables are in use in two California long-distance electrical transmission systems. The electrical conductivity of aluminum is about 60% that of copper, so that an aluminum cable so employed to have capacity equal to copper needs to have a cross-section 66⅔% greater, though with such increased size the weight is but one-half that of copper. In California some difficulty is found in splicing, and the greater surface exposed to storm entails disadvantages not entirely overcome.

The Snoqualmie Falls Power Co., operating the system here briefly described, has stations at several points on its line and at the termini, and is developing 10,000 H. P., supplying light and power, with ability, if desired, to produce and furnish all requirements in that direction far beyond its present capacity.

◆

A GENERATION AGO deep mining west of the Rocky mountains culminated on the eastern slopes of the Sierras in shafts from 2700 to 3300 feet deep on the Comstock, Nevada. In the Calumet copper mines of Michigan are now the deepest mine shafts, where, within an area of one square mile, the Tamarack M. Co. has three shafts, 4450, 4650 and 4750 feet in depth, respectively, and the Calumet & Hecla one of 4900 feet vertical depth. The former company proposes this year to sink one of its shafts—No. 5—to a depth of one mile from the surface.

Concentrates.

METALLIC GOLD is not soluble in any single known acid.

THE efficiency of man as a human machine is figured to be about 20%.

AUSTRALIA has not yet imposed the proposed 2% export duty on gold.

LEPIDOLITE is found in abundance near Pala, San Diego county, Cal.

PATENTED MINING CLAIMS are taxable, the same as any other real estate.

ALL SOLIDS, and, probably, all liquids, become incandescent at the same temperature.

THE deepest shaft in Colorado is at the Geyser mine, near Silver Cliff, Custer Co., 2640 feet deep.

EXHAUST STEAM should solve the difficulty experienced in the freezing of the cyanide solution.

COPPER can be welded. C. G. Wilborg, Galesburg, Ill., can give full practical account of the work.

THE Colorado School of Mines, at Golden, charges students from other States $100 per year tuition.

A COMPLETE file of this paper from May, 1860, in bound volumes, could be supplied by the business office.

SIXTEEN HORSE POWER should ordinarily suffice for a 10-stamp mill, each 850 pounds, 7 inches lift, 90 drops per minute.

THE locator of a mining claim located since Jan. 1, 1900, has till Dec. 31, 1901, to do the first required $100 of assessment work.

IF, after the treatment with sulphuric acid, the heavy petroleum does not sufficiently refine, try silicate of soda as a neutralizing agent.

ONE pound of anthracite coal will produce about 90 cubic feet of gas, having a calorific value of about 137 B. T. U. per cubic foot.

AFTER a valid location of a mining claim is made, the locator holds it only upon the condition that he works upon and improves the claim.

THERE is a difference between German and American avoirdupois weights. A German pound equals 1.1023 American pounds, avoirdupois.

IN various placer sections iron rails are now used placed lengthwise in the sluices, for riffles, close together, and with uniformly good results.

ORDINARY domestic kerosene of 120° F. flash and 150° F. fire test has a specific gravity of about 0.785, and one gallon will equal 8.33×.785=6.539 pounds.

A READY and simple way of making oxygen is to heat in a close retort a mixture of four parts chlorate of potash and one part black oxide of manganese.

THERE is no "State mining law" concerning mining locations in California at present, the last legislature having repealed the law passed by its predecessor.

PROBABLY the lowest cost production of metallic lead in the United States is in southeast Missouri, where statistics indicate an average cost of 2½ cents per pound.

A RECITAL, in the location notice of a mining claim, that it is the relocation of another mining claim, is an implied admission of the validity of the former location.

IF a patentee finds himself justly entitled upon his invention to more than is secured to him by the patent already granted, the safe and proper remedy is by a reissue.

BORNITE is a copper-iron sulphide of a reddish-yellow color with an iridescent tarnish. It sometimes runs as high as 50% copper and occasionally contains gold and silver.

THE ridiculous statements in sundry dailies regarding the price of molybdenum and the demand therefor are not to be given serious notice, and were not, apparently, intended to be believed.

NO BOILER should be subjected to a test under pressure of steam. When testing a boiler by the cold water method, should a leak or rupture occur, the pressure would at once fall to zero.

SLUICES need rarely exceed 1000 feet in length, though greater lengths are not uncommon. At one time the Spring Valley mine at Cherokee, Cal., used three parallel sluices, each 2½ miles in length.

IT is not necessary in Hawaii or the Philippines to pay any government fee for the registration of U. S. patents. It is merely required that a certified copy of the patent be filed with the Governor-General.

OPAL is a variety of quartz in which the silica appears to have a different molecular arrangement. Its hardness and specific gravity are less than ordinary quartz. It is soluble in a hot alkaline solution.

A VOLUME of 500 cubic feet of free air per minute, at 75 pounds, can be transmitted through 1000 feet of 3-inch pipe with a loss of 41 pounds. If a 5-inch pipe were used the loss would be reduced to 0.24 pounds.

THE horse power of a gasoline engine is found by multiplying the area of the piston in square inches by the mean effective pressure in pounds per square inch, and by the number of explosions per minute. Multiply the quotient thus obtained by one-half the piston speed in feet per minute (if a single-acting engine) and divide by 33,000; the quotient will be the indicated horse power.

THE Federal Courts have decided that, as between the wet process and the fire assay, the latter shall be the official method of determining the amount of dutiable lead in ores imported into the United States.

BY warming the fuel, and with the use of a tank carbureter, it is considered possible to "run an ordinary gas engine with kerosene." Kerosene will ignite from a hot surface at a much lower temperature than gas.

SULPHOCYANATE OF POTASSIUM is a double cyanide of sulphur and potassium, formed by reaction of soluble sulphides on cyanide: these soluble sulphides are formed by the action of cyanide of potassium on some metallic sulphides.

CONCERNING the "Concentrate" in the issue of Dec. 15, 1900, regarding the paper on mica by J. A. Holmes, any requests for copies thereof should be addressed to R. W. Raymond, Sec. A. I. M. E., 99 John St., New York City.

IN a mile of 6-inch pipe, with a velocity of 3 feet per second, the loss of pressure will be 15 pounds per square inch when new, and this will be increased to 31 when the pipe is rusted and covered with incrustations after the lapse of time.

THERE are three places in the United States where the magnetic needle will point directly toward the north —Lansing, Mich., Columbus, Ohio, and Charleston, S. C. At the north pole the magnetic needle would point straight down.

THE statement that East Indian copper coins were shipped to this country as scrap copper was exact. The last shipment was 250 tons to the Oxford Copper Co., New York City, and 5 tons to the New Haven, Conn., Brass Foundry Co.

IN mine surveying the difficulty sometimes found in sighting the fine string hanging from the station roof, carrying a plumb-bob, can be obviated in the case of dim light by having the back-sight man hold a piece of white tracing cloth behind the string.

THE permanganate process of gold recovery has been repeatedly described herein, and while experimental tests have reported satisfactory results, so far as known the process has not in an extended or commercial way yet given evidence of commanding value.

IF an ounce of iron and a ton of iron were dropped from the same vertical height at the same time, the ounce piece would reach the ground first, because of the resistancy of the air. In a vacuum all bodies, regardless of weight, fall with the same velocity through any distance.

THE atmosphere extends at the equator 26,000 miles beyond the earth, and at the poles 17,000 miles. The old estimates of the height of the atmosphere based on decrease of temperature of 1° C. for each 100 meters elevation are abandoned. The actual decrease is 0.6° per 100 meters.

UNDER a contract for milling ores which provides that "said ores, rock and earth shall be worked in the usual and ordinary manner of working like ores, and returns therefrom shall not be less than 70% of the pulp assay," the return is for an average of 70% and not on each ton of ore furnished.

IN the C. Grollet chlorine and bromine process for the extraction of gold, chlorine is introduced at the beginning of the operation and bromine at the end, the operation lasting usually eight to twelve hours. The process is claimed to give satisfactory results at an experimental plant at Harfleur, France.

THE energy transformed by one gallon of liquid air, when evaporated and expanded into 800 gallons of air of ordinary temperature and atmospheric pressure amounts to approximately ¾ H. P. for one hour. A moderate estimate of the cost of liquid air, when produced in quantities, is 20 cents per gallon.

AT sea level, to raise water which flows freely to the suction pipe of a pump to a height of 8 feet requires at least 7 inches of vacuum; this corresponds to an atmospheric pressure of 11.228 pounds; at that pressure water boils at 198° F. The pump would not, probably, lift water at a temperature exceeding 150° F.

A "BEDDED VEIN" is understood to mean an ore body or vein matter lying about as a seam or bed of coal lies between sandstone strata, horizontal or inclined, as are the strata between which it exists. A fissure vein may cut clear across the stratification planes of the rocks; a bedded vein does not, but conforms to their dip or lay.

A $20 GOLD PIECE weighs 516 grains—1.075 ounces. Of this, 90% is pure gold and 10% copper, there being .9675 of an ounce of pure gold and .1075 of an ounce of copper. One ounce of pure gold is worth $20.671834625; the actual amount of pure gold in a $20 gold piece is $19.9981999368, so that if there be no loss by wear or abrasion there is practically $20 worth of pure gold in a $20 gold piece.

THE total exports of sulphur from all Sicily during 1899 amounted to 490,325 tons, of which 134,288 tons came to the United States; the average price was $18.72 per ton, against $18.85 during the year before. As to the quantities exported to the United States during the last seventeen years, the highest figure touched was in 1891, when it reached $21.95 per ton; the lowest, in 1895, averaged $10.86 per ton. The largest quantity shipped during any one year was in 1898—142,553 tons; smallest quantity, 1887, 68,347 tons.

WITH a triplex pump forcing water to the surface, the delivery pipe discharging at an elevation of 300 feet above the pump, the pressure gauge connected with the bottom end of the delivery pipe indicating a pressure of 144 pounds per square inch, the velocity of the flow through the 6-inch delivery pipe is 688½ feet per minute, and the quantity pumped per minute is 135.2 cubic feet.

MINERAL LODES are ordinarily more recent than the rocks they traverse, and older than the rocks or lodes by which they are intersected. Nor are mineral veins all of the same age; they are of different ages and different places, the same as the mountain ranges and the dykes of igneous rocks are of different ages. Each vein system owes its existence to local events and conditions, both at the surface and at depth.

MUCH of the most desirable and valuable matter published herein each week is furnished by the readers of this paper, referring to work that they are doing or in which they are interested. Probably no other journal published contains so much original material from the men who do what they write about. Such matter is always gladly received, and any expense attached to securing available material will be cheerfully audited.

THE tractive power of a mine locomotive is found as follows: The diameter of the cylinder squared, multiplied by the length of stroke in inches, multiplied by the mean effective pressure in pounds, divided by the diameter of the driving wheel in inches, equals the total tractive power. The mean effective pressure in the cylinder is assumed at 85% of the boiler pressure. The tractive power of a locomotive multiplied by the speed in miles per hour, divided by 375, gives the horse power developed.

IF charges of gas pass through the engine unignited when the engine is working under a fair load it is ordinarily an indication of need of repair of the igniter. With an electric igniter employing a battery as a source of current, it is frequently the battery that is at fault. Open circuit batteries when nearly exhausted regain some strength when rested over night, and will furnish ample current for a short time, but rapidly weaken in use. If the battery has run for some time it should be renewed, and the effect upon the ignition noted.

AT Anaconda, Montana, the slimes average 50% silver, 0.5% gold, 15% copper, and 34.5% valueless impurities. They are washed and put into a lead-lined tank, with three parts 66° sulphuric acid and one part water. Steam and air are introduced through a perforated lead pipe by means of an injector. This treatment oxidizes and dissolves the copper, together with some of the impurities. The slimes are then washed on a filter, dried, mixed with one-fifth their weight of soda ash, and melted in a small reverberatory furnace, finally being cast into bars of bullion 980 fine. This bullion is shipped to the parting works for separation of the gold and silver.

A, HAVING located a tunnel site, subsequent mining locations on the line thereof are prohibited so long as work is being prosecuted with reasonable diligence in the tunnel; if B locates a mining claim subsequent to A's tunnel location, the latter is senior in point of time, and A may drive his tunnel through B's claim without his consent. If, however, A and B are simply locators of mining claims which may be near or join each other, A has no right to pass through B's claim, although B may be junior in point of time to A. The location of a mining claim does not carry with it the right to pass through other claims subsequently located. The consent of the junior locator is essential.

THE style spoken of is the hydraulic chief knuckle joint and nozzle with two elbows placed in reverse position, when in right line, connected by a ring in which are anti-friction rollers. The ring is bolted to the flange on the elbow, but gives the upper elbow free horizontal movement, while vertical movement is obtained through a knuckle joint placed in outlet on the top elbow. This joint is a concave surface fitted to a convex one, the former having an opening for the pipe to pass through. The interior is unobstructed by bolts or fastenings, and the man at the pipe operates it by a lever. Vanes or riffles are inserted in the discharge pipe, to prevent a rotary movement of water caused by the elbows, and to force it to issue in a straight, concentrated and solid form.

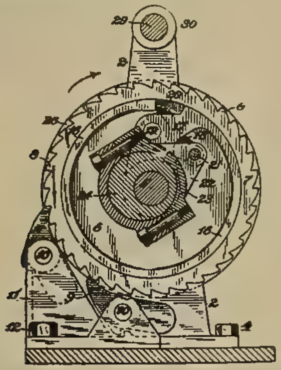
IF the co-owner or owners in a mining claim neglect or refuse to put up or do their share of the annual work necessary to hold the claim, he or they interested who want to hold it should first do the required assessment work, then give the delinquent legal notice by personal notice in writing or by publication. If in the former way after ninety days the delinquent fails to pay his share his interest becomes the property of him or them who have done the required work; if by the latter way, the delinquent has ninety days after the last date of publication. "Advertising out" a delinquent co-owner is never a pleasant job, and everything done should be in strict accord with all legal requirements, including filing of certificate of annual expenditure with the county recorder. In case of subsequent demonstration of value there is often likelihood of contested title, and in such case the holder of the claim should be fortified by legal proof of his rights.

Mining and Metallurgical Patents.

Patents Issued December 18, 1900.

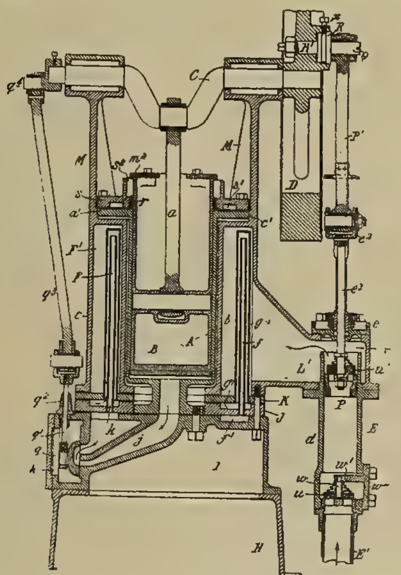
Specially Reported for the MINING AND SCIENTIFIC PRESS.

LOWERING BRAKE FOR HOIST.—No. 663,886; W. S. Halsey, Pittsburg, Pa.



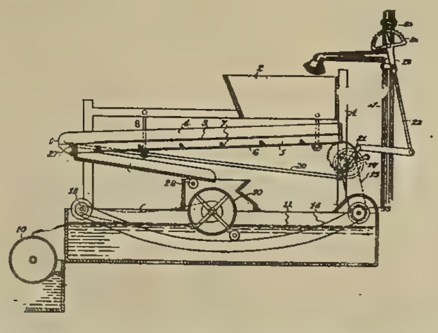
Combination of shaft, hoisting drum fixed thereto, friction wheel fitted to turn freely on shaft, means for preventing rotation of friction wheel in one direction upon shaft, permitting its rotation thereon in opposite direction, internally bored circumferential flange forming frictional bearing surface, on friction wheel, transversely divided expansible friction-ring fitting bearing surface, connecting arm fixed to end of friction ring and to shaft, double-armed expanding lever fulcrumed in connecting arm having its outer arm adapted to abut against end of friction ring opposite that to which connecting arm is fixed, eccentric fixed to operating wheel, and strap encircling eccentric and coupled to inner arm of expanding lever.

STEAM PUMPING ENGINE.—No. 663,909; F. M. Leavitt, New York, N. Y.



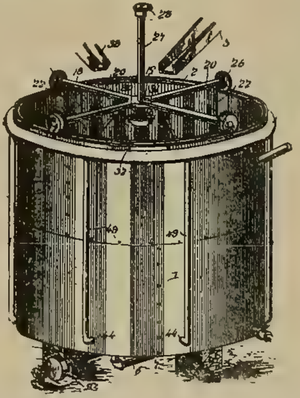
Combination of shell L having outer and inner walls c b, forming between them condenser chamber F′ closed at top, base shell I beneath, condenser tube plates J and K clamped between shells, inner and outer condenser tubes f and g projecting upward from respective plates into chamber F′, parts formed with annular passage f′ communicating with lower ends of tubes f, and with annular passage g′ communicating with lower ends of tubes g, vacuum pump, base shell I formed with exhaust passage k leading to passage f′; passage l leading from passage g′ to pump.

GOLD SEPARATOR.—No. 663,993; W. W. M. Hickey, San Francisco, Cal.



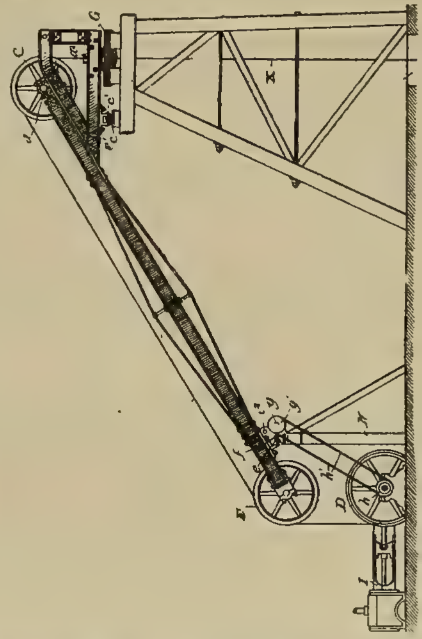
Gold separator, including inclined screen, amalgamated plate below screen having riffles, water tank, chute connected with amalgamated plate inclined reversely thereto, amalgamated drum cylinder below discharge end of chute receiving material therefrom, belt submerged within tank, receiving and conveying away material discharged from cylinder, drums at opposite portions of tank around which belt passes, connections between drum and amalgamated drum for rotating latter in unison with movements of belt.

ORE MIXING MACHINE.—No. 664,059; J. P. Schuch, Jr., Cripple Creek, Colo.



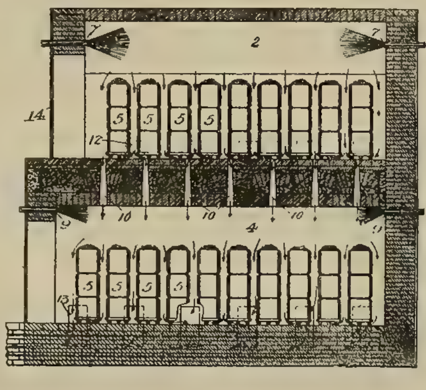
An open tank provided at bottom with solution drain, perforated false bottom arranged within tank above main bottom and supporting filtering material, ore discharge pipe communicating with interior of tank immediately above plane of false bottom, revoluble agitator depending within tank in proximity with reference to false bottom, plurality of air jets arranged to communicate with tank in plane intermediate false bottom and lower end of agitator there above.

HOISTING MACHINERY.—No. 664,073; H. C. Behr, San Francisco, Cal., assignor to Fraser & Chalmers, Chicago, Ill.



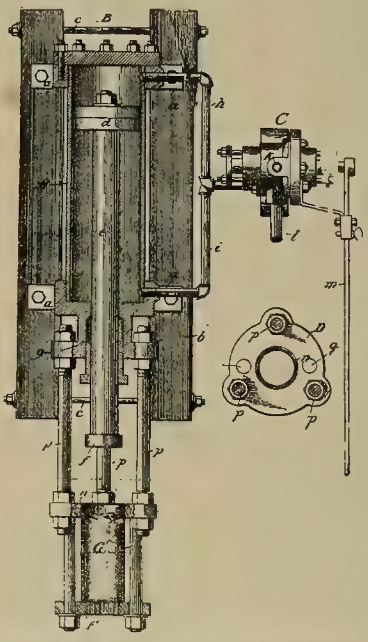
Combination with mine shaft, gallows frame above shaft and winding drum at one side of and extending at angle to shaft, of swinging frame pivoted at one end portion upon gallows-frame extending in downward inclined direction, free end adjacent to drum, swinging at its free end in arc center, approximately in line with rope depending into shaft, pit-head sheave journaled on swinging frame, with rope-leading face on axis of swinging frame, rope-guide sheave on free end portion of swinging frame approximately in line with pit-head sheave.

ANNEALING FURNACE.—No. 664,173; G. W. Packer, Chicago, Ill.



Annealing furnace, upper heating chamber consisting of series of ovens or chambers, passages between adjacent ovens of series, lower heating chamber consisting of series of ovens or chambers provided with passages between adjacent ovens, independent means for supplying fuel and air to each oven, flues leading from each chamber of upper series to one chamber of lower series, escape flues in each lower oven.

AMALGAM PRESS.—No. 664,330; A. Mackay, Douglas Island, Alaska.



Appliance for expressing surplus quicksilver from amalgam, comprising, in combination, frame, threaded apertured plate, rods fixedly connecting plate to frame, foraminous cylindrical receptacle having open ends screwed at top in aperture of plate, rods depending from plate having nuts at lower ends, laterally swinging perforated base plate normally closing lower end of cylinder pivoted to one of depending rods, provided with a recess to engage other depending rod, nuts forming supports for base plate, ram movable in receptacle, means for actuating ram to express quicksilver from amalgam, and to expel latter through open lower end of receptacle when base plate is swung to opening position.

PROCESS OF RECOVERING ZINC.—No. 664,269; C. Hoepfner, Frankfort-on-the-Main, Germany.

Reacting upon zinc oxide or material containing it, with carbonic acid and solution of calcium chloride at temperature above normal and pressure above atmospheric, precipitating portion of zinc as hydroxide with suitable precipitant, as lime, removing precipitated zinc hydroxide, and using regenerated calcium chloride solution in treatment of more raw material.

DIRECTOR ROBERTS, of the United States mint, says that 1901 will show the greatest gold production the world has ever known. "We estimate from data in our possession," he says, "that the world's production next year will reach a total of $365,000,000. The year 1901 will show that the United States is again at the head of all countries as a producer of gold. Our total next year will probably rise to $94,000,000, eclipsing Australia and South Africa for the first time in several years."

THE close of the century has about perfected the steam engine, which is still the great motor; it has bought the gas engine, the air compressor, the electric motor and the water wheel to a degree of perfection that seems to make difficult further progress in efficiency. All these are of foremost use in mining and metallurgy. The close of the century has developed steel production and the smelting of ore from carefully guarded and costly secret processes to a cheap simplicity that makes practical their universal use.

THE California State Mining Bureau has issued Bulletin No. 18, "The Mother Lode Region of California," by W. H. Storms, 154 pages replete with up-to-date information thereon. This appears almost simultaneously with Folio 63, issued by the U. S. Geologic Survey on the same region. Any one possessing the two has about as good an idea of the "mother lode" of California as it is possible to impart by means of illustrated description.

IN this issue of this journal there are 76,176,000 square inches of paper surface.

ARIZONA and New Mexico are twinkling stars on the horizon of statehood.

New Methods for the Extraction of Copper and Zinc.

Written for the MINING AND SCIENTIFIC PRESS by DR. J. OHLY.

The month of October of the present year has been remarkable on account of the discovery of new and advantageous processes employed for the purpose of extracting copper and zinc from their respective ores. These processes have been covered by patents, granted by the United States Government, and are worthy of intimate study, since they disclose a new principle of chemical nature, which was not known unto the present. The first of these patents comprises the employment of "nitre cake," a material resulting in the manufacture of nitric acid from sodium nitrate (Chile saltpetre) and sulphuric acid. The main point of this manufacture consists in the expulsion of all the nitric acid contained in the saltpetre at a low temperature, so as to prevent any loss occasioned by the decomposition of the acid fumes produced. When this point has been reached, the remaining product, known as nitre cake, consists on the average of 75.8% of sodium sulphate, 16.68% of sulphuric acid, 6% water, and 1.52% of insoluble residue. An aqueous solution of this nitre cake has the capacity of dissolving copper and zinc from the respective ores, with the proviso, however, that the latter, if consisting of sulphides, must be subjected to roasting beforehand, while oxides and carbonates can be leached successfully according to this process without resorting to any other preliminary preparation of the ore than crushing and grinding. It has been found also that a 5% Baume solution answers best for the extraction of the ore, since the solvent shows under these conditions a selective propensity for the copper and zinc present, and touches but to a limited extent the iron or aluminum compounds eventually contained in the material to be treated. The solutions resulting in this manner are freed of their metallic contents either by the electrolytic or chemical method, when, in both cases, the copper is precipitated first in the metallic state, and the zinc remains in solution to be recovered afterwards.

The chemical reaction underlying this process consists evidently in the formation of a readily soluble double salt of copper, zinc and sodium sulphates, and is induced by the presence of free sulphuric acid. As the solving action of sodium sulphate, in the form of nitre cake when in aqueous solution, was not known unto the present, this point constitutes the intrinsic value of the patent.

The inventor of the process, C. G. Collins of New York, added, however, two further modifications to the original method, and for each of the three, the United States Government has granted separate patent rights on October 9 of the present year. In the second process, No. 659,339, salt cake is employed instead of nitre cake—the former a product resulting during the first step of soda manufacture from salt and sulphuric acid according to the process of Leblanc. The by-products in the latter consist of hydrochloric acid — besides others not considered here—which serves, when added to black oxide of manganese, for the production of chlorine, by means of which bleaching powder or chloride of lime is manufactured subsequently. These two by-products —hydrochloric acid and bleaching lime—have contributed greatly to keep alive the old Leblanc process, whose invention dates back into the turbulent times of the French revolution, and represents one of the saddest incidents connected with the creation of an ingenious and inventive mind.

In 1775 the French Academy of Sciences offered a high price for the discovery of a process answering the artificial preparation of soda. Nicolas Leblanc was the man to accomplish the project, and, having submitted his process to the Duke of Orleans, he succeeded in obtaining the necessary capital from that personage in order to carry out his proposition on a commercial scale. The merits of his invention having been acknowledged, a patent was granted to him by the French Government, which comprised practically all the steps of the process as it is applied at the present day. Soon after other manufacturing operations of this character were commenced, and the brightest prospects opened for the inventor and his associates, when the duke was thrown into prison by the revolutionists under the accusation of assisting in the manufacture of a product "hurtful to the public health," found guilty forthwith and beheaded in the year 1793. This ruthless procedure of the "Committee of Public Welfare" was followed by another harsh and malicious step, compelling Leblanc to renounce the stipulations of his patent "for the benefit of the country." In spite of his protestations only the paltry sum of 600 francs was awarded to him as indemnification of his losses, and he was left to console himself as best he could for the following years, when in 1801 the soda works were returned to him by decree of Government. But, being without capital at this period, he found it impossible to start the works or even to compete with others, which had had been established in the meantime and were profiting by his invention. Ultimately a committee appointed to investigate his claims awarded him a small remuneration, the insignificance of which drove the inventor to despair, so that he, crushed by the ingratitude of his countrymen, made an attempt on his life, and died a miserable death. Though he left his family in the most destitute circumstances, the small sum granted by the committee was never paid to his wife or children surviving him.

This dreadful experience of the inventor of a process that has brought untold millions into the coffers of the soda manufacturers of the civilized world is proof for the saying that "the way of the inventor is hard," or for the more vulgar variation, "the inventor don't get anything," reminding one of the sad lines of Robert Burns in "Despondency," which read:

> O life! thou art a galling load,
> Along a rough, a weary road,
> For wretches such as I—

In the course of years quite a number of processes aiming at the manufacture of soda, among them the cryolite, ammonia, and several electrolytic methods, have entered into competition with the old invention, so that it has been limited in cases to the manufacture of salt cake, bleach, and hydrochloric acid exclusively. The compound resulting on roasting common salt or sodium chloride with sulphuric acid is naturally an inexpensive product, which can be manufactured or bought in quantities to suit, and consists approximately of 95% sodium sulphate, 2% sodium chloride, 2% of sulphuric acid, and 1% magnesium sulphate, the latter being a usual admixture, in the form of chloride, to common salt, and imparting to it hygroscopic properties.

It will be readily seen, that the roasting of salt with sulphuric acid for the production of salt cake may be carried on to advantage in localities where the two ingredients required can be bought at the lowest figures. Conditions in this respect are undoubtedly favorable in any of the Western States, and it seems, therefore, that this manufacture might be profitably employed in combination with the leaching of copper-zinc ores and the subsequent production of the two metals. Since the price of copper has been in the ascendancy for the past six months, and has reached the respectable figure of 17 cents per pound at present, while that of zinc may be put down as 5 cents for the same amount, there is every reason extant to declare the erection of such works a very lucrative undertaking. This favorable condition is even maintained at present for copper alone, when the recovery of this metal from low-grade ores is carried on by means of sulphuric acid, which must be considered as an expensive article in comparison to the extremely low-priced solvent resulting in the manufacture of salt cake and the by-products consisting of hydrochloric acid and bleaching powder. As these articles bring good figures in the market, it would seem that the point under consideration represents an inducement of extraordinary merits.

There remains, however, one phase in the manufacture of salt cake, which deserves special consideration, and that is the utilization of the hydrochloric acid, resulting as one of the by-products. It might, of course, be conducted into water, which absorbs the acid fumes with avidity, and thus form the commercial article, known as muriatic or hydrochloric acid. The latter may serve subsequently for the manufacture of bleaching powder, but a more profitable and direct utilization of the same would consist in employing it also for the extraction of copper and zinc from the ores by introducing the gas into the water of the tanks containing the crushed material, when it will gradually dissolve in the former and attack the copper and zinc present so as to form a solution of the two chlorides of these metals. The final result would, therefore, differ from that accomplished on applying salt or nitre cake merely by the nature of the copper and zinc salts produced, which would be chlorides when using hydrochloric acid, and sulphates in the other case. The subsequent separation of copper and zinc from these solutions would offer no special difficulties.

Experiments made in this regard by the author show clearly, that the point taken is a correct one, and that the extraction of copper-zinc ores, effected by the simultaneous employment of salt cake and hydrochloric acid gives very encouraging returns. Ores of the character desired not being readily obtainable, equal weights of wasted chalcopyrite, copper glance and unroasted copper carbonate were mixed with the same amounts of roasted zincblende, and the resulting mixture ground to pass through a fifty mesh sieve. One gramme of each sample, thus obtained, was then brought in solution, and the copper and zinc contents determined by the usual titration processes. After that, ten grammes each of the three mixtures were covered with a measured amount of water, when the fumes of hydrochloric acid, produced by heating a weighed amount of salt and sulphuric acid in a glass retort, were conducted into the water to saturation, and left in contact with the ore for twenty-four hours. Three other samples of the same weight and kind were then covered with a 5% Baume solution of the salt cake produced, and the mixture allowed to stand for the same amount of time. The six solutions thus obtained were then drawn off, and their relative copper and zinc percentage determined as before, when the analytical results showed that the extraction percentages for the mixture of unroasted carbonate and roasted zincblende, when treated with salt cake solution amounted to 97.8 in copper and 88.9 in zinc, for the mixture of roasted copper glance and blende to 99.4 and 87.6 respectively, and for that of roasted chalcopyrite and zincblende to 92.4 and 85.5. The extraction of copper, effected by hydrochloric acid, on the other hand, approached closely the figures obtained by the treatment with salt cake solution. while the percentages of zinc were considerably lowered, and amounted to 87.3 in the first case, 75.5 in the second, and 72.4 in the third case.

The separation of the metallic copper and zinc from equal volumes of the six solutions, prepared and tested in the same manner as before, was accomplished by the electrolytical method only, and the results obtained were compared with those resulting through analysis. They were found to approach these figures closely.

The third patent, granted to Mr. Collins under the same date, and numbered 659,340, comprises the employment of both salt cake and niter cake, presumably in equal parts by weight, for the preparation of the solvent. In this case, as in the others, the observations made as to the strength of the solution for the first and second patents hold good, and it is advised to use a strength of 5% Baume in case the ore carries large quantities of iron, aluminum or other soluble substances.

On closer observation of these patents the thought might occur to the reader that they can be readily circumvented by using sodium sulphate or glauber salt, sulphuric acid, and water, in the proportions of 75.8, 16.68 and 6, respectively, in the first case, and sodium sulphate, salt, sulphuric acid, and magnesium sulphate in the relative proportions of 95, 2, 2, and 1 in the second case, though the price of the solvent obtained in this manner would be raised thereby to some extent. By mixing these ingredients in the proportions of 85.5 for glauber salt, 9.34 for sulphuric acid, 1 for salt, 0.5 for magnesium sulphate, and 3 for water, the third solvent would result, and the owner of the patents would not have the right to interfere with the application of these three solvents, prepared in the manner indicated. Though it would be unjust to encourage or induce such practices, the writer cannot refrain from pointing out the risk incurred by inventors through the obligation, imposed upon them by the Government, to explain every detail of their processes in the patent applications, after which the information given is usually spread broadcast by journals and daily papers of the country.

A lixiviating works for the extraction of copper ores, erected on the principles explained above, would preferably be located on a hillside of gentle declivity, the upper terrace being of sufficient size to allow of the erection of a furnace for the manufacture of salt cake, and, in immediate proximity to it, of the placing of two tanks, employed for the alternate dissolving of the copper and zinc from the ore by means of salt cake solution and hydrochloric acid. This furnace should be constructed preferably on the English or Tyneside pattern, and might be either two or three bedded, according to the production intended. The tanks serving for the preparation of the copper-zinc solutions should be connected by automatic siphons with the third and fourth tanks of the second terrace, which would take up the solutions as soon as they have cleared sufficiently. From these reservoirs the liquid may be conducted into copper cylinders, kept in rotation by appropriate machinery and filled with iron scraps—a contrivance which will enhance the speedy precipitation of the copper. Preferably, however, the recovery of both metals present should be effected in the electrolytic way, since the chemical methods serving for the separation of the zinc only allow of the separation of that metal in the form of oxide, and are rather tedious and expensive.

Other points observed during the treatment of the ore samples, as described above, were the following:

It was noticed, that the hydrochloric acid did not display the selective capacity for copper and zinc to the same degree as salt or nitre cake solution, and that, therefore, the liquids obtained by means of that solvent, contained a greater amount of iron than those resulting in the other way. The presence of the latter does, however, not prevent the successful precipitation of the copper, but seems to interfere to some extent with the recovery of the zinc in the quantities desired. It may, therefore, be necessary, in case the iron contents predominate largely, to remove them, after the electrolytic precipitation of the copper has been accomplished, so as to obtain a solution containing practically no other ingredients than zinc salts. It was found that this end could be readily obtained, and in an inexpensive manner, by precipitating the iron with lime, and subsequently electrolyzing the remaining clear solution.

Furthermore, it was observed that the introduction of gaseous hydrochloric acid into the water added, caused a gradual heating of the liquid, so that some lead, present in the samples, entered into the solution as chloride, which separated out on cooling in the form of a white precipitate.

Though the chemical principle, upon which the processes mentioned are based, was not realized unto the present—that is, the action of nitre cake or salt cake in aqueous solution upon pulverized copper and zinc ore—yet the selective capacity of sodium sulphate at higher temperatures has been taken advantage of in smelting operations years ago. In England especially the applicability of sodium sulphate for the separation of zinc from silver and lead in ores carrying these three metals has been realized, and a very efficient process established accordingly. Large works of this character are at present in operation there, and the results obtained argue very favorably for the extended utilization of this inexpensive and rather neglected or overlooked material for smelting purposes. This remark is especially true for that industry as carried on in the United States.

In the process under consideration the zinc contents of the ore pass into the slag, while the silver and lead settle in the bottom of the crucible or furnaces employed in the form of bullion. The zinc contents of the slag are recovered by roasting, when the metal volatilizes as zinc oxide, and is condensed in properly constructed flumes, while the separation of silver from the lead, which represents the final step of the operation, is then effected in the usual manner.

"Orthodox" and "Wild Cat" Oil Propositions.

NUMBER II.—CONCLUDED.

The following is a simple method for determining the dip of exposed strata with sufficient accuracy for practical purposes:

In Fig. 1 let P Q D C represent the surface of an inclined stratum. It is required to determine the direction in which it dips, and the angle at which it is inclined.

If a plumb-bob is suspended from a partly open rule, as shown in Fig. 1, and the open ends of the rule be turned in the direction of the dip until the plumb-line forms one side of a triangle with the two limbs of the rule, then the lower limbs G H will lie in the direction of the dip; for the plumb-line will only complete the triangle with the limbs of the rule when its lower limb is placed on I K, the line of greatest inclination of stratum P Q D C. This can be seen by turning the rule so that limb G H falls on line L M or N O, neither of which is the line of greatest inclination of the stratum. It will then be seen that, while the limb G H is in either of these positions, or any other position except the one which coincides with the line I K, the plumb-line and the limbs of the rule will not form a triangle.

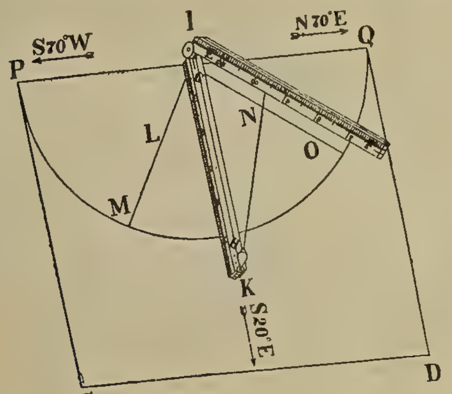


FIG. 1.

Diagram illustrating method of determining dip of exposed strata.

If E F, the upper limb of the rule, be placed in a horizontal position and the lower limb G H on I K, the line of greatest inclination, the side of the triangle formed by the plumb-line will be opposite the angle of the dip. The value of this angle may be found from the two sides of the triangle formed by a portion of the upper limb of the rule and the plumb line.

The angle of the dip may also be ascertained with approximate accuracy by carefully laying the rule, opened as explained in the preceding paragraph, on a piece of paper, drawing the angle and measuring it with a protractor.

Some rules are furnished with a clinometer scale, by which the angle formed by the open limbs of the rule is indicated.

It will be apparent to mathematicians that, if the upper side of the triangle be considered as radius, the plumb-line will represent the tangent of the angle of the dip; and if the hypothenuse, i. e., the lower side of the triangle, be considered as radius, the plumb-line will represent the sine of the angle of the dip.

As previously mentioned, the strike is always at right angles to the dip. Thus, in the case of stratum P Q D C, if the direction of the dip, as shown by line I K, is found to be S. 20° E., the strike will be represented by line P Q, at right angles to line I K, and the stratum will extend in a horizontal direction with a strike of S. 70° W., or N. 70° E.

Care should be taken that the surface of the stratum, the dip of which is to be ascertained, really is a bedding plane. It must be borne in mind that the bedding planes are seldom true planes, as they are subject to many inequalities.

Therefore, if possible, the dip should be estimated at several places on the same stratum, and the average of the results taken as the dip. In estimating the dip of a stratum of rock by this method, it is well to clear off a space on the surface of the stratum and to lay thereon a board, thus getting a better surface on which to work.

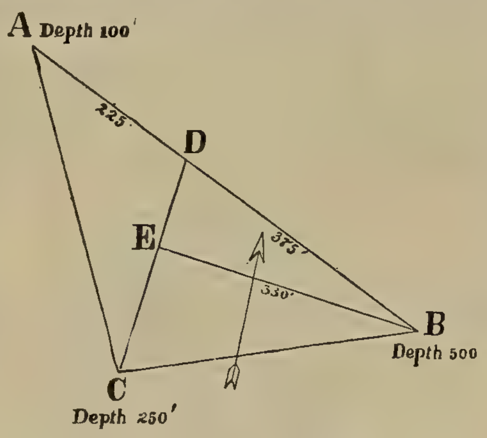


FIG. 2.

Diagram illustrating method of determining strike of oil sand stratum.

When a remunerative oil-yielding stratum has been discovered, its strike and dip should be determined by drilling three wells according to the following method:

In Fig. 2 let A, B and C be three wells in which the oil sand has been struck at 100′, 500′ and 250′, respectively, below any datum plane, such as a horizontal plane touching the top of well A. Draw A B, and let it represent a horizontal distance of 600′. If a point be found between wells A and B at which the oil sand can be struck at a depth of 250′ below the datum plane, a line drawn from well C to that point must necessarily be drawn along the strike of the formation; and if a line be drawn at right angles towards the strike of the formation and towards the deepest well, that line will necessarily be drawn in the direction of the dip of the formation. Moreover, the figures contain the elements from which the angle of the dip may be calculated.

The question is: At what point along the line A B will a well strike the oil sand at 250′ below the datum plane? The distance A B is 600′; the difference in the depth of wells A and B is 400′; therefore, the grade of the surface of the oil sand A and B is 400′ in 600′, or 2′ in 3′. Hence, wells situated along line A B and sunk to strike the stratum of oil sand, would, if measured from the datum plane, increase in depth as well B was approached, and the depths would be in proportion to the distance from A measured along A B.

It is required to find a point along the line A B at which the oil sand may be struck 250′ below this line, or 150′ deeper than at A. Since the increase in depth of wells which may be sunk from the datum plane to the oil sand along the line A B is at the rate of 2′ in depth to every 3′ of horizontal advance toward B, the distance from well A to the required point will be to the increase of depth of well at the required point as 3 to 2, or 1½ times 150′, which is 225′. Lay off A D = 225′. As point D is 225′ distant from well A, along line A B, a well sunk at point D will strike the oil sand at a depth of 250′ below the datum plane. Hence a line drawn from C to D will give the direction of the strike of the oil sand stratum.

Or the proposition may be stated thus: The grade of the stratum of oil sand between wells A and B is 400′ (the difference between the depth of the wells at A and B) divided by 600′ (the horizontal distance between the two wells), which gives two-thirds of a foot in depth to 1 foot along A B. Dividing 150′ (the difference of depth of wells A and C) by two-thirds of a foot, we obtain the distance 225′, which is the distance A D. Therefore, if a well were sunk at D, the oil sand would be struck at a depth of 250′. Draw the line C D. Now, it is evident that a well sunk at any point along C D would strike the oil sand at a depth of 250′. Hence, as stated before, the line C D is the direction of the strike of the oil sand stratum. Moreover, any line drawn at right angles to line C D, and in the direction of the deepest well, will be drawn in the direction of the dip of the formation.

It is now required to find the angle at which the oil sand dips, and this can be found as follows: From B draw B E at right angles to C D (the line of strike). This line E B is the direction of the dip of the formation. By measurement, we find that line E B is 330′. If a well were sunk at point E, it would strike the oil sand at a depth of 250′ below the datum plane. Therefore, the grade along the surface of the oil sand in the direction of E B is 250′ in 330′; and this grade represents an angle of about 37°. If the meridian be represented by the arrow in Fig. 2, then the oil sand penetrated by the wells A, B and C dips S. 80° E., at an angle of about 37°, and, consequently, the strike is N. 10° E.

When a remunerative stratum of oil sand has been struck and the angle at which it dips has been ascertained, as shown in the foregoing paragraphs, the distance from any of the wells, as B, to the point at which the oil sand ought to crop out at the surface of the ground, if it were on a level with the datum line, can be determined. This is done by the following method:

Let Fig. 3 represent a vertical cross-section drawn through the ground plan of Fig. 2, along line B E, and extended along the line of dip toward the outcrop. Let B b represent 500′, the depth of well B, and let E e represent the depth of a well which, if sunk at E, would strike the oil sand at a depth of 250′, as explained in the preceding paragraph. It is required to find the point at which the stratum of oil sand, struck in well B, ought to crop out at the surface of the ground, provided the surface were on a level with the datum line and not covered with alluvium. Through points b and e, or the top of the oil sand stratum, draw b e, and extend it until it cuts the datum line; the point where it cuts this line is at L. If the distance between B and L be measured, it will be found to be about 660′, which is the distance between well B and the outcrop. If the surface of the ground sloped upward from the datum line, as indicated by the outline H Y, it is evident that the oil sand would crop out at a point above the datum line. This point can be found by extending line b L till it strikes the surface. It is obvious that if the surface of the ground sloped downward from any point, such as H on the datum line, the outcrop would be below the datum line.

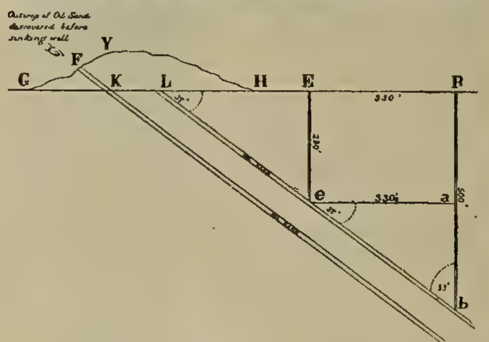


FIG. 3.

Diagram illustrating method of determining dip of oil sand stratum.

The angle at which the oil sand dips, and the distance from well B to the outcrop, may be found by measurement and the simple methods already given, with sufficient accuracy for practical purposes. But, if a closer estimate is desired, it can be obtained by the following trigonometrical formulas:

From the right-angled triangle a e b (see Fig. 3), of which a e = 330′ and a b = 250′, we have:

$$\text{Cot. of angle of dip } (a\ e\ b) = 330' \div 250' = 37^\circ\ 8'\ 48''.$$

From the right-angled triangle B L b, of which B b = 500′, and the angle a e b = angle B L b = 37° 8′ 48″, we have:

$$B\ L = 500' \times \text{cot. } 37^\circ\ 8'\ 48'' = 660'.$$

That is to say, the distance from well B to the outcrop at L, measured on the datum plane, equals the depth of the well multiplied by the cotangent of the angle of the dip.

If in the first instance an outcrop of oil sand had been discovered at point F, and well B had been sunk to strike it, then it becomes important to determine whether or not the previously discovered outcrop of the oil sand is identical with the outcrop of the oil sand as determined by calculation. It has been found that the angle of the dip would cause the oil sand struck in well B to come to the surface at point L or Y. Therefore, it is reasonable to suppose that the discovered outcrop which comes to the surface at F represents a stratum of oil sand underlying that penetrated by wells A, B and C. (See Fig. 2.)

If an outcrop of oil sand had been discovered at F and well B sunk, and oil sand had been discovered at 500′, it would naturally be supposed that the oil sand stratum discovered at point F had been reached. If struck a little sooner than expected, it might be accounted for on the ground that there is some irregularity in the dip; but when three wells are sunk and the dip, calculated by the method of triangulation already explained, shows that the stratum of oil sand struck in wells A, B and C ought to appear at L or Y, it is presumptive evidence that the outcrop of oil sand discovered at F is a stratum underlying that penetrated by the wells. When no outcrop of oil sand has been discovered, it is important to find out where the outcrop ought to be in order that some idea may be had on the ground as to the width of that portion of the oil line which lies between the well and the outcrop.

In all these calculations everything must be reckoned with reference to a common datum, which is preferably the horizontal plane passing through the highest or lowest part of the oil field in which the calculations are made. Oil fields should be developed by this method of triangulation, or some modification of it. In the development of an oil field in California it is expected that many cases will occur where the calculations will not tally with the results, for the reason that there are irregularities in the formation;

but, taken as a whole, progress by triangulation is the only safe method of procedure.

It will be evident to mathematicians that the calculations herein set forth may be made by various formulas.

From the foregoing paper it will appear that, although the element of risk is inseparable from petroleum mining, it is greatly diminished by competent and careful preliminary work, consisting of:

First.—A study of the structural features of the locality wherein operations are to be conducted.

Second.—By following a systematic method of triangulation for determining the strike and dip of the oil sand, and the site of new oil wells.

When a remunerative oil line has been discovered, it should be developed gradually; in districts where there has been much geological disturbance it is better to limit the distance between wells to about 300′.

If oil lines are discovered on both sides of an anticlinal fold, it is well to develop them simultaneously, by which means a correct idea as to the structure of the fold may be obtained.

By prospecting and developing territory on the lines mentioned in this paper, a few wells may be so located as to demonstrate in most instances the value of the territory; whereas wells drilled without due regard to the geological conditions of the locality demonstrate nothing more than the value of the rocks they actually penetrate, and several wells may be drilled which prove only the same fact instead of the group of facts on which the value of an oil field depends.

From the foregoing discussion it is apparent that the depth of oil wells depends on the angle at which the oil sand dips, and the distance the wells are from the outcrop of the oil sand, or from the axis of the fold or the fault line on which the wells are situated. As a general statement, it may be said that the most productive wells are about 1000′ in depth, some being much deeper.

The "life" and yield of such wells are naturally varied. Some wells are "spouters" and "start off" by flowing several hundred barrels of oil a day, but in most instances the flow subsides and the well becomes an ordinary "pumping well." In some instances wells have "started off" with a yield of 100 barrels or more a day by pumping, but in the course of from two to six years the yield has diminished to ten barrels or less a day. In other instances the first yield was less than 100 barrels a day, but the rate of production was better sustained during the "life" of the well. In some oil fields the wells are considerably less than 1000′ in depth, but, as a rule, their yield is not so great as that of the deeper wells.

The cost of drilling wells varies according to the accessibility of the locality where the well is situated, and the character of the formation penetrated.

The following statement as to the cost of drilling 1000′, exclusive of the cost of casing, is a consensus of opinion obtained by correspondence with several well known oil producers:

Locality.	Cost of Drilling 1000′.
Los Angeles and the Kern River district	$1,000 to $3,500
The Puente Hills	3,500 to 7,000
Newhall and territory on the north side of the valley of the Santa Clara river	5,000 to 7,500
The foothills of the Coast Ranges on the west side of the San Joaquin valley	2,000 to 7,000

A review of the oil fields in the Coast Ranges leads to the conclusion that the most favorable locality in which to drill "prospect wells" is one wherein a definite stratum of oil sand has been discovered in a formation belonging to a geological horizon known to include productive oil measures in other places; preferably there should be seepages of liquid petroleum at or near the locality in which prospect wells are to be drilled, and the angle at which the oil sand dips should not be more than 50° nor less than 10°.

The Burlap Process.

On page 610 an old resident gives a brief account of the gold bearing gravel bars of the Snake river, which winds between Oregon and Idaho. In further mention of the manner in which the gold is saved, the burlap process is worthy of note, as practiced by many an old miner along the banks of that river.

The method is as follows: A short sluice carrying a considerable stream of water is first prepared; attached to this there is an inclined table about 16 feet in width and from 10 to 20 feet in length. Where the table is 20 feet in length it is usually divided in its incline, that is, the first 10 feet adjoining the sluicebox is sharper in its incline than the last 10 feet, which is almost level with the horizon. There are flanges or a rim on each side of this table, 4 to 6 inches high, and through its center it is divided by a partition board, leaving each half 8 feet wide. On the first 8 feet of each length there is placed a quicksilvered copper plate, and over this is laid a sheet of burlap, usually of Manila bagging, firmly stretched and secured, so as to give an even surface to meet the current that is to pass over it. To the sluice there are screens attached for catching the coarse gravel and sand, and the gravel being shoveled into the sluice the fine sand, magnetic iron and fine gold particles soon reach the burlap sheet that is spread over the table. The current carries forward the sand and all lighter matter, and the short hair-like surface of the burlap retains the gold and black sand. Some of the gold particles penetrate the bagging and are caught on the quicksilvered plates. After exposure to the current for about twelve hours or less, the water is turned entirely onto one side, the burlap sheet on the other side removed and carefully washed in a large vat filled with water, where it is entirely freed of the particles of gold and black sand which adhered to it on the table. It is then replaced on the table, the current turned on again and the burlap on the other side treated in the same way. When the washings of these burlap sheets have accumulated to a considerable quantity in the vat, mercury is poured upon them and by means of an agitator the mercury is forced over and over and through the mass of auriferous black sand until it has taken up every particle of gold. The black sand or magnetic iron is then washed out and the amalgam renewed, the free quicksilver separated by forcing through felt or buckskin, and the remainder separated from the gold by fire.

Ralston Divide, Placer County, Cal.

Written for the MINING AND SCIENTIFIC PRESS by
A. BORDEAUX.

The MINING AND SCIENTIFIC PRESS devoted considerable space in the issue of July 30, 1898, to the Ralston Divide Gold Mining Co.'s property, in Placer county, Cal. The following will give further information regarding the work done during the two years since:

The property embraces ninety claims, about 15 miles in length of the Ralston Divide, between Long Canyon and the Middle Fork of American river. This divide is comparatively virgin ground, only sufficient work having been done to prove the presence of gold in many places; some of the old works date as far back as the early days of California in 1850. Besides the mining ground, the company acquired several miles of ditches, the longest or Lambert ditch being 25 miles in length, and starting from a big dam on the American river at French Meadows. Other ditches, like the Long Canyon ditch, are 10 to 12 miles in length. There is a wagon road between the Divide and Summit Station, the highest point where the overland Pacific Railroad crosses the Sierra Nevada mountains, at an elevation of over 7000 feet.

The property belongs to the Ralston Divide G. M. Co., a California corporation, representing a French company—the Compagnie des Mines d'or du Long Canyon—composed entirely of French capital, with headquarters at Paris, 5 rue Scribe. The California office is at 214 Pine street, San Francisco. The directors are F. Chappellet, president; A. Bordeaux, vice-president and manager; H. W. Pulcifer, C. Rillict, H. Fabrigue; George W. Dixon, secretary.

Following is a full list of early hydraulic works on the Ralston divide: Pat Goggins, extensive hydraulic pit; Vaughn, small pits and shaft; Willard, small pits and 500 feet of tunnels in bedrock and gravel; MacPherson, 500 feet of tunnels in blue gravel; MacAllister, small pits; Ramsey & Poland, two hydraulic pits, extensive; Blacksmith Flat, large pit; Quartz Point and Quartz Flat, two extensive pits in white gravel; Marshall, Hillside and Red Cut, three pits in blue gravel; Ralston Pennsylvania mine, large pits in upper blue and white gravels; Diana, two pits and two tunnels in white gravel.

The Long Canyon's bed has been hydraulicked below Willard and below Blacksmith Flat.

From May, 1898, the following has been done:

At the Pat Goggins claim, 3500 feet of tunnels in full gravel, and breastings; output of $5000 during the prospecting operations of 1899. Granite mine, 700 feet of tunnel in full gravel. Ramsey claim, 100 feet of tunnel in gravel. Blacksmith Flat claim, 100 feet of tunnel in gravel. Lynchburg claim, 3150 feet of tunnels, partly in bedrock, partly in gravel. Red Cut, 1000 feet of tunnels in blue gravel. Total, about 8500 feet of tunnels. Most of this development work has been done in order to locate a deep gutter or river channel inside the Divide; but so far the channels have proved to be very wide and flat, except for a few stretches of shallow and richer gravel. In order to work profitably such wide channels, with no special concentration of gold, it will be necessary to operate on a large scale, rather than to try extensive underground works by drifting. Piping underground has been tried successfully in some places—in El Dorado and Nevada counties. This is the case when the gold is scattered over the full width and height of the channel, with occasional pay leads, but lacking in a concentration of gold in deep gutters, as in many of the mines of Forest Hill Divide, in Placer county.

Two of the mines are, and a third one may be, equipped for producing this coming winter—Pat Goggins, Lynchburg and Blacksmith Flat.

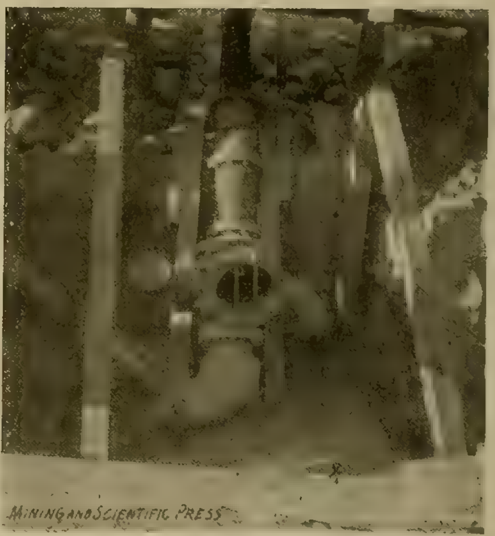
At the Pat Goggins an elevator will raise up the gravel 40 feet high, as the ground is flat. The ditches, reservoirs and pipe lines were completed last summer. The elevator, furnished by the Risdon Iron Works of San Francisco, is able to pass 100 cars an hour with a pressure of 300 feet and 600 inches of water. As the gravel inside was proving good last spring, work will be done by drifting at the same time as by hydraulicking outside.

Lynchburg is equipped with derricks and giants under a pressure of 350 feet of water. Ditches, reservoirs, pipe lines are ready.

Blacksmith Flat cannot dispose for the present of more than 80 feet of pressure, but there is another ditch to be completed next year, at which work was started already last summer, that will give about 250 feet of pressure and large capacity of water. Subsequently the other mines will be opened up and developed according to the first results obtained. A large undertaking like this cannot succeed without large expenses, as everything is to be done in a new and remote country. The locating of the Forest Hill channels has entailed an immense amount of expenses in prospecting tunnels by hundreds, and the Ralston divide is scarcely less extensive than the Forest Hill divide.

Elevator Sluice, Pat Goggins Mine, Ralston Divide, Placer County, Cal.

CHANNELS.—The development works by tunnels, and the different surveys have proved the existence of and located two different kinds of gravel, which, as it seems, belong to two different channels. So far there are no indications of any deep and narrow channels; on the contrary, all the gravel tunnels met with only wide stretches of flat river beds, between far distant and slow-grade rims. At the same time, the depressions along the exterior contact line of gravel and bedrock are of considerable length with a corresponding depth pointing conclusively to the sole existence of some broad outlets. As there do not appear to exist any deep and narrow outlets in any place all around the Divide, it is fairly probable that there are no deep or narrow channels.



Evans Elevator, Pat Goggins Mine, Ralston Divide, Placer County, Cal.

As both the white and the blue gravel belong to some wide and flat channels, it would seem as if they were two stratas in the same channel, and this opinion was expressed in a report of W. Lindgren on the old Yuba and American river channels. The white gravel is always at a slightly superior level above the blue gravel, and might possibly be its upper lead, now resting upon the cement, but now resting upon the bedrock, thus proving to be an independent channel. In the Forest Hill Divide the same white and blue gravels exist, with the same difference of level, and yet, according to Ross Browne's map, their channels are different altogether; the deepest one is the youngest. According to W. Lindgren, on the contrary, the deepest one would be the oldest; this is adverse to the facts, as, for instance, the modern rivers, being the youngest ones, have cut the deepest bed across the bedrock.

I am disposed to believe that on the Ralston divide the white and blue channels are different, but they may have run parallel, and even between the same rims in some places, and this still better explains the sole existence of very wide depressions of bedrock along the contact line.

In the Forest Hill divide there is a similar phenomenon, the parallel existence of a white and of a blue channel, at a slightly different level. The white Pond channel is different from the blue Mayflower channel, and is considered to be the oldest one; yet they run close by each other, even with an intersection right below Forest Hill.

If there are no deep and narrow channels in the Ralston divide, there may be some pay leads. Even in the widest rivers there are generally some deeper gutters, and such gutters in California are the regular channels of the miners, being the richest pay leads. To locate them is a much more difficult task than to locate the old river itself, and this was only done in the Forest Hill divide many years later, after the discovery of the auriferous gravels, and after the hydraulicking of the inlets, outlets and breakouts of the channels. Subsequently only to the discovery of a gutter in these inlets and outlets was it possible to discover a pay lead in a channel by tunneling across the bedrock, and by drifting. Drifting always follows hydraulicking. The Mayflower rich channel was detected after its very existence was demonstrated at Bath and Dardanelles.

This last period has not yet been reached in the Ralston divide, but the second period, the discovery of a pay lead in a wide river bed, seems to have been attained in the wide outlet of the Pat Goggins blue channel by drifting. Similar work is now undertaken at the Blacksmith claim. Elsewhere drifting under ground will be possible only after the development on a large scale of the big hydraulic mine at Lynchburg. There is a prosperous future for the Ralston divide mines. When the hydraulic mines are exhausted, then will start the drift mines.

It is exceedingly probable that the white and blue channels of this divide are the upstream course of the white and blue channels of the Forest Hill and Georgetown divides, their connections being Kentucky Flat and Michigan Bluff.

Before closing, I can not refrain from saying a few words on the old theory of an ocean beach to explain the California channels. An upheaval of the Sierras has not been proven as non-existing, and an ocean beach only seems able to explain certain difficulties, like the close vicinity of the very wide channels at North Bloomfield, Dutch Flat and Iowa Hill, some running to the Yuba, some running to the American river. The local miners and the geologists disagree as to the course of these channels. We are still far from knowing everything about the California channels.

Electric Power Transmission 153 Miles.

The Snoqualmie Falls Power Company, of Seattle, Wash., whose present 1200 H. P. hydraulic station has been given previous mention herein, conducted tests on the 13th ult., to show that electric transmission of power could be made commercially practicable at a distance as great as 153 miles. The experiments occupied several hours, during which the various services of the company were cut off; and the three-phase transmission lines were connected up in one continuous circuit commencing at the power house, running to Seattle, back to the hills, then to Tacoma and back again to the falls. The regular transmission is 32 miles to Seattle and 44 miles to Tacoma. In each case there are two circuits, one on one side and the other on the other of the pole line, arranged with a triangular spacing of 30 inches between wires.

The single continuous three-phase circuit 153 miles long was composed of 58 miles No. 264 (diameter in mils) aluminum wire, 4 miles No. 1 B. & S. G. medium hard copper, and 51 miles No. 234 (diameter in mils) aluminum wire, 36⅔ miles No. 2 B. & S. G. aluminum cable, 1⅔ miles No. 3 B. & S. G. medium hard-drawn copper and 1⅔ miles No. 0 medium hard-drawn copper. The apparatus used consisted of a Westinghouse 1500-kilowatt three-phase generator, used for producing the current, and a similar machine used as a synchronous motor at the end of the circuit.

With the 153-mile circuit open at the incoming end, the tests were made for charging it at different voltages, the alterations (7200) being kept constant. It was found that as the voltage increased the charging current rapidly increased; that is, at 22,500 line voltage it required 62 kilowatts to charge the line; at 30,000 volts it required 112 kilowatts, and at 35,000 volts it required 180 kilowatts. With the step-down transformers at the falls cut in and their secondaries open, it was found that the current required to charge the line increased; that is, at 22,500 volts it required 76 kilowatts, and at 30,000 volts it required 123 kilowatts. The voltage at the incoming end of the circuit, with charging current only on the line, was 24,600 volts when the impressed voltage was 22,500 volts, and 32,100 volts when the voltage at the outgoing end was 30,000 volts. Tests were also made to determine the different amounts of charging current required at different frequency, the voltage being kept constant at 30,000, and it was found that at 6000 alterations 100 kilowatts were required to charge the line, at 6600 alterations 105 kilowatts and at 7800 alterations 115 kilowatts. The line was then tested for loss of power in transmitting a non-inductive load consisting of the water rheostat, at the falls at the end of the 153-mile circuit, and it was found that the line voltage out was 30,000, incoming 22,500, drop, 25%. The amperes per phase at 1000 volts out was 624, incoming 554, loss, 11.2%. The total kilowatt outgoing was 1100, incoming, that is, delivered into the water rheostat tanks, 723, loss, 34.2%. A test was also made for charging current with the sub-station transformers at Seattle and Tacoma and the lowering transformers at the falls in circuit, but with secondaries all open, and it was found that with the 30,000 volts out, there was 31,500 volts in, and it required 193 kilowatts to charge the line.

A test was then made of operating a second generator as a synchronous motor at the end of the 153-mile circuit, and the machines were synchronized without any trouble whatever, but soon began pumping so that it was found advisable to separate the machines. The experiment was then tried of operating the water rheostat and the synchronous motor in multiple at the end of the 153-mile circuit, and the performance of the motor was very much improved. The water was then shut off from the water wheel and the driven motor immediately reverted to a generator driven by its own inertia; the current in the lines were reversed and the first generator became in turn a motor and ran at the other end of the 153-mile circuit until the inertia was expended.

Gold in Snake River Gravel Bars.

Written for the MINING AND SCIENTIFIC PRESS by
WM. H. WASHBURN.

The gravel bars of Snake river, in Idaho, Oregon and Washington, have attracted attention for forty years. Extending for hundreds of miles along this river, from its headwaters to its junction with the Columbia, these bars contain gold to the value of from a fraction of a cent to several dollars per cubic yard. The latter values are found in a very few spots and of limited extent, and when discovered are soon worked out by itinerant prospectors. Twenty years ago these best spots were a favorite resort of miners and prospectors in search of a grubstake, but they have nearly all been long since exhausted, so that the man with a pan and rocker has slim picking these days.

The source of the gold cannot, of course, be accurately determined. The generally accepted theory is that it is the finer particles from the placer deposits of tributary streams, its extreme fineness and usually flattened shape permitting it to be transported hundreds of miles along with the sand and gravel. In fact it travels much faster than the larger sizes of the latter. Some claim that the vast lava beds of southern Idaho (which are said to contain a small amount of gold) have contributed the greater portion of the values. In support of this theory it may be said that, so far as the writer has observed, fine gold is to be found in the streams draining any extensive lava formation in a mining country. Probably it has been derived from both sources.

Our investigations having been made from a point about 20 miles below Huntington, Or., to 50 miles above Ontario, these remarks will be mostly confined to what is to be found between these points.

The gravel ranges in size from fine sand to boulders seldom larger than a man's head. The current has a velocity of from 3 to 5 miles per hour. The gold is very unevenly distributed throughout these bars, being generally found in strata of medium sized gravel, from a few inches to a few feet thick, usually overlaid by from 2 to 10 feet of barren sand or gravel. Below these strata the gravel may also be worthless. Depth does not seem to cause any increase in values; where the bedrock has been reached at a few points on the rim it holds but little gold.

As a typical instance of values, on one claim I found about 18 inches of gravel at water level, from which I rocked from 75 cents to $2.50 per yard. It was overlaid by about 8 feet of sand practically barren; the gravel below being afterward proven to carry but little value. Another claim shows strata of from 2 to 4 feet thick and about 150 feet wide by about 300 feet long, carrying about 50 cents per yard, also overlaid by about 6 feet of barren sand, the underlay being barren for at least 6 feet to water level. These figures are given to give a fair idea of the pay streaks in general. There are open bars in places with no overlay, and where the pay streak is of sufficient depth they are generally preferred by those engaged in dredging. There are many pay streaks found some distance from the river, but usually under the conditions as to overlay above described. In some places there are strata of cemented gravel from 1 to 3 feet thick, but generally it is absent.

It may be useful to note the conditions under which these pay streaks are laid down, as indicated by the open bars along the river. We find the gold is deposited along the short or inner side of the curves in the course of the river. Any stratum of good gravel in the opposite bank has evidently been laid down at some previous time under the same conditions.

The accompanying sketch will show the occurrence of gold more clearly. The colors are coarsest at the head of the deposit, gradually becoming finer and fewer, and spreading out below, until the gravel is too poor to pay. As long as the river retains its course the pay streak will continue to form as the bar is extended from year to year, thus forming the larger deposits. One old resident worked a certain spot over for eleven consecutive years, a fresh deposit of gold being made by the annual June rise of the river. The average size of the gravel, as well as other signs, seem to indicate that the gold is only deposited where the current has a certain medium velocity. The valley is from 3 to 10 miles wide, and quite flat generally, the course of the river having from time to time swerved from side to side across its whole width. At the few points where the bends in the river are made more permanent by rocky banks, the pay streaks seem to be deeper and of greater extent than elsewhere. I have prospected bars on the Columbia river near Wenatchee and Brewster, and found the gold to occur under similar conditions, although it is a trifle coarser.

The gold above the mouth of the Boise river is very fine, averaging about 1200 colors to 1 cent, and is worth from $17 to $19 per ounce. Below the mouth of the Boise the gold is not quite so fine, averaging about 900 colors to 1 cent. The value is lower, being from $14 to $16 per ounce. It is always associated with black sand (principally magnetite) and a heavy reddish gray sand made up of minute rubies and other various colored crystals. When carefully separated the black sand contains only a trace of gold. Below Huntington, as far as I prospected, the most of the gold is evidently of local origin, being quite coarse, and nuggets of considerable size are found, although the pure gold from above is still in evidence in favorable spots.

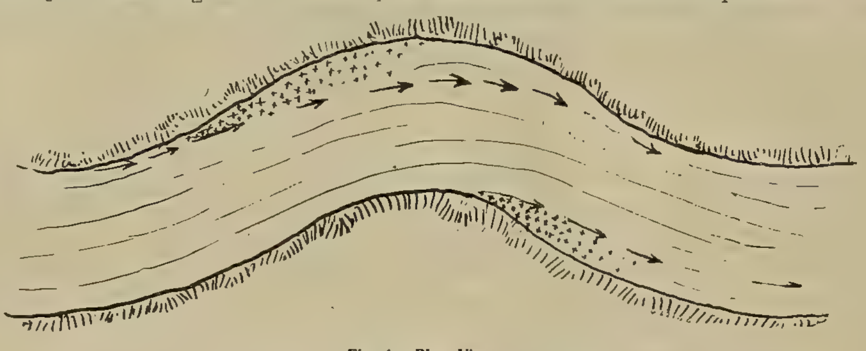


Fig. 1.—Plan View.

The crosses indicate the occurrence of the gold with relation to the bends of the river.

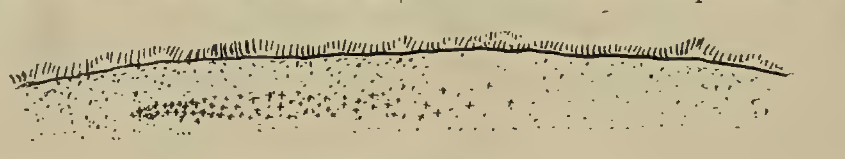


Fig. 2.—Horizontal View.

The crosses show the gold as it may occur in the opposite or long side of the bank of the river from a previous deposit.

MINING SUMMARY.

Specially reported for the MINING AND SCIENTIFIC PRESS.

ALASKA.

On Douglas Island the Alaska-Treadwell G. M. Co. has 880 stamps dropping on its four properties, as follows:

Treadwell	240
New Treadwell	300
Ready Bullion	120
Alaska-Mexican	120
"The 700"	100

In other mines around Juneau 234 stamps are dropping, as follows:

Alaska-Juneau G. M. Co.	40
Nowell G. M. Co.	20
Ebner Gold Mining Co.	15
Humboldt Mining Co.	10
Berners Bay M. & M. Co.	40
Alaska G. M. Co. of Indiana	10
Julian Mining Co.	10
Portland-Alaska	10
Early Mining Co.	5
Melen M. & M. Co.	20
Sumdum Chief G. M. Co.	10
Bald Eagle-Sumdum	4
Alaska-Willoughby G. M. Co.	10
Snettisham G. M. Co.	10
Windsor Bay mine	10
Windham-Ebner mill	10
Total	234

The Portland-Alaska G. M. Co. proposes resumption of operations on the Horrible, near Seward; a new tramway and ten additional stamps will be put in.

The Alaska-Treadwell mine during the month ending the 15th inst. crushed 30,077 tons ore, value $41,746, and 374 tons sulphurets, value $13,125; total product for month, $57,911; expenses, $38,000; average value of ore, $1.92 per ton. There were 540 stamps in operation; 300 of them, run by water power, dropped only four days, when the ice caused their closing down.

ARIZONA.

MARICOPA COUNTY.

A strike of rich ore is reported from the Midnight Test, Groom Creek.

YAVAPAI COUNTY.

Because of the recent cave at the United Verde, Jerome, the mill will probably be moved to a more stable foundation.

CALIFORNIA.

AMADOR COUNTY.

The War Eagle, near Plymouth, is bonded to Angels parties.——Ore is being taken out at the Fernando ranch, between Sutter Creek and Amador City, for a mill run at the Mutual, Sutter Creek.——The Bunker Hill, Amador City, is unwatered; shaft, now down 800 feet, will be continued.

At Defender, good ore is reported opened up on the Cleopatra.——A new drill is in at the Defender, and work on the 200 and 300-foot levels is progressing favorably; the stamp mill is running steadily.

New electric machinery is in at the Oneida, Jackson; fifty stamps are dropping; more men will be put on.——The new hoisting machinery at the Kirkwood is working successfully; sinking is in progress.

Work on the Peerless, Jackson, is progressing satisfactorily.

BUTTE COUNTY.

The well of the Feather River Oil Co., Oroville, is now in a dark blue shale; gas is flowing.

CALAVERAS COUNTY.

The Mountain King, Hodson, is closed down, the present plant being unable to handle the water.

The 900-foot tunnel on the Del Monte, at Railroad Flat, has reached the shaft; ore from the 38-inch ledge recently opened up assays $15.38 per ton.

Sinking is in progress on the Live Oak at El Dorado.——The Con. Gold Hill M. Co. will begin operations on the Gold Hill (gravel), on Esperanza creek, near Mokelumne Hill.

The Campo Seco Cop. M. Co. has bought copper property on the Simone Lozano ranch, near Lancha Palna.

COLUSA COUNTY.

The Mount Shasta Oil & Dev. Co. has put in a new rig on its property at Arbuckle and will begin drilling soon.——R. W. Gorrell is sinking a new well.

EL DORADO COUNTY.

The Eagle G. M. Co. is hydraulicking on its property near El Dorado; Manager G. Walker.——The Wyllie, at El Dorado, is leased to the management of the Live Oak.

INYO COUNTY.

The King Con. M. Co. projects a mill on its property near the Redlands mill, at Ballarat.

KERN COUNTY.

The Oriental Oil Co. has struck oil sand on 30, 32-24, Bakersfield.——The Monte Cristo Oil Co. is laying a pipe line to the railroad.——The Navajo Oil Co.'s No. 2, at Sunset, is in the oil.——The Kern Oil Co.'s No. 2, Bakersfield, is producing 500 barrels oil per day.——The Mt. Diablo Oil Co.'s No. 2 on 30, 28-28 is down 900 feet.——The Monarch Oil Co.'s No. 2, on 2, 11-24, Sunset, is flowing.——The Giant Oil Co. is making arrangements to pipe oil to McKittrick.——The Monarch Oil Co., at Sunset, is putting in a pumping plant.——The Del Ray Oil Co. will put in three rigs on 5, 29-28, and begin drilling.——The Cantua Oil Co., on 14, 28-27, has a showing of oil at 1000 feet; oil sand is expected to be found at a depth of 1200 feet.

The California Standard Oil Co.'s well at McKittrick is flowing steadily.——The Corona Oil Co. is down 1500 feet in its first well.—At Sunset, on 31, 32-24, the Lucky Boy Oil Co. is down 400 feet.——The Sunset Standard Oil Co. will begin drilling on 20, 11-23.——The Golden Gate Oil Co., which recently struck oil on 34, 12-24, has suspended operations until an under-rimmer is put in.——The Lincoln Oil Co., of Oakland, is drilling on 14, 28-27, Bakersfield; 14-inch casing is used.——A new 26 H. P. engine is in at the Buckeye, near Randsburg.

Oil is reported found at a depth of 1190 feet, on the Common Sense property at Temblor.

The Butte Lode M. Co., operating the Butte, at Randsburg, last week shipped to Los Angeles two gold bars worth $4200; result of a mill run of seventy-two tons of ore; twenty men are employed.

LASSEN COUNTY.

Work on the Daisy Dean, at Hayden Hill, is suspended.

LOS ANGELES COUNTY.

The Coalinga oil lands, owned by Chansler & Canfield of Los Angeles and W. H. H. Hart and others of San Francisco, are reported sold to an English company for $1,850,000.

MARIPOSA COUNTY.

The new mill at the Mariposa, at Mariposa, is ready; sinking will be resumed.

NAPA COUNTY.

The Mount Shasta Oil Co. has completed a road to its property in Berryessa canyon; it is putting in a new derrick also; a second gusher is opened up; oil from this well sells readily in San Francisco.

NEVADA COUNTY.

The Diamond, near Grass Valley, is bonded; work goes on under Manager Murphy.

Dunlap & Thomas, operating the Lecompton, at Willow valley, have twenty men working; ore is being mined, and it will be shipped to the Selby Smelting & Lead Co., San Francisco.

The Boston & Grass Valley G. M. Co. is incorporated at Nevada City.

The twenty new stamps are in at the Empire mill, and now forty stamps are dropping on ore from the mine; the work of tearing down and replacing the other twenty stamps will begin next week.

ORANGE COUNTY.

The Union Oil Co. has over 1400 feet of 11⅝-inch casing in one of its wells in Brea canyon, near Fullerton.——The Columbia Oil Co.'s No. 9 is expected to produce 50 barrels, and No. 10 is expected to turn out from 75 to 100 barrels oil per day; the company will put in rigs and start two new wells soon.——The Fullerton Oil Co. has another well completed.

PLACER COUNTY.

Work is resumed on the old copper mine at Old Whiskey Diggings, near Sheridan.——A strike of rich ore is reported made on the Herman, at Westville.——Supt. T. G. Durning is retimbering the Grey Eagle tunnel, Auburn.——Rhodes & Collins are cleaning out the old shaft on the Crater, at Ophir.——The Malmberg mill is running on ore from the Rocky Ridge.——The Never Sweat is sold to J. Johnson.

On Turkey Hill (gravel), El Dorado Canyon, Michigan Bluff, a new electric plant consisting of two 60 H. P. generators, etc., are in; power will be distributed as follows: Mill, 35 H. P.; compressor, 35 H. P.; electric locomotive, 20 H. P.; hoisting, 7½ H. P.; pumping, 7½ H. P.——Miller & Son are working the Lost Camp at Blue Canyon.

SAN BERNARDINO COUNTY.

The Colton Cement Works have closed, with little prospect of reopening. The works have changed hands and management several times within a few years.

SAN DIEGO COUNTY.

The Free Gold M. Co. has its 100-stamp mill and cyanide plant at Hedges running steadily.——The new stamp mill going in on the American Girl group is nearing completion.——The New York Oil Co. will drill for oil on the beach near Oceanside.——The Monarch well is down 1000 feet.——At San Marcos the well on the Kelly ranch is reported down 1000 feet.

A drilling outfit is going in in the Carisso creek district, near Temecula.

SAN LUIS OBISPO COUNTY.

E. Smith has brought suit against A. A. Dubost for alleged misrepresentation of value of the Adelaide (quicksilver).

SHASTA COUNTY.

The Trinity Copper Co. of Boston are locally credited with intention to build a new smelter above Copley on the Sacramento river.——The Shasta Con. Oil Co. is putting a No. 1 Standard rig on its property on Cow creek, east of Bella Vista.——The vertical shaft in the Mount Shasta, in Clear Creek section, near Shasta, is down 340 feet; sulphides are opened up at this depth; sinking will be continued to 500-foot level.——On the Blackstone and Isabelle Bell 350 feet of tunneling and 280 feet of drifting are completed; a 145-foot shaft is sunk.——On the Oro Fino the lower tunnel is in 250 feet; ore assays $2.50 to the ton.——A 400-foot tunnel is run on the White Rose, south of the Mount Shasta.——Two shipments of ore from the Anaconda recently returned $30 per ton.——A new prospect tunnel is being run on the Golinsky (copper), near Kennet.

SISKIYOU COUNTY.

Manager H. Miller is pushing work on the Bonanza group, at Fort Jones; $10,000 will be spent in prospecting, and if results are satisfactory a plant will be put in.

The Siskiyou Placer M. Co. has bought the Montezuma Hill, Independence creek, near Yreka, containing 124.48 acres, and two-thirds interest in the Clear Creek, for $6000.

A rock crusher, two concentrators and a Pelton water-wheel are in on the Brown Bear and Fraction group.——A recent crushing of ore from the Rohm, on White's gulch, gave $60 to the ton.——The lower crosscut tunnel on the Golden West will be extended to tap the ledge at greater depth.——Good ore is being taken out at the Protection.——Men are working on the Eddy (placer) and a good cleanup is expected.——The Pittsburg Dredger Co. will build a dredger for use on property on South Fork of Scott river.——Ore from the Polar Bear, at Callahans, is said to run $50 in copper to the ton.

Supt. J. McKeene of the Helena G. M. Co., operating on Boulder creek, near Callahans, is pushing work on the new forty-ton mill and the cyanide plant.——The Yreka M. & M. Co. are getting out ore to run the full twenty stamps.——Two Chinese companies are mining on the Klamath river—one at Virginia Bar ferry and the other at the mouth of Vesey creek.

STANISLAUS COUNTY.

E. P. Newhall, associated with Alvinza Hayward in development of quicksilver mining properties near Grayson, says that sinking on the Adobe Valley property was discontinued at a depth of 180 feet; too much water. Crosscutting for the vein is in progress at that depth. Fourteen men are employed.

At the Summit quicksilver mine, owned by the same parties, a tunnel is in 700 feet, and it is expected will cut the vein at 400 feet—250 feet deeper than the old workings.

TRINITY COUNTY.

The new dredge, built by C. D. Galvin, for use on Weaver creek, near Weaverville, is ready for work.

The Last Chance G. M. Co., operating the Paulsen placers, below Lowden's, will develop other properties in this county next year.——The Sykes Placer M. Co., operating the old Bloss & McClary, at Trinity Center, has put in new pipe and will operate another giant.

TUOLUMNE COUNTY.

The Mt. Hood M. Co., capital stock $129,000, is incorporated at Jamestown.——Sinking from the 1700-foot level of the Rawhide is resumed; shaft will be sunk to the 2000-foot level.——McGinn Bros. are sinking a shaft on the Golden Rule, south of Stent.——Developments at the Tri-Color, Tuttletown, show good results.——More men are put on at the Mount Hood, and sinking is in progress.——Lucas and others are working property on Jackass hill, near Tuttletown.——The Mack, at Big Oak Flat, is temporarily closed down; a new hoist will go in and a new shaft will be sunk. A new 20-stamp mill, 50 H. P. air compressor, pump, etc., is projected, to be run by electric power.——The Graham mill, on Sawmill flat, near Columbia, is crushing ore from property on Five Mile creek.——The pocket recently opened up on the Hudson, on Bald mountain, yielded $4000.

The Longfellow, at Big Oak Flat, has resumed operations, the misunderstanding over the wage question being satisfactorily settled.——Sinking is in progress on the Rhode Island, at Groveland, and a station is being cut on the 400-foot level.——The other ten stamps at the Mt. Jefferson are dropping.——The Mack Con. M. Co., Big Oak Flat, has suspended operations for the present; a new plant will go in and sinking continued to 1000-foot level.——At Sonora, night and day shifts are sinking a shaft on the Hazel Dell.——The Grape Vine M. Co. has bought the Lost Fox for $15,000; water-power, with a head of 700 feet, is available.——At the 800-foot mark in the tunnel on the Golden West, a 6x8-foot raise to the surface is being run; when completed the 6x10-foot shaft will be continued to the 300-foot level; machinery for the new mill is on the ground, and Supt. Restano expects to have the stamps dropping by May 1st.

A good body of ore is reported opened up at a depth of 520 feet on the Norwegian, near Sonora.——The shaft on the Black Oak is down 1200 feet; the cyanide plant is running steadily.——A good body of ore is opened up 1½ miles from Stevens' Bar.——Operations on the Neale, on Portuguese Gulch, near Sonora, are progressing.——The Oleson, at Golden City, 5 miles from La Grange, maybe reopened and worked as a copper property.——The shaft on the Goldwin, Sonora, is down 300 feet.

At a depth of 20 feet on the Standard, near Soulsbyville, the vein has widened to 10 inches, carrying free gold; if tests prove satisfactory a complete plant will be put in.

Work on the Kodak, Carters, will start Jan. 1st.——On the Bald Mountain, above Brown's Flat, Wainwright & Elsbree recently took out $4000 in one week.——Sinking the Black Oak shaft, now down 1200 feet, will resume Jan. 1st.——The new mill on the Goldwin will be up April 1st; Supt. McClintock.

COLORADO.

BOULDER COUNTY.

The Emancipation, at Sunshine, will probably be sold to New York men for $275,000; the mine is producing high-grade sylvanite; forty-five men are employed; during 1900 it has produced $3000 to $5000 per month; over $10,000 have been taken from the dump alone.——The Culbertson mill, at Culbertson, 4 miles east of Boulder, is leased to Newhouse & Frank; it was recently overhauled and remodeled; capacity 300 tons per day.——The Slide, at Gold Hill, is operated under the leasing system, more than fifty leasers working on the property; W. Teller, owner.——The Melvina, at Salina, is operated by the Great Eastern G. M. Co., J. E. Harriman of Boston, Mass., Supt.; main shaft is down over 700 feet; during last five months sales of ore have amounted to over $20,000; a recent shipment of thirteen tons of ore returned $1650 to the ton; a 3500-foot adit tunnel is being run on the vein, and it is expected to cut the shaft at the 800-foot mark.——The Denver Trans., Tunnel & Drainage Co. is organized; a 10x8-foot tunnel, 1500 feet long, will be run into Chittenden mountain, near Boulder.——One hundred feet of sinking on the Denver group is just completed.——The 2000-foot Mogul tunnel is completed.

CHAFFEE COUNTY.

On the Belle of Granite, Granite, fifteen men are employed; a car of ore netted $1550.——The Tasmania M. Co. is pushing work on the Tasmania at Winfield; the company expects to blow in a smelter.

CLEAR CREEK COUNTY.

The Cleveland, at Idaho Springs, will be worked on a large scale by P. Mixsell and eastern men; a new hoisting plant is in, and sinking will be pushed during next year.——The Foxhall tunnel property, on Seaton mountain, near Idaho Springs, consisting of seven patented claims is sold to Milwaukee men for $25,000; men will be put on, and work prosecuted during the winter.——The John Owen Co. is preparing to erect a 100-ton concentrator at Idaho Springs to treat ores from the Freighters' Friend and Arundel mines sinking and drifting are in progress on the Freighters' Friend, and the shaft of the Arundel is being unwatered.

The Mendota, at Silver Plume, is shipping lead and silver ore; a new compressor and boiler are going in; compressor and boiler rooms, and the Maril tunnel and shaft are lighted by electricity; new men are being put on daily; mill is running steadily.——It is said the Pelican-Dives Co. will spend $50,000 in development next year.——Friesell & Erickson, operating on the Pelican-Dives, have opened up a streak of high-grade ore, mill returns from twenty tons of which gave 200 ounces silver to the ton.——C. S. Desch & Co., operating the Corry City, have just opened up a good body of ore carrying silver, lead and a little gold.——Pureneau & Kendall are doing considerable work on the Pay Rock.——The shaft on the Smuggler will be sunk 200 feet deeper.

The Colorado & Southern has fixed a 60-cent per ton rate on mill dirt and other low-grade material from Black Hawk to

Dumont, value in any case not to exceed $10 per ton crude.

The Allan mill, on Chicago creek, near Idaho Springs, which was recently remodeled, is running under management of E. C. Braggs.——The Bertha G. M. Co. will work twenty-two claims in Pleasant Valley district; a new 22 H. P. engine is in.——The Yankee Con. M. M. & Tun. Co. will work its property at Yankee during the winter.

EAGLE COUNTY.

P. Breene will sink a 600-foot shaft on one of his claims at Kokomo.——A company is being formed to work the Little Gold Dust group.——The Mendota mill is being overhauled and improvements are going on; W. H. Miller, manager.

FREMONT COUNTY.

The bed from which the Colorado Portland Cement Co. obtains its raw material is along the south side of the Arkansas river valley, 6 miles east of Florence, at Portland. The necessary ingredients for making Portland cement are said to be already mixed by nature in practically the correct proportions. Near the site of the mill rises a shale bluff, 300 feet thick, underlaid by a 50-foot stratum of limestone. Extending along the edge of the valley is a deposit of the Niobrara period of the cretaceous formation.

The Florence Oil Co. is putting up another rig 5 miles southeast of Florence. Weaver & Co. have well No. 4 in pumping order.——Natural gas, struck at Hooper recently, is being put to practical use, and the field will be developed.——The Sedalia, at Salida, is shipping ore to the Rocky Mountain smelter at that point

GARFIELD COUNTY.

A company is organizing at Glenwood to prospect the mineral resources near there.

GUNNISON COUNTY.

The Colorado S. M. & M. Co. has driven its West Mountain tunnel, at Pitkin, in 88 feet; work will continue through the winter.

HINSDALE COUNTY.

A strike of high-grade ore was recently made in the tunnel of the Golden Fleece, near Lake City.

LAKE COUNTY.

The year's shipments from the Resurrection mine will aggregate about 45,000 tons of ore, comprising oxidized iron and lead carbonates, the values being gold, silver and lead. These shipments are from the two shafts, 800 and 760 feet deep, respectively, and 1700 feet apart.

Leadville, Dec. 16.

The output of Leadville mines at present foots up to 2800 tons per day, which may be classified as follows: Smelter iron ore, 850 tons; lead carbonates, 250 tons; dry sulphides, 400 tons; dry siliceous, 300 tons; lead sulphides; 500 tons; manganese oxides, 300 tons; zinc sulphides, 200 tons. The zinc ores carry a small per cent of lead and usually about 43% zinc; and these are produced mainly by the Moyer and others. The Iron-Silver, Ibex and Monarch furnish the most of the dry sulphides and the siliceous ores come mainly from the Ibex and Penn. The iron-silver ores in the main are supplied by the Home group, Moyer and the leasers on Tryer hill, while the Small Hopes, A. M. & W. and Mab ship most of the lead sulphides. The carbonates come in the main from the various properties on Carbonate hill. The Modoc, Phœnix and Sixth Street mines in the main ship the manganese, the Morning and Evening Star group shipping an oxidized iron.

Leadville, Dec. 20.

The Greenback, owned by S. Wood and associates, has not shipped for some time by reason of a surfeit of water. The shaft is 1100 feet deep, which for a time filled up to near the 900-foot station with water. To keep the mine unwatered a 1000-gallon, 1100-foot lift pump is being put in place at the 1100-foot station. Three 125 H. P. boilers will furnish power.

Leadville, Dec. 21.

The Denver & Rio Grande and the Colorado & Southern railway companies have extended branch lines and spurs to practically every mine within the Leadville district. The prevailing method here now is to build a trestle from the ore landing floor of the shaft house over the railroad track, extend ore car trackage out upon the trestle and dumping the cars from the mine into the railway cars below. At some mines twelve railway cars stand below the trestles waiting to be loaded with ore.

Leadville, Dec. 18.

The Josie group, comprising a tract of 70 acres on Big Evans gulch, lying northwest of the Resurrection and adjoining the Dollie B., is being developed by Montana men, J. H. Henley, Supt. of the Ibex. A shaft has been sunk 530 feet in depth, from the 400-foot station of which crosscuts are being run both north and south, with also a crosscut southward from the 275-foot station.

Leadville, Dec. 20.

The old Robinson, in Ten-mile district, near Leadville, will be operated by Eastern men.——The Weldon, Leadville, is closed down temporarily while repairs to hoist are being made.——The P. O. S. is shipping ore steadily.——The Rock Hill Con. M. Co. has decided to resume operations on the Nil Desperandum shaft, at Leadville.

A strike is made on 475-foot level of the Rose Emmet, Leadville.——The A. M. W. Co. has put in a new settling tank at its new concentrating plant to catch flour lead passing off with surplus water.

The International Prospecting D. & M. Co. at Leadville will begin drilling on Valentine No. 2 with a new Keystone driller, capable of drilling a 6-inch hole down 2000 feet; it weighs 23,300 pounds.

The plant of the Harrison Reduction Co., at Leadville, is to be converted into a big concentration mill.

MINERAL COUNTY.

The Big Kanahwa Leasing Co., operators of the United mines, shipped about 1000 tons of ore from the latter in November. The main shaft is 1175 feet deep, and it is the purpose to sink 300 feet deeper to the level of the Wooster tunnel, by which the mine is to be drained. The ores are lead sulphides, carrying gold and lead values. They seem well adapted to concentration, and plans are being made for a concentrating mill, to be located near the mouth of the Wooster tunnel, the ore to be sent out through the latter. The vein on this property ranges from 8 to 12 feet wide. This is the same vein which passes through the Commodore, Bachelor, Amethyst and Park Regent. To a depth of 400 to 500 feet the ores were siliceous and high in silver, with no lead; and at greater depth the silver values disappear, the ores being a lead sulphide, with good gold values.

Creede, Dec. 21.

PARK COUNTY.

Schlessenger & Son have a bond and lease on the Last Chance, near this place. Recent work shows an ore body about 30 feet wide, the ore being a siliceous silver-lead material, carrying silver-lead values, with some gold. Small shipments have been made, but the ores are specially suited to concentration and the intentions are to erect a mill for this work. The Last Chance ore body is the same as that so well opened on the Hill Top, in the same locality. The vein on the latter is phenomenal, in one place the workings showing the ore to have been taken out to a width of 15 to 40 feet between walls and 500 feet vertically, without timbers or other support. About 1,000,000 tons of ore have been mined from the Hill Top. A 3-mile tramway line carries the ore from the mine to the concentrator at the railroad track.

Fair Play, Dec. 18.

Sixty-dollar ore is being shipped from the Ironclad, at Alma.——The Gold Dollar Co. announces output for November as 600 tons, worth $21,000.——The reported consolidation of the Golden Dale and Moose properties is denied.

A Milwaukee, Wis., company will build three dredgers and begin operations in the Platte river near Fairplay.

PITKIN COUNTY.

At Aspen the large Norfolk compressors of the A. J. are removed to the Mollie Gibson; the thirteenth level of the latter is cleaned out and ore will be mined.

SAN JUAN COUNTY.

The Kendrick-Gelder smelter is operating satisfactorily on ores produced in this vicinity. Considerable iron and copper ores from Red Mountain may be supplied next year.

Silverton, Dec. 24.

The Silver Lake group, at Silverton, is locally reported sold to the American Smelt. & Ref. Co. for $2,500,000.

The tunnel on the Emma, at Silverton, is in 700 feet.

SAN MIGUEL COUNTY.

The Silver Bell, at Telluride, is being developed steadily.——Good ore is being taken out of the Suffolk properties.

SUMMIT COUNTY.

The Mecca Co., operating in French gulch, near Breckenridge, will probably put in a steam plant in the bedrock shafts to replace the horse-whim is now in use.——The Gold Pan Placer Co., operating on the Blue river, will soon begin work on a large hydraulic system, which will be finished by next summer.——The Blue River G. Excavating Co. will start operations on the Blue river next spring.

TELLER COUNTY.

The Columbine-Victor Tunnel Co. will operate motors of twenty-five cars pulling capacity in the tunnel.——A new 4-drill compressor is in at the Last Dollar; it will be used until arrival of a new 12-drill compressor.——Returns from twenty-two tons of ore, recently shipped from the Zenobia, give 1.335 ounces to the ton.

A strike of $125 ore is reported found on the 125-foot level of the Frank S., on Raven hill, Cripple Creek.——At a depth of 500 feet in the working shaft of the Hidden Treasure, on Bull hill, a streak of ore running $1000 to the ton is opened up.——The shaft on the Louise E., on the saddle between Squaw and Grouse mountains, is being sunk on a wide vein of quartz running from $8 to $70 to the ton.——The stockholders of the Grace Greenwood Co. have decided to sell out for 80,000 shares of Anaconda stock.

J. H. Hammond has begun work on the Independence, at Victor; sinking and drifting are in progress.

In the 850-foot level of the Gold Coin, Victor, sylvanite ore is being mined; a station is being cut on the 1000-foot level; 100 tons of ore are produced daily.——A strike is reported on the Washington claim of Stratton's Independence.——Pres. J. F. Burns of the Portland G. M. Co., Victor, thinks there are 6 miles of development work done on the Portland and that over 60,000 tons of ore have been marketed, returns for which foot up between $3,500,000 and $4,000,000.

Ore recently opened up on the 850-foot level of the Anaconda, Cripple Creek, shows sylvanite and assays $120 to the ton.——Two and one-half tons of ore recently shipped from block No. 2 of the Deadwood, at Independence, returned $1300; ore was taken from the 570-foot level.

IDAHO.

BLAINE COUNTY.

The Crœsus G. M. Co. will put in a compressor and a hoist on the Crœsus, at Hailey, next spring; it will also add twenty or thirty stamps to the ten now on the property.

The Minnie Moore mill, at Hailey, will be repaired and started up in sixty days; thirty men will be put on.——The Relief will also resume.——A new company is being organized in the East to work the Hope.

Work on the Tiptop is progressing.——Work on the Black Cinder will be resumed.——The Golden Star mill will resume operations next spring.——Between 30,000 and 50,000 tons of ore are reported in sight on the Jumbo; the mill will run in the spring.——A 20-stamp mill will go in on the Liberal and Maggie May group next spring.——The mill on the Tyrannis will start up again next spring.——Wall & Keith will work the Bullion next spring.

CANYON COUNTY.

P. Pence and others are developing a quartz prospect on upper Squaw creek, near Walker's mill, at Payette; a tunnel is being run.

ELMORE COUNTY.

On the 300-foot level of the Crown Point, at Mountainhome, a 200-foot shaft will be sunk, and if ore continues good a smelter will be put in; sixteen men are working.

IDAHO COUNTY.

Operations on the Big Buffalo, at Buffalo, will be resumed by Manager Stevens; shaft, now down 24 feet, will be continued.

KOOTENAI COUNTY.

The newly incorporated Cœur d'Alene M. Co., formed to work claims in the Hayden Lake district, a few miles from Lake Pend d'Oreille, is pushing work on the properties. The claims are the Phillipps No. 1, Phillipps No. 2, Daisy, Ellen and Gordon.——The Blue Bird, in Lake Pend d'Oreille, of the Black Tail Mountain M. Co., recently shipped fifteen tons of ore which returned $969.33 net, or $64.62 per ton.

LATAH COUNTY.

The Syndicate, on Gold creek, 30 miles east of Kendrick, is sold to Seattle men; supplies are going in and work will be pushed; two shifts will be put on, and a shaft sunk.

LEMHI COUNTY.

Ore from the Grunter, near Salmon, runs from $20 to $50 gold to the ton.

W. W. McDowell has an option on the Copper King (copper), on Beaver creek, near Salmon.

OWYHEE COUNTY.

The Westinghouse Electric & Mfg. Co., putting in the electric power plant at Swan Falls, on the Snake river, 30 miles from Silver City, for the Trade Dollar Con. M. Co., expects to have it running this week; plant consists of three 300 K. W. dynamos, four turbines driven under a head of 15 feet; cost of entire plant, including dams, etc., is estimated at $250,000; current will be transmitted to the Trade Dollar, at Silver City, for power and lighting purposes.

SHOSHONE COUNTY.

There is enough placer ground on Beaver and Trail creeks, near Delta, to keep up operations for thirty years.——Starr & Coulson are working the Ribbon, near Murray.

Three shifts are working on the Standard tunnel; latter is in 900 feet; an additional 2000 feet will be run to tap the ledge; progress is at rate of 150 feet per month; the 600-foot station is nearly completed; an electric locomotive will be put in, track for same being nearly completed; 240 men are employed; J. R. Finley foreman.

Busen & Brooks have just completed 1200 additional feet of flume near Delta.

The mills of the Morning and Hunter mines, at Wallace, are handling 1300 tons of ore daily, producing 150 tons, or six carloads, of concentrates.

MICHIGAN.

HOUGHTON COUNTY.

A conservative estimate of the cost of a new mill in Houghton would be $50,000 per stamp; some of them have cost $75,000 per stamp; the new mills range in size from two to four stamps each. The Franklins' new mill cost $300,000.

MONTANA.

MADISON COUNTY.

Twenty-five men are working at the Broadway, at Silver Star; foreman, J. W. Martin.——The Hungry Hollow is reported sold to J. N. Kirk, W. Forbes and J. Emslie of Butte; a leaching plant will probably be put in.——C. E. Damours, operating the Kearsarge, at Summit, near Virginia City, is shipping high-grade ore; he will put in a 5-stamp mill on the property.——A strike is reported made on the West or Owsley Mayflower.

SILVER BOW COUNTY.

The Bell, Diamond, Mountain Con. and Agreen Mountain, four Anaconda mines employing 1500 men, and which shut down some time, have resumed.

Reports of estimates of mineral outputs of Butte mines for 1900 are as follows: Anaconda, $20,466,706; Boston & Montana, $12,783,185; Butte & Boston, $3,956,000; Montana Ore Purchasing Co., $3,404,000; Parrot & Co., $3,341,352; Colorado Co., $3,075,000; W. A. Clark mines, $2,472,000; Speculator mine, $3,200,000; Washoe Co., $667,932; other mines, $50,000. Total, $53,419,175.

What is said to be the richest streak of gold-bearing ore ever in Montana was last week opened up near Rocker, across Silver Bow creek; ore assaying $100,000 to the ton was found at a depth of 26 feet.——Mullins & Buckley, operating the Shamrock, near Garnet, have opened up ore running $70 to the ton; two carloads of ore recently shipped to the East Helena smelter returned $1600 per car.——The Excelsior M. & Smelt. Co., capital $200,000, is incorporated at Butte.

In Brown's gulch, near Butte, a strike is made on the Honduras, Fortune's Car and the Vent, and extensions of the latter. Ore taken out has run from 90 ounces silver and $5 gold up to 250 ounces silver and $12 gold to the ton.

NEVADA.

ELKO COUNTY.

A recent shipment of ore from the Monarch of Spruce mountain returned $40 to the ton.

ESMERALDA COUNTY.

The Silver Peak mines at Hawthorne are sold to the Silver Peak G. & S. M. Co. of New York for $600,000.

LINCOLN COUNTY.

Referring to the approaching sale of the plant built by the Mineral Union Co. at Goodsprings, Prof. H. Hirsching writes stating that he is in no way responsible for the sale, and that his process is not the cause thereof.

LYON COUNTY.

The Kossuth, at Silver City, will probably resume soon; E. B. Rail, owner.

STOREY COUNTY.

On the 1000-foot level of the Caledonia, Virginia, the drift started from a point 195 feet in the west drift from the incline upraise from a point 400 feet in the southeast drift, 1100-foot level, is out 74 feet; face in hard quartz and bunches of porphyry, quartz assaying $4.32 to $7.19 per ton; the west crosscut No. 1 is in 68 feet; formation vein porphyry and seams of quartz.——During week ending Dec. 20, ten cars of ore were extracted from 900-foot level of the Overman; value, as per car samples, was $17.38 per ton, of which amount $10.01 was gold.

The Pfeifer and Fisher mills, in Six-mile canyon, near Virginia, is running; the cyanide plant is closed down for the winter.

WASHOE COUNTY.

At the Reno Star, Reno, ore running as high as $1 to the pound is reported.

Work in the tunnel of the North Mountain, Peavine, is progressing; good ore is being taken out.

WHITE PINE COUNTY.

A strike of rich ore is reported made in the Oro, near Ely.

NEW MEXICO.

BERNALILLO COUNTY.

A 5x7 drift will be run on the A level of the Lone Star, at Bland.

COLFAX COUNTY.

The Yellow Bandana, in Touch-Me-Not canyon, Baldy mountain district, will be worked on a large scale by the Wooster (O.) G. M. & Tunnel Co.——The Taos G. M. & M. Co. will put in a mill at the Black Copper, near Elizabethtown. —— The Montezuma, on Baldy mountain, is leased to H. Finch; ten men are employed—— Ore from the Black Horse, according to smelter returns from Pueblo, runs from $10 to $18 per ton; P. H. Van Zuylen manager and leaser; 1700 feet of development work is completed on the property.—— Work is progressing on the Rebel Chief, Mountain Queen, Aztec, Paragon, Smuggler, French Henry, Black Joe, Mystic and McGinty, on Baldy mountain.——The Ohio G. M. Co. will put in a new mill and other machinery on the Denver, at Elizabethtown; 100 men will be employed during the winter.——Work on the Legal Tender, in Willow gulch, is progressing; ten men are working; the cyanide plant is running steadily.——A new mill will go in on the Senate-Bobtail next spring; ten men are employed at present.——The Raton, Texas & Gulfky is projected, to connect Raton with the Chicora coal fields near there.

GRANT COUNTY.

The Royal Copper Co., operating properties near Cap mountain, Lordsburg, has sunk a 65-foot shaft on the Atlantic; a new 100-foot shaft will be sunk; the shaft on the Manila, now down 50 feet, will be continued to the 100-foot level.

SOCORRO COUNTY.

At the Last Chance, at Mogollon, the amalgamation plant is running steadily. ——The Silver Bar M. Co. is taking out good ore from the Silver Bar; twenty-five men are employed.——In the Little Fanny good ore is being mined.——The B. O. B. will resume.

OREGON.

BAKER COUNTY.

On Dixie creek, 7 miles from Prairie City, and about 60 miles from Baker City, is located the Quartzburg district, once famed for its rich placer mines, and is now attracting attention because of quartz deposits carrying gold and copper.

On the Present Need, 45 miles northwest of Baker City, a 400-foot tunnel is being driven to tap the ledge at a depth of 750 feet; ore is free milling; F. Morey, manager.

The Gem, Sparta district, is reported bonded to Denver men; there are three shafts on the property—one 190 feet, one 87 feet and an incline shaft on the vein down 450 feet.

UTAH.

BEAVER COUNTY.

Manager A. B. Lewis, of the Imperial and Royal Copper Companies, reports a strike in the old Atlas, near Frisco.—— Another strike of silver-lead ore is reported made on 200-foot level of the Hickory group.

IRON COUNTY.

The Abe Lincoln group, comprising three claims, 6 miles from Highland, is reported sold to California men; the property adjoins the Half Moon group, now being operated by Salt Lake parties, who are running a stamp mill at Highland. The management of the two properties will jointly run a stamp mill and a concentrator; ore runs $9 gold, thirteen ounces silver and 6% lead to the ton.

Ore (gold and silver) in sight on the Johnny & Victor claims, at Stateline, owned by the Johnny G. M. & M. Co., is estimated at 6064 tons, valued at $189,677.60.

A new boiler, hoisting engine and pump are in on the Johnny at Stateline; Manager W. J. Dooley. Sinking of the shaft, now down 170 feet, will be continued when the latter is unwatered. Ten additional stamps will probably be put in early next year.

JUAB COUNTY.

The Centennial-Eureka, at Tintic, is credited with earning $30,000 per month net under its contract with the American S. & R. Co.

The Utah, at Fish Springs, is shipping high-grade silver and lead ore to the sampler at Salt Lake.

The shaft on the Ridge and Valley is to be sunk 150 feet from present 600-foot level; a drift will be run to cut the ore.

A good-sized body of ore is opened up in the south drift on the 450-foot level of the Alaska.

Good ore is being taken out of the Orient at West Tintic. An upraise is being run on the vein, and a drift east toward the old Scotia.——The Mammoth mill at Tintic is running again.——Ore is opened up in the 800-foot level of the Mammoth at Tintic.——The Star Consolidated recently shipped four cars of ore to Salt Lake which returned $2300. Manager Packard reports good results at the mine.——Manager J. A. Hunt reports satisfactory progress at the May Day.

Shipments of ore from mines of Tintic for week ending Dec. 22 are as follows:

	Cars.
Centennial-Eureka	39
Gemini	22
Godiva	2
May Day	4
Humbug	1
Grand Central	10
Ajax	2
Mammoth	8
Carissa	5
Tesora	8
Joe Bowers	1
Swansea	6
Star Con	4
South Swansea	3
Total	115
Concentrates—	Cars.
Eureka Hill	9

The Tesora M. Co. of Tintic has bought the Cornucopia and Treasure Hill mines, adjoining the Tesora, near Silver City, for $40,000; the company will drift from 400-foot level of the Tesora to strike the Treasure Hill at the 600-foot level.

PIUTE COUNTY.

The Oro Monte M. Co., capital $30,000, is incorporated to work the Tunnel and other claims in the Mount Baldy district.

SALT LAKE COUNTY.

Returns from two cars of ore from the Red Wing, at Bingham, show 38% lead, twenty-seven ounces silver and $1.60 gold per ton.——The Carrie Mack M. Co., capital $100,000, is incorporated at Salt Lake, to work the Homestake and other claims in Little Cottonwood district, near Salt Lake.

The Highland Boy, Bingham, on the 22nd inst., shipped 60,102 pounds of pig copper to the East.

When at highest speed the Highland tram, Bingham, dumps 120 buckets of ore per hour.——At the Fortune a connection is made with the Freedom tunnel.

The Bingham C. & G. M. Co.'s new smelter, at Bingham, is nearing completion; Supt. of Construction W. H. Nutting expects to have everything under cover this week.

The Ben Butler, Bingham, will put on more men, preparatory to opening up two new drifts.

SUMMIT COUNTY.

On the 18th inst., Purchasing Agent J. C. Griffiths, of the American Zinc & Lead Smelting Co., bought 1000 tons of lead and zinc ore from the Crescent, Park City; ore is said to carry 32% zinc, 20% lead and about 10 ounces silver to the ton.

Work on the Silver King aerial tram, Park City, is practically suspended for the winter; twenty-one men were laid off recently.——The California mill is again running steadily and reports state that new ore reserves are being shown up in the mine daily.——Twenty-one bars of silver bullion, 1000 fine, were shipped East from the Marsac refinery recently.

Following are shipments of ore from the Mackintosh sampler for the week ending Dec. 22:

	Pounds.
Daly-West	1,161,000
Silver King	910,000
Ontario	453,000
Anchor (concentrates)	305,000
California (concentrates)	12,000
Total	2,841,000

The Ontario (silver), at Park City, has produced over $30,000,000, and has paid $13,662,500 in dividends; output is seventy-five tons ore daily; 250 men are employed.

TOOELE COUNTY.

J. A. Jacobson will push work on property near the Honerine at Stockton during the winter.——The Sacramento is turning out 140 tons of ore daily.

A 4-foot vein of steel galena is reported at a depth of 10 feet in the new shaft on the Black Diamond group.

New rolls have been put in the Daisy mill, at Mercur; 75,000 tons of ore are estimated in sight.

WASHINGTON.

FERRY COUNTY.

The pay shoot in the Chico, Republic, shoot has been widened out to 6 feet; operations have been delayed owing to new valves for the compressor being lost in transmission; the compressor has been out of use for four months.——The tunnel on the Racket is in 160 feet.——North and south drifts are being run on the 300-foot level below the tunnel level of the Princess Maud.

Supt. Behne, of the Palo Alto, reports ore in drift as improving in value with development, increase running from $2.50 to $25.40 to the ton: average is about $10 to the ton.

Considerable surface work is being done on the Chespa-Blue Jay, at Republic; H. L. Neville, Supt.——The Golden Chariot will probably soon resume.

Up to Dec. 15, in the new Republic mill, Republic, twenty-four tanks have been cleaned up, representing 2400 tons of ore; the last six tanks cleaned up showed the following percentages of savings: 91.43, 91.69, 91.90, 94.15, 94.35 and 94.98. The company has 184 men working, as follows: Mill, 52; mine, 57; construction work, 26; on flume, etc., 49.

Ore running from $2.50 to $6.65 per ton is being taken out at the Morning Glory No. 2, 1500 feet from the Morning Glory; a new shaft house will be built, and a new shaft sunk.

KING COUNTY.

The following shows the total coal output for 1900 and 1899.

	1900.	1899.
Pacific Coast Co., Newcastle	173,049	155,205
Pacific Coast Co., Franklin	153,090	165,421
Pacific Coast Co., Lawson	69,470	36,611
Pacific Coast Co., Gem	30,000	......
Black Diamond Coal Mining Co., Black Diamond	208,200	217,643
Issaquah Coal Co., Issaquah	128,294	107,938
Seattle Electric Co., Renton	31,178	35,008
Cedar Mountain Coal Co., Cedar Mountain	3,000	......
Totals	796,281	717,826

KITTITAS COUNTY.

Ore from the Blue Jacket at Nelson Siding, near North Yakima, is said to assay from $4.40 to $43 per ton.

OKANOGAN COUNTY.

The 40-foot tunnel on the Buckhorn (copper) is expected to be completed soon. ——The Washington group is reported sold to Philadelphia men for $20,000, and the Tintic group to same parties for $30,000.

SPOKANE COUNTY.

Spokane has decided to hold a mining exposition in Spokane from June to November, 1902. Congress will be asked for an appropriation of $250,000. Each State and district represented will also be asked to contribute.

The Oronoco M. Co., capital $100,000, is incorporated at Spokane.

STEVENS COUNTY.

The First Thought M. Co., operating the First Thought, at Vossburg, will put in a smelter on the property next year.

The Bear Mountain M. & Dev. Co., capital, $50,000, is organized at Colville, to work properties on Bear Creek, 12 miles from there; a 500-foot tunnel is being driven; ore will be shipped to the North port smelter next year.

WYOMING.

Twenty-one miles west of here H. Schwartz has eleven claims near Hecla of oxidized copper ore. There is a stamp mill and leaching outfit. He will use the Gardiner copper leaching process.

Cheyenne, Dec. 21.

FOREIGN.

AUSTRALIA.

The main shaft on the New Bendigo group, at St. Arnaud, Victoria, is down 700 feet.——Ore recently opened up on the Cecil Rhodes, at Kyneton South, in the Lauriston district, ran one ounce to the ton in a 30-ton mill test.——From a run of 925 tons of ore from the Russell's Reef, 603 ounces gold were returned.

BRITISH COLUMBIA.

The shipment of ore from Rossland for 1900 aggregated 220,000 tons, practically shipped by three mines, the Le Roi 160,000 tons, the Center Star 40,000 tons, the War Eagle 10,000 tons.

The ore shoot recently opened up in the first, second and third levels of the I. X. L., Rossland, is 185 feet in length; ore is said to average $100 per ton.—— With the new cyanide plant soon to go in at Ymir, it is thought that a saving of $1 per ton will be made, making a total of about $600 monthly.——The Athabasca G. M. Co. has taken over the assets and affairs of the Exchequer G. M. Co., and will work ores from the Athabasca with its cyanide plant.——Ore from the Big Four group, in Porcupine creek district, near Nelson, runs $40 to the ton; operations on the group are closed down for the winter.——Work on the Big Horn group, same district, is progressing; two shafts are running a crosscut. W. M. Edgar, Supt.

The pay roll of the St. Eugenie, at Moyie, for November, was $26,000; ore shipments for same period were 2600 tons.

In the Atlin district considerable work has been done on the benches on Willow creek, with results which show them to be richer than the creek claims.——The Atlin-Willow Creek M. Co. during the season worked its gravel beds on Willow creek with giants.——The Surprise Gulch Hydraulic M. Co. has built over 4½ miles of ditches and flumes during the season; 2 miles more of ditches will have to be built to reach the falls on Pine creek, from which it expects to obtain its water supply.——The McKee Creek M. Co. is putting in a new plant.

The Mother Lode, near Greenwood, has shipped 4435 tons of ore to the smelter at Greenwood, which will be blown in March 1st.——The main building, 182x120 feet, of the new Standard Pyritic Smelt. Co.'s smelter, 3 miles below Greenwood, on Boundary creek, is completed; plant will be put in soon; work on the flume which will bring water from the dam, one mile up the creek, is nearing completion; the hot and cold blast furnace will be 40x176 inches inside of tuyere lines; the smelter will treat 300 tons ore per day; Manager Laidlaw.

The consolidation of the Granby smelter and other interests of the Miner-Graves syndicate, in the Boundary district, into one company with a capital of $15,000,000, is confirmed, according to reports from Toronto and Montreal; a contract is closed whereby the Granby smelter will supply 700 tons of copper matte monthly to New York parties, and 200 tons monthly to Liverpool dealers. The consolidation will take in the Granby smelter, the Knob Hill, Old Ironsides and Grey Eagle, and the new company will be known as the Granby Con. M., Smelt. & Power Co.

The Arlington, at Slocan, has shipped 1205 tons of ore during season of 1900.—— A strike is reported in upper workings of the Enterprise.——J. F. Collom has relinquished the bond on the Mabou, above the Enterprise; bond was for $65,000.—— Operations on the V. & M. group, on Twelve-mile, are begun; shipments of ore are expected to be made in six weeks; Supt., C. W. Harrington.——Ferguson & Griffiths are running a drift on the Neepawa, Ten-mile.

The following are estimated figures for the coming year's output of mines at Rossland, based on statements of local mine managers:

Mine.	Tons.
Le Roi	275,000
Center Star	125,000
Le Roi No. 2	75,000
Nickel Plate and other B. A. C. properties	75,000
Iron Mask	20,000
Miscellaneous, including War Eagle, Evening Star, Giant, I. X. L., Velvet and Spitzee	30,000
Total	600,000

Appended are the shipments from January 1 to December 15, 1900:

Mine.	Tons.
Le Roi	158,180
Center Star	38,182
War Eagle	10,922
Le Roi (No. 1 and Josie)	2,922
Iron Mask	2,623
Giant	563
I. X. L	552
Evening Star	428
Monte Christo	273
Spitzee	155
Iron Colt	80
Total	214,880
From December 15 to January 1, 1901 (approximated)	15,120
Total	230,000

The Butcher Boy group, near Greenwood, is bonded to G. A. Sonneman of Spokane, Wash., for $100,000. —— The Carmi will soon begin shipping ore to the pyritic smelter near Greenwood.——Work on the Emma, in Summit Camp, is resumed. —— The Winnipeg M. Co. has levied an assessment of 1 cent per share. New machinery, consisting of a 30 H. P. boiler, 16 H. P. hoist, a 100-gallon per minute pump and 200 feet of rails, costing $2000, will go in. Work on the 300-foot level will be resumed.——The Alameda, in Deadwood Camp, is bonded to H. Shallenberger of Spokane.——The Dundee, at Ymir, will resume.—— The tramway at the Tamarac is nearly completed.—— Eighty stamps are dropping at the Ymir. ——The Fog Horn is reported sold to Spokane men for $35,000.

The Sovereign, at Slocan, is shipping ore to the Kaslo sampler.——Manager Parrish of the B. C., Phœnix, says that up to date 16,000 tons of gold-copper ore have been shipped from this mine. During October 4000 tons of ore were shipped; 2500 tons were shipped during November. Ninety men are employed. The shaft is down 384 feet. Sinking will be resumed.

——Near Salmo men are working on the Keystone and ore is being shipped.

MEXICO.

The Iguaran copper mines in the State of Michoacan, acquired about two years ago by the Rothschilds, are being developed on an extensive scale. Over $1,000,000 has been expended. The mines are some distance from railway transportation, and the owners propose building a road connecting the mines with some point on the Pacific coast to ship the product.

The Indianapolis & Sonora Copper & M. Co. of Indianapolis, Ind., operating in the Cananea mountains, Sonora, have forty men sinking, tunneling, etc.; operations on a large scale will be pushed next year.——Development on property in the Arizpe district, 10 miles from San Felipe, on the Sonora river, shows ore to run 275 ounces silver to the ton.

Monterey reports negotiations in progress for the purchase of six large smelters in Mexico and a number of the best paying silver and gold mines in the country by the American Smelting & Refining Co. Nearly $40,000,000 is involved in the deal.

It is reported that the Rosario, in Chihuahua, is sold to C. W. Clark of Butte, Mont., for $800,000. The erection of a large plant on the property is contemplated.

The placer mines on the Fuerte and Rio Mayo are turning out to be good holdings. One hundred pounds were shipped to the United States mint at San Francisco recently, the output of nine weeks' work with twenty men from the mines of W. M. Fiske, Fuerte, Sonora.

The Piedras Verdes copper property is now under examination by B. Tibby for W. A. Clark of Butte, Montana. The price asked is $1,000,000. The property consists of 400 claims 15 miles northwest of Alamos.

NEW ZEALAND.

A recent crushing of 80 tons of ore from the Four in Hand, at Coromandel, returned £416 ($2025.92). —— Twenty-two tons of ore from the Bunker Hill gave 115 ounces gold, valued at £350 ($1704.50). ——A twelve day's run of the Mananu Co.'s mill, at Whangamata, returned £888. ——Ore from the Monowai mines, Thames, is said to assay £175 ($852.25).——A strike of rich ore is reported from the New Whau, Thames.

SOUTH AFRICA.

The coal fields recently found in Rhodesia are situated 180 miles northwest of Buluwayo, and are estimated to cover an area of over 400 square miles; seams vary from 5 to 16 feet in width; coal lies within 40 feet of surface, and it will be worked by inclines instead of shafts; the Cape to Cairo Railroad will tap the fields.

A Belgian company, with a capital of $250,000, will mine in Abyssinia, concessions having been obtained from King Menelik, giving the right to mine for gold in Wallaga; it is said that $200,000 per annum is produced here with primitive methods.

TASMANIA.

The mineral exports for November were £122,000 ($594,140)—and for the last eleven months, £1,444,000 ($5,571,280).

Books Received.

Practical Coal Mining, 8vo., pp. 462, Geo. L. Kerr, London; Chas. Griffin & Co., Ltd., Philadelphia, J. B. Lippincott Co., of value to British colliery engineers, with some general formulæ of universal applicability, but of little practical avail as a whole to American workers. The book has over 500 illustrations.

Water Power, 8vo., pp. 563, Jos. P. Frizell, London, Chapman & Hall; New York, Jno. Wiley & Sons. This is one of the most valuable books on the subject received during the year. The contents are of an unusually high order of merit, and admirably arranged. There are twenty-five chapters, any one of which are worth the price asked for the book. The discussion of dams, development of natural water power and hydraulic motors are particularly good. The author of this book had something to say, said it, and quit when it was said.

Minerals and Mining of New Zealand, 1900; printed by the Government at Wellington, 4to., pp. 250, with accompanying maps, somewhat after the fashion of the biennial reports that used to be issued by the California State Mining Bureau, and of the same high order of usefulness. There is much valuable information, carefully prepared statistics, and elaborate tabulated details. Some of the items sound singular to an American reader, as, for instance, five pages of small type, "List of mine managers, battery superintendents, and engine drivers who have obtained certificates." The book is an epitome of New Zealand's mining industry, and shows growth and increase therein.

Personal.

E. Klemo of Bodie, Cal., is in Butte, Mont.

W. A. Clark of Montana is in Jerome, Arizona.

T. A. Rickard has returned to Denver from London.

G. A. Lonsberry, of Denver, Colo., is in Sonora, Mex.

E. H. Mead, of Leadville, Colo., is in Salt Lake, Utah.

T. Jacobson has returned to Salt Lake, Utah, from the East.

C. H. Dunton, Supt. Larkin, Placerville, Cal., is in Sacramento, Cal.

Jno. B. Shaw has been elected Sec. Gould & Curry M. Co., San Francisco.

R. H. Postlethwaite has returned to San Francisco from Nevada county, Cal.

W. G. Dodd, of the Union Iron Works, San Francisco, has returned from Yuma, Ariz.

M. W. Mather, Supt. Plumbago, Nevada City, Cal., is convalescing at that point.

Clay B. Steele has returned to Denver from New York and other Eastern points.

B. M. Newcomb, general Supt. Harvard G. M. Co., Jamestown, Cal., has resigned.

T. C. Gorrie, Supt. Santa Ysabel, Stent, Cal., is now agent for the Harvard, Jamestown, Cal.

H. T. Scott, of the Union Iron Works, San Francisco, has returned from Washington, D. C.

L. D. Sivyer has returned to Spokane, Wash., after an eight weeks' trip to Utah and Colorado.

Supt. G. Douglas, of the Gould & Curry, Virginia, has returned there from San Francisco.

A. Shorten is appointed Sec. Galena M. Co., Fish Springs, Utah, vice S. J. Paul, resigned.

Supt. J. C. Scafford of the B. C., Phœnix, B. C., has resigned; he goes to Rossland, B. C.

J. Boyd, manager Palmer Mountain Tunnel M. Co., Loomis, Wash., is in Spokane, Wash.

D. W. Brunton of Denver is engaged in professional work in the Mesabi iron range, Minnesota.

W. R. Ramsdell, of Spokane, Wash., and C. P. Bowker, of Rossland, B. C., are in Salt Lake, Utah.

H. Bolthoff of the Hendrie & Bolthoff Mfg. & Supply Co., Denver, Colo., is now traveling in Europe.

W. Wilson, formerly manager Elkton, Cripple Creek, Colo., has returned there from British Columbia.

J. P. Munger, Supt. Harvard G. M. Co., Jamestown, Cal., has resigned and goes to San Benito county, Cal.

Elias Rund of Taku Arm, near Atlin, B. C., is in San Francisco to buy mining machinery to operate quartz property for the Engineer M. Co.

G. M. Hyams has resigned as consulting engineer Anaconda, Parrot and all the other copper mines controlled by the Amalgamated Copper Co., Montana. He remains with the Boston & Montana.

A. W. Hudson has resigned the managership of the Northport, Wash., smelter and goes to New York. The management will now be in the hands of Bernard Macdonald, manager British America corporation mines, Rossland, B. C.

Recently Declared Mining Dividends.

	Payable.
Acacia M. Co., Colorado, 1 cent per share, $15,000	Dec. 22
Gold Coin M. Co., Colorado, 2 cents per share, $20,000	Dec. 31
Con. G. M. Co., Colorado, 1 cent per share, $10,000	Dec. 25
Isabella M. Co., Colorado, 1 cent per share, $22,500	Dec. 22
Star Con. M. Co., Utah, 5 cents per share, $18,000	Dec. 22
Bull Hill Con., Colorado, $15,000	Dec. 31
Centennial Eureka M. Co., Utah, 50 cents per share, $50,000	Jan. 1
American Smelting & Ref. Co., New York, 13.4% on preferred stock	Jan. 1
Boston & Colorado Smelt. Co., Colorado, 1½%, $11,250	Jan. 1
Ingham M. Co., Colo., ½ cent per share, $6750	Jan. 15

Commercial Paragraphs.

F. A. Rider is now connected with and interested financially in the Hassell Iron Works of Colorado Springs, Colo.

J. W. Richards, assayer, Denver, Colo., reports an increasing number of ore samples from many and widely divergent points, indicating unusual activity in the mining industry.

The mining equipment of the Biwabik, Mich., ore mine includes three shovels, two of which are 85-ton and one 65-ton, Bucyrus. These three shovels, during the present season, have mined from its natural bed 915,000 gross tons of ore, working day shift. In a single month they mined 205,000 tons. One of these the 65-ton), in ten hours, loaded 185 twenty-nine ton cars, or 5365 gross tons.

List of U. S. Patents for Pacific Coast Inventors.

REPORTED BY DEWEY, STRONG & CO.,
PIONEER PATENT SOLICITORS
FOR PACIFIC COAST.

FOR THE WEEK ENDING DEC. 18, 1900.

664,033—Can Opener—C. A. & O. Anderson, Portland, O.
664,073—Hoist—H. C. Behr, S. F.
664,213—Brake—H. A. Denney, Reardan, Wash.
664,245—Lock—J. A. Eastman, Fruitvale, Cal.
664,246—Candle—W. R. Ellis, Livermore, Cal.
664,138—Hotel Register—C. E. Elstner, Los Angeles, Cal.
664,142—Can Filling Machine—F. B. Fulton, Anacortes, Wash.
665,881—Horse Hitching Device—N. L. Goodwin, Thorp, Wash.
663,992—Saw Filing Machine—S. W. Gutridge, Granite, Ogn.
663,895 — Power Transmitter — J. Herbs, Fall Brook, Cal.
663,993—Gold Separator—W. W. M. Hickey, S. F.
664,215—Sled—R. E. Hickson, Moro, Ogn.
664,154—Paint—J. A. Hommel, Los Angeles, Cal.
664,048—Saw Handle—J. Jett, S. F.
663,969—Massage Chair—Johnston & Vanorman, Los Angeles, Cal.
663,905—Pulley Block—E. Knight, McCloud, Cal.
664,022—Hydrocarbon Burner — G. H. Larkin, S. F.
664,052—Bicycle—O. J. Laury, Redding, Cal.
664,054—Draper Slat Protector—C. J. & T. T. Luckehe, Gridley, Cal.
663,914—Treating Ores—H. Luckenbach, Seattle, Wash.
664,330—Amalgam Press—A. Mackey, Douglas Island, Alaska.
664,292—Motor Vehicle—W. Riddell, S. F.
664,298—Nozzle Tip—F. W. & H. L. Shupert, Spokane, Wash.
664,300—Gummer—D. M. Smyth, Pasadena, Cal.
664,029 — Gas Generator — V. T. Weathers, Ione, Cal.
664,030—Comb Cleaner—J. H. Wheeler, S. F.
33,761—Design—W. S. McRay, Cosmopolis, Wash.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s Scientific Press U. S. and Foreign Patent Agency, the following are worthy of special mention:

Design for Horseshoe Pad.—No. 33,691. Dec. 11, 1900. J. Ewing, San Francisco, Cal. This invention relates to a novel construction of elastic pad which is adapted to be attached to horseshoes to form a resilient bearing for the weight of the horse. It consists of a crescent-shaped block having a thin, flat plate with curved edges and the rear formed with a solid block of greater thickness with divergent annular ends to fill the space between the heels of the shoe.

Bed Bottom Attachments.—No. 663,170. Dec. 4, 1900. John Hoey, San Francisco, Cal. This invention relates to an attachment for bed bottoms of that class known as "wire" bed bottoms. It consists in the combination with the side rails and transverse bars of a bed bottom, of a cap or housing for said bars including a double series of parallel horizontal flanges. One series of these flanges forms a housing for the end bar, and the other series forms a housing for the side rail, said latter housing having its flanges extended beyond those of the other series. Vertical transverse end flanges connect the horizontal flanges, and the cap or housing has a centrally located bridge or extension for raising the end bars above the side rails, and having an exterior covering plate.

Face Steamer.—No. 663,574. Dec. 11, 1900. W. C. Keithly, San Francisco, Cal. The object of this invention is to provide a device by which the vapors of various liquids may be brought into contact with the face, or to be inhaled by the person undergoing treatment. It consists of a generator having an upwardly extending wall at one side curved transversely, a perforated chamber lying against this wall, terminating short of the upper limits thereof, the lower portion of this chamber being in direct communication with a generating chamber, and a means for heating the latter so that the vapor will pass through the perforated wall. A flexible hood or attachment is adapted to form a closure for the upper part of the apparatus and to enclose the head of the patient so as to confine the vapors.

Draper-Slat Protector.—No. 664,054. Dec. 18, 1900. C. J. & T. T. Luckehe, Gridley, Cal. This invention relates to a means for protecting the transverse bars or slats which are employed in connection with endless traveling canvas or other belts. It consists of a metal piece or cap fitting upon and partially enclosing the slat and having transverse and convex corrugations or runners between which the rivet is headed which secure the cap and the slat together. This prevents the wear which would ordinarily cut off the rivets or their heads, so that they would pull through and allow the parts to become detached, the corrugations forming a channel of sufficient depth for that purpose.

Gold Separator.—No. 663,993. Dec. 18, 1900. W. W. M. Hickey, San Francisco, Cal. This invention relates to an apparatus for separating gold from sand and other material with which it may be associated. It comprises an inclined screen, an amalgamated plate below the screen having riffles, a water tank, a chute connected with the amalgamated plate and inclining reversely thereto. In connection with this is an amalgamated drum or cylinder below the discharge end of the chute which receives material therefrom, and the material which is discharged from the cylinder is received upon a belt submerged within a water-containing tank and traveling so as to convey the material away continuously. The belt passes around drums at opposite ends of the tank and the cylinder is driven by connections from one of these drums. The screen, amalgamated plate and chute are caused to reciprocate by suitably connected mechanism, and by means of a pumping mechanism the water is raised continuously and discharged into the upper part of the apparatus, the pump being actuated in unison with the movement of the other parts.

Comb Cleaner.—No. 664,030. Dec. 18, 1900. J. H. Wheeler, San Francisco, Cal., one-half interest assigned to Wm. Wilson of same place. This device is intended to clean combs, such as are used for the hair, and to remove any dirt or obstruction which ordinarily accumulates between the teeth of the comb. It consists of a frame or holder having parallel sides, wire coils upon said sides and a wire or strand wound around the sides and through the interstices of the coils, so that the wire is equidistantly fixed to form rows, the wires of one row spacing intermediate with the wires of the other. These rows thus lying in parallel planes, it is only necessary to press the comb upon them, and they will pass between the teeth of the comb and clean out any deposit which may have been formed therein.

Bicycle.—No. 664,052. Dec. 18, 1900. O. J. Lawry, Redding, Cal. This invention is designed to provide a relief for the riders of bicycles by making the axles or journals of the wheels and their bearings movable in suitable guides in the frame, supporting said axles against the pressure by springs of sufficient stiffness. The forks of the frame have slotted inner sides and the wheels are adapted to revolve between the forks, and are provided with a guide interior to each member extending some distance above and below their point of connection with the wheel axle. Each of said guides has its upper and lower ends slotted, one at right angles to the other, and the slots are provided with rollers adapted to travel in contact with the inner walls of the forks so that the movement will be easy and the axles will not bind; at the same time the wheels will be kept in an essentially vertical position between the forks. Above these slides are sufficiently stiff and elastic springs upon which the weight of the machine and the rider is carried. These springs constantly yield to all obstructions and irregularities of surface and thus form a very easy riding machine.

Lock.—No. 664,245. Dec. 18, 1900. J. A. Eastman, Fruitvale, Cal., assignor to C. R. Eastman of same place. This invention is designed to provide an improved lock for doors, sashes and other meeting parts. It comprises a locking bolt or latch having its rear end connected with a swinging link so that the outer end or head of the latch may be projected through the continuous slots in the lock and the keeper, and mechanism is provided by which the bolt is afterwards depressed so that its enlarged head will be engaged with the keeper by a positive movement. A reverse movement of the parts will lift the bolt and carry it backward into the lock case which is fixed to one of the doors. The device thus forms a very efficient means for securing the parts together.

Latest Market Reports.

SAN FRANCISCO, Dec. 27, 1900.

SILVER—Per oz., Troy: London, 29⅝d (standard ounce, 925 fine); New York, bar silver, 64c (1000 fine); San Francisco, 64c: Mexican dollars, 50¾c.

Regarding the buying of silver, Bradstreet's reports that the buying for Eastern account in London has slackened again, but the offerings are moderate, and no accumulation of supplies of bars can be seen. Further buying orders for India are expected to make their appearance ere long, as trade conditions in that country are in a favorable state and the demand for money for circulation is large. The matter depends, however, to a large extent on the ability of the Indian Government to draw gold from Australia once more.

COPPER.—New York: Lake, 1 to 3 casks, $17.25 cash; carload lots, 17.00; Electrolytic, 1 to 3 casks, 16.87½; carload lots, 16.62½; Casting, 1 to 3 casks, 16.75; carload lots, 16.50. San Francisco: 18. Mill copper plates, 20c; bars, 22@23c.

LEAD.—New York, $4.37½; Salt Lake City, $4.00; St. Louis, $4.25; San Francisco $5.00, carload lots; 5¼c 1000 to 4000 lbs.; pipe 6¾, sheet 7½, bar 6c; pig, $4.70 @5.10. London, £16 2s per ton.

SPELTER. — New York, $4.55; St. Louis, $4.10; San Francisco, ton lots, 5¼c; 100-lb lots, 6c.

ANTIMONY.—New York, Cookson's, 10c; Hallett's, 9¼c; San Francisco, 1000-lb lots, 12c; 300 to 500 lbs., 13@14c; 100-lb lots, 15@18c.

IRON.—Pittsburg, Bessemer pig, $13.00; gray forge, $13.25; San Francisco, bar, per lb., 2.65c in small quantities.

STEEL.—Bessemer billets, Pittsburg, $19.75; open hearth billets, $21.50; San Francisco, bar, 7c to 12c per lb.

TIN.—New York, pig, $27.00; FranSancisco, ton lots, 29c; 1000 ℔s., 29¼c; 500 ℔s., 29½c; less, 30c; bar tin, ⅌ ℔, 35c.

QUICKSILVER. — New York, $51.00; large lots: London, £9 2s 6d; San Francisco, local, $48.00 ⅌ flask of 76½ ℔s.; Export, $45.

During last month 1654 flasks were received at San Francisco. Sea exports therefrom for the eleven months to Dec. 1st were 6588 flasks.

NICKEL.—New York, 50@60c ⅌ ℔.

MAGNESIUM.—New York, $3.00 ⅌ ℔.; San Francisco, $4.00.

ZINC.—San Francisco, 5¼c; slab, 5¾c; bar, 7c.

BABBITT METAL.— San Francisco, No. 1, 10c.

SOLDER. — Half-and-half, 100-℔. lots, 18½c; San Francisco, Plumbers', 100-℔. lots, 15½c.

ASSAY LITHARGE.—San Francisco, 10c ⅌ ℔, small lots.

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 30c to 35c.

BISMUTH.—New York, ⅌ ℔., $1.60 50-℔ lots; San Francisco, $2.50 to $2.75 ℔ lots.

PHOSPHORUS. — F. o. b. New York 50@60c ⅌ ℔.

TUNGSTEN.—New York, ⅌ ℔., 95c; San Francisco, $1.15.

FERRO-TUNGSTEN. — New York, 37%, 35c; San Francisco, 65c (60%).

PLATINUM.—San Francisco, crude, $17 ⅌ oz.; New York, $18.20 per Troy oz

POWDER.—F. o. b. San Francisco: No 1. 70% nitro-glycerine, per ℔., in carload lots, 15¼c; less than one ton, 17¼c. No. 1*, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1** 50%, carload lots, 11¾c; less than one ton, 13¾c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9½c; less than one ton, 11½c. No. 2** 30% carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9, in lots not less than 1000.

FUSE.—Triple tape, $3.60 per 1000 feet; double tape, $3.00; single tape, $2.65; Hemp, $2.10; Cement No. 2, $3.00; Cement No. 1, $2.65, in lots of 3000 feet and up.

CANDLES.—Granite 6s, 16 oz., 40s., 11¼c ⅌ set; 14 oz., 40s., 10c.

CHEMICALS.—Cyanide of potassium, 98%-99%, jobbing, 32½@33½c ⅌ ℔.; carloads, 30@31c; in 10-℔. tins, 40c; sulphuric acid, 66% B, 2c ⅌ ℔.; soda ash, $1.60 ⅌ 100 ℔s. 58%; hyposulphite of soda, 2¾@3c ⅌ ℔.; blue vitriol, 5½@6c ⅌ ℔.; borax, concentrated, 7@8c ⅌ ℔.; chlorate of potash, 12@13c; roll sulphur, 6c; alum, $1.90@2.00; flour sulphur, French, 2¼@2½c; California refined, 1¾@2c; nitric acid, in carboys, 8c ⅌ ℔.; caustic soda, in drums, 3@4c ⅌ ℔.; Cal. s. soda, bbls., $1.00; sks, 95c ⅌ 100 ℔s.; chloride of lime, spot, $2.50@2.60; nitrate of potash, in kegs, 8c; caustic potash, 10c in 40-℔. tins.

COAL. — San Francisco, coast, yard prices: Wellington, $9; Seattle, $7.00; Coos Bay, $5.50; Southfield, $9.00. Cargo lots, Eastern and foreign: Wallsend, $8.00; Brymbo, $7.50; Pennsylvania, hd., $14.00; Scotch, $8; Cumberland, $12; Cannel, $9.50; Welsh Anthracite, $12.00; Rock Springs, $8.50; Colorado Anthracite, $14.50. Coke, $16 per ton in bulk; $18 in sacks.

OILS.—Linseed, pure, boiled, bbl., 86c; cs., 91c; raw, bbl., 84c; cs., 89c. Deodorized Stove Gasoline, bulk, 14½c; do., cs., 20½c; 86° Gasoline, bulk, 21c; do., cs., 27c; 63° Naphtha or Benzine, deodorized, in bulk, per gal., 13½c; do., in cs., 19½c; Lard Oil, Extra Winter Strained, bbl., 70c; cs., 75c; No. 1 bbl., 50c; cs., 55c; Neatsfoot Oil, coopers' bbls., 60c; extra bbls., 65c; cs., 60c; No. 1 bbl., 52½c; cs., 57½c.

San Francisco Stock Board Sales.

SAN FRANCISCO, Dec. 27, 1900.

300 C. C. & V.	$1 55	600 Ophir	65c
500 Chollar	13c	200 Savage	15c
100 Crown P't.	11c	100 Sierra Nev.	23c
100 G. & C.	32c	300 Silver Hill	46c
100 Mexican	34c	100 Utah	03c
200 Overman	10c		

ALPHABETICAL INDEX TO ADVERTISERS.

(—) Indicates every other week or monthly advertisements.

A — PAGE.

Adams, W. J....14
Ainsworth & Sons, Wm....14
Aitchison Perforated Metal Co., Robert....10
Akers, Wm. A....14
Allis Co., Edward P....5
American Copper Mining & Extraction Co....10
American Diamond Rock Drill Co....9
American Injector Co....—
American Oil and Refinery Co....17
American School of Correspondence....—
American Steel & Wire Co....—
Ames, A. T....7
Atlas Pipe Wrench Co....11

B

Baird & Co., Henry Carey....17
Baker, F. D....1
Baker & Hamilton....—
Balliet, Letson....14
Barnhart, Geo. W....18
Bartlett & Co., C. O....1
Bell, J....14
Bell, Newton M....16
Benjamin, E. H....14
Birch & Co., W. H....—
Boesch Lamp Co....—
Bradley Pulverizer Co....4
Braun & Co., F. W....7
Breitung, E. N....1
Bretherton Hot Blast Smelting Co....11
Brownell, J. S....19
Bucyrus Dredge....5
Bullock Mfg. Co., M. C....9
Burlingame & Co., E. E....—
Burt Mfg. Co....1
Burton, Howard E....14
Butters & Co., Ltd., Chas....14

C

California Anti-Caloric Co....5
California Debris Commission....1
California Perforating Screen Co....15
California Vigorit Powder Co....17
California Wire Works....19
Canton Steel Co....9
Cary Spring Works....2
Colorado Iron Works Co....3, 10
Colorado Midland Railway....15
Colorado & Southern Ry....15
Compressed Air Machinery Co....12
Cons. St Gothard Gold Mining Co....1
Copper King, Ltd....19
Cory, C. L....14
Crane & Co....5
Crown Gold Milling Co....6
Cuplin, P. P....5

D

Davidge & Davidge....14
Dearborn Drug & Chemical Works....13
Denniston's San Francisco Plating Works....11
Denver Engineering Works....15
Denver Fire Clay Co....13
Denver & Rio Grande R. R....17
Detroit Lubricator Co....16
Dewey, Strong & Co....17
Doble Co., Abner....9
Donaldson & Co., A. M....1
Dow Pumping Engine Co., Geo. E....10
D. S. M....1

E

Eby, Jno. D....—
Electric, Railway & Mfrs. Supply Co....1
Elkins, John T....14
Ericsson Telephone Co....1
Eureka Co....1
Eureka Con. Drift Mining Co....17
Evans & Co., C. H....3
Excelsior Redwood Co....16

F

Fairbanks, Morse & Co....4
Falkenau, Louis....14
Ferris, John W....1
For Sale....1
Fowler, G. C....11
Fraser & Chalmers....15
Frue Vanning Machine Co....19
Fulda's Planing Mills....—

G

Garratt & Co., W. T....12
Gates Iron Works....8
General Electric Co....10
General Photo-Engraving Co....11
Gibson, Chas. B....14
Globe Engineering Co....11
Globe Iron Works....—
Gold & Silver Extraction Co. of America, Ltd....13
Goodell, Albert I....14
Goodyear Rubber Co....—
Gould & Curry Silver Mining Co....17
Griffin, Frank W....5
Gutta Percha Rubber & Mfg. Co....—

H

Haff, Edward L....14
Hallidie Ropeway....19
Hamilton Mfg. Co., Wm....18
Hamilton, W. H. W....14
Hanks, Abbot A....14
Harrigan, Jno....14
Harvey, F. H....14
Hayden & Co., J. M....13
Heald's Business College....15
Hendrie & Bolthoff Mfg. & Supply Co....3
Hendy Machine Works, Joshua....7
Hercules Gas Engine Works....18
Hersey, Clarence....14
Heyl & Patterson....6
Hirsching, H....13
Hoskins, W....13
Hooper Pneumatic Milling Co....1
Hooper & Co., C. A....16
Hug, D....12
Hunt, A. M....14
Huntington, F. A....18
Huntley, D. B....14

I

Independent Assay Office....14

J

Jackson Drill & Mfg. Co....9
Jackson Machine Works, Byron....—
Jeanesville Iron Works Co....13
Jeffrey Mfg. Co., The....16
Jessop & Sons, Ltd., Wm....11
Jewett, Daniel G....14

K

Kent Mill Co....12
Keuffel & Esser Co....13
Keystone Driller Co....2
Knight & Co....—
Koppel, Arthur....18
Krogh Mfg. Co....15
Kyle & Co., T. D....14
Lallie, J. S. J....14
Leffel & Co., James....12

L

Leschen & Sons Rope Co., A....4
Lexow, Theodor....9
Leyner, J. Geo....9
Link-Belt Machinery Co....11
Lloyd, Benj T....1
Luckhardt Co., C. A....13
Ludlow-Saylor Wire Co....5
Lunkenheimer Co....16

M

Macdonald, Bernard....14
Madison, Bruce & Sellers....18
Main Belting Co....11
Mandell, Frank C....14
Mariner & Hoskins....13
Marion Steam Shovel Co....18
Mariposa Commercial & Mining Co....1
Marshutz & Cantrell....—
May Day Gold & Silver Mining Co....17
McFarlane & Co....18
Meredith, Wynn....14
Mershon, James R. T....1
Mine & Smelter Supply Co....8
Miners' Assay Office....14
Montgomery Machinery Co., J. H....11
Moore & Co., Chas. C....8
Morris, H. D. & H. W....6
Mutual Investment Union....1

N

National Consolidated Mining Co....17
National Iron Works....—
Nevada Metallurgical Works....14
New Process Raw Hide Co....17
Nicholson, Hudson H....14
Novelty Mining & Milling Machinery Co....4

O

Ogden Assay Co....14
Oregon Railroad & Navigation Co....15
Oriental Gas Engine Co....—
Orleans Mining Co....17
Otis, McAllister & Co....—

P

Pacific Coast Machinery Co....2
Pacific Coast Smelting & Refining Works....19
Pacific Tank Co....5
Paraffine Paint Co....5
Parke & Lacy Co....9, 19
Paul, Almarin B....14
Pelton Water Wheel Co....12
Pennington Sons, Inc., Geo. W....17
Perez, Richard A....14
Peterson, L....16
Phillips & Co., Alvin....13
Piedmont Development Co....1
Pneumatic Cyanide Process Co....13
Postlethwaite, R. H....14
Powell Co., Wm....16
Price & Son, Thomas....14

Q

Quick, Jno. W....15

R

Rand Drill Co....9
Rank, Sam'l A....14
Reade, Frank....14
Real Estate Combine....1
Realty Syndicate....1
Reckhart, D. W....14
Richards, Jno....10
Richards, J. W....14
Rickard, Stephen....14
Risdon Iron Works....3
Robins Conveying Belt Co....11
Roebling's Sons Co., John A....16
Roessler & Hasslacher Chemical Co....13
Runkle, H. E....1

S

San Francisco Novelty & Plating Works....15
San Francisco Pioneer Screen Works....15
Schaw, Ingram, Batcher & Co....11
Schilling & Sons, Adam....18
School of Practical Mining....14
Selby Smelting & Lead Co....8
Shaw, Willis....2
Shepard & Searing....15
S. H. Supply Co....1
Silver King Mining Co....17
Silver State Electric Co....1
Simonds, Ernest H....14
Simonds & Wainwright....14
Situations Wanted....1
Smidth & Co., F. L....17
Smith & Co., Francis....—
Smith & Thompson....13
Smooth-On Mfg. Co....18
Snedaker, James Angus....14
Star Drilling Machine Co....17
State Ore Sampling Co....—
Stevens, Ralph E....14
Stillwell-Bierce & Smith-Vaile Co....—
St. Louis Sampling & Testing Works....13
Strout & Son, W. H....14
Sullivan Machinery Co....9

T

Tatum & Bowen....18
Taylor Iron & Steel Co....16
Taylor & Co., John....13
Thomson & Boyle Co....8
Trenton Iron Co....16
Truax Mfg Co....11
Tyler, S. W....14

U

Union Gas Engine Co....6
Union Iron Works....2
Union Photo-Engraving Co....5

V

Van Der Naillen, A....14
Van Dieren, Hermann J....13
Van Slooten, Wm....14
Van Wagenen, Theo. F....14
Volger, Wm. B....11
Vulcan Iron Works....12

W

Walter, R. J....14
Wanted....1
Water Supply Association....10
Weber Gas & Gasoline Engine Co....18
Weigele Pipe Works....12
Western Chemical Co....17
Westinghouse Electric & Mfg. Co....2
Wetherill Separating Co....13
Wigmore & Sons, John....8
Wimmer, Geo....15
Witte Iron Works Co....18
Wohler, Bartning Suc's....10
Wolff & Zwicker Iron Works....13
Wood, Henry E....13
Woodbury, Geo. E....—
Wynkoop, W. C....14

Y

Yawger, I. C....9

Z

Zeller, Geo. A....1

THE ONLY WAY TO REACH THE READERS OF THE : : : MINING AND SCIENTIFIC PRESS

is through the MINING AND SCIENTIFIC PRESS. Its readers comprise the users and buyers of Mining Machinery and Mining Supplies and Apparatus throughout this west half of America.

SITUATIONS WANTED.

Position as superintendent of gold mine wanted by a Mining Engineer who has had 11 years' practical experience in mines, mills and cyanide plants in California and abroad. Has his own assay outfit. Address M. E. M., Mining and Scientific Press.

YOUNG MINING AND MECHANICAL ENGINEER desires position. Technical and practical training. First-class mine and land surveyor. Neat and accurate draughtsman. Six years' experience. Accustomed to handling men. No objection to office work. Excellent references. Address E. N., this office.

Mining engineer with ten years' experience in copper and lead mining, milling and smelting, desires to secure position as superintendent or manager of developing or producing property in this country or abroad. Good assayer, surveyor and bookkeeper. Address "Montana," care of Mining and Scientific Press.

WANTED—A position as superintendent for a mining company by a man of 16 years' practical mining experience; understands mining and milling (amalgamation, concentration and leaching); good assayer and accountant; would accept a subordinate position if good; references. Address "Advertiser," 1225 Webster St., Oakland, Cal.

A position as superintendent or mining foreman by a man of 20 years' practical experience in mining in all its branches in the different mines in California and Mexico—gold, silver, copper and quicksilver mines. Have had the handling of large forces of men. Can speak Spanish. Can go through and secure any kind of ground. The best of references. D. E. F., care this office.

CHEMIST AND ASSAYER, with experience in draughting, bookkeeping and typewriting, desires position as assayer or assayer and bookkeeper in mine or as secretary to mining engineer or mine official. Has fair literary and scientific education. Experience in the preparation of reports, prospectuses and catalogues. Excellent moral character and good health. For further particulars, address E. R. M., care Mining and Scientific Press.

Engineers, Firemen, Machinists and Electricians: New 40-page pamphlet containing Questions asked by Examining Board of Engineers. Sent free. GEO. A. ZELLER, Publisher, ST. LOUIS, MO.

Annual Meeting.

The Regular Annual Meeting of the Stockholders of the CONS. ST. GOTHARD GOLD MINING COMPANY will be held at the office of the Company, 113-114 Crocker Building, San Francisco, California, on THURSDAY, the 10th day of January, 1901, at the hour of 2 o'clock P. M., for the purpose of electing a Board of Directors to serve for the ensuing year, and the transaction of such other business as may come before the Meeting.

Transfer Books will close on MONDAY, December 31, 1900, at 3 o'clock P. M.

B. N. SHOECRAFT, Secretary.

Office—113-114 Crocker Building, San Francisco, California.

Annual Meeting.

The Regular Annual Meeting of the Stockholders of THE REAL ESTATE COMBINE will be held at the principal office of said Corporation, said principal office being situated at No. 14 Sansome St., Room No. 15, San Francisco, California, on THURSDAY, the 17th day of January, A. D. 1901, at the hour of 3 o'clock P. M. of said day; said meeting being held for the purpose of electing a Board of Directors to serve for the ensuing year and for the transaction of such other business as may come before the Meeting.

GEORGE STERLING, Secretary.

Principal Office—No. 14 Sansome St., Room No. 15, San Francisco, California.

Annual Meeting.

The Regular Annual Meeting of the Stockholders of THE REALTY SYNDICATE will be held at the principal office of said Corporation, said principal office being situated at No. 14 Sansome St., Room No. 15, San Francisco, California, on THURSDAY, the 17th day of January, A. D. 1901, at the hour of 11 o'clock A. M. of said day; said meeting being held for the purpose of electing a Board of Directors to serve for the ensuing year and for the transaction of such other business as may come before the Meeting.

J. C. WINANS, Secretary.

Principal Office—No. 14 Sansome St., Room No. 15, San Francisco, California.

Annual Meeting.

The Regular Annual Meeting of the Stockholders of the PIEDMONT DEVELOPMENT COMPANY will be held at the principal office of said Corporation, said principal office being situated at No. 14 Sansome street, Room No. 15, San Francisco, California, on WEDNESDAY, the 16th day of January, A. D. 1901, at the hour of 3 o'clock P. M. of said day; said meeting being held for the purpose of electing a Board of Directors to serve for the ensuing year and for the transaction of such other business as may come before the meeting.

GEORGE STERLING, Secretary.

Principal office—No. 14 Sansome street, Room No. 15, San Francisco, California.

Annual Meeting.

The Regular Annual Meeting of the Stockholders of the MUTUAL INVESTMENT UNION will be held at the principal office of said Corporation, said principal office being situated at No. 14 Sansome street, Room No. 15, San Francisco, California, on MONDAY, the 21st day of January, A. D. 1901, at the hour of 3 o'clock P. M. of said day, said meeting being held for the purpose of electing a Board of Directors to serve for the ensuing year and for the transaction of such other business as may come before the meeting.

J. C. WINANS, Secretary.

Principal office—No. 14 Sansome street, Room No. 15, San Francisco, California.

THE CALIFORNIA DEBRIS COMMISSION, HAVING received applications to mine by the hydraulic process from John Costa et als., in the Lady's Canyon Mine, near Sierra City, Sierra Co., to deposit tailings in worked-out pits; from W. B. Dudley et als., in the Dudley Placer Mine, near North Columbia, Nevada Co., to deposit tailings in a worked-out pit; from the Eagle Gold Mining Co., in the Reichel Claim, near Mountain Ranch, Calaveras Co., to deposit tailings in Murray Creek; and from the Emery Gold Mining and Water Co., in the Rose Hill Mine, near Mountain Ranch, Calaveras Co., to deposit tailings in Murray Creek, gives notice that a meeting will be held at Room 59, Flood Building, San Francisco, Cal., on January 14, 1901, at 1:30 P. M.

DEWEY, STRONG & CO.
SCIENTIFIC PRESS PATENTS PATENT AGENCY
330 MARKET ST. S.F.

FOR SALE.

Two Second-Hand PUNCHING MACHINES,

SUITABLE FOR PIPE MAKING.

FRANCIS SMITH & CO., 46 Fremont St., San Francisco, Cal.

FOR SALE.

Developed Silver-Lead Mines and Prospects,

Parral and Santa Barbara Districts of Mexico.

The coming greatest camp in the Republic. Correspondence solicited

H. E. RUNKLE, El Paso, Texas.

GUARANTEED MINING STOCK FOR SALE.

Excellent chance for profit, no chance for loss. Can convince the most skeptical that our way of guaranteeing mining stock is perfectly safe and one of the most desirable investments. Can furnish highest grade of references. Write or call for particulars, if you wish to purchase, on E. N. BREITUNG, Marquette, Mich., or branch office, Washington, D. C.

Gold Gravel Mining Dredger.

FOR SALE—The Shovel Dredger "Pinius," lying in the Feather river, 4 miles below Oroville.

In a bank not exceeding 10 feet above the water line this dredger can handle 1400 cubic yards a day at a cost of 7¼ cents a cubic yard, and can dig 20 feet below the water line.

For further particulars, apply to JOHN W. FERRIS, 320 Sansome St., San Francisco, Cal.

AIR COMPRESSORS.

All makes and sizes. All rebuilt and sold under written guarantee. Good as new. Write us size you want.

Send for Catalogue No. 37.

THE S. H. SUPPLY CO.,

22nd and Larimer Sts., DENVER, COLO.

MARIPOSA COMMERCIAL AND MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Mariposa County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 24th day of December, 1900, an assessment (No. 20) of Ten ($10) Dollars per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 320 Sansome street, room 24, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 11th day of February, 1901, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on SATURDAY, the 2nd day of March, 1901, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

JOSEPH H. MOOSER, Secretary.

Office—320 Sansome street, room 24, San Francisco, California.

ELECTRICAL REPAIRING.

THE SILVER STATE ELECTRIC CO.,
1517 Nineteenth Street, DENVER, COLO.
ARMATURE AND FIELD WINDING.
ELECTRIC MACHINERY.

Telephone Work. Repairs Our Specialty.
Agents Le Valley Carbon Brush. Telephone 1249.

Quicksilver

—FOR SALE BY—

The Eureka Company,
OF SAN FRANCISCO.
ROOM 1, - - 320 SANSOME STREET,
SAN FRANCISCO.

AUTOMATIC SAMPLING

Mill Plans, Cyanide, Concentration, Smelter.

F. D. BAKER, Mech. Engr., DENVER.

WANTED.—INFORMATION ABOUT ANY mine or mining camp where there would be an opening for a store.

Address A. H., this paper.

People Who Know.

People who have used our filter are repeating their orders. They know that

The Cross Oil Filter

is the filter they want.

Can't we send you one on approval at our expense?

THE BURT MFG. CO.,
Akron, Ohio, U. S. A.
Largest Mfrs. of Oil Filters in the World.

We also make the
BURT EXHAUST HEAD.

WE CONVEY AND ELEVATE EVERYTHING.

TACKS, SAND, ROCK, ORES, RED HOT IRON, MOLTON SLAG, COAL AND SALT.

CONVEYORS AND ELEVATORS MADE BY C. O. BARTLETT & CO. CLEVELAND, OHIO.

BEST CONVEYOR FOR FEEDING ORE CRUSHERS.

OIL!

JAMES R. T. MERSHON,
BROKER,
537-538-539 Parrott Bldg.,
SAN FRANCISCO, CAL.

Dealer in Legitimate Oil Stocks Only.

Write for a prospectus of the fields. Mailed gratis.

OIL!

Big Vein Cyaniding Ore IN MONTANA.

Over 12 feet wide; values $5 to $30, gold and silver. Mine can be developed cheaply by tunnels to depth of 600 feet. Many improvements; 1500 feet work done; buildings up, and good road; timber and water. Prospect for a big mine seldom equaled. Lease and bond on favorable terms. D. S. M., care this office.

WE BUY very rich Ores, Dental Scraps, Tellurium Ores, Mill Wastes, Jewelers' Sweeps, Gold Retorts, Old Iron Retorts, Base Amalgam, Quicksilver, Amalgamated Plates, Gold and Silver, Old Slags.

A. M. DONALDSON & CO.,
ASSAYERS AND WASTE PRODUCT SMELTERS,
1661 Larimer St., Denver, Colo.

Donaldson's Assayers' Slag Hammer { 1 lb......$1.10
1 lb. 3 oz. $1.25

BENJAMIN T. LLOYD, STOCKS, BONDS AND MINES.

Have immediate customers for well-developed Gold and Copper Properties.

P. O. Box 608, **SALT LAKE CITY, UTAH.**

DEWEY, STRONG & CO.,

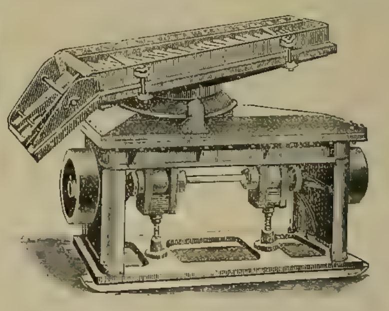
PATENT AGENTS. 330 Market St., S. F.

TREAT YOUR ORES, SAVE YOUR VALUES,

AND : : : CONCENTRATE AMALGAMATE

In substance at one operation by the

Hooper Pneumatic System.



Floor Space, 3x6 Ft. Weight, 2250 Lbs.
Capacity, 10 to 50 Tons Daily.

WE USE NEITHER
WATER, CHEMICALS NOR QUICKSILVER.

Ores, etc., Treated:

Gold,
Lead,
Zinc,
Mica,
Tin,
Slags,
Silver,
Copper,
Chrome,
Nickel,
Clays,
Garnet,
Graphite,
Fluor Spar,
Corundum,
Antimony,
Cinnabar,
Black Sands,
Any Sands,
Mixed Ores,
Metallic Ores.

SAMPLE LOTS TREATED FREE.
WRITE FOR SHIPPING TAGS.

WHAT THEY SAY:

Capt. C. S. Collins, 58 Broad St., N. Y., says: "Its the best **GOLD** saver in the world."

Capt. H. R. Gillingham, Cid., N. C., says: "Saves the minutest float Gold, and after two years' use am convinced it is the only machine that will save float Gold."

Sam Keast, Supt. Buster mine, A. T., says. "Will do perfect work and save all the Gold, fine or coarse, with proper usage. We save Gold readily that floats on water."

Earle C. Bacon, Engineer, N. Y., says: "Samples (concentrates) received and are finest work I have ever seen in that line."

Dr. Thos. H. Hicks, Expert in Gold and Silver Treatment, Ft. Wayne, Ind., says: "That little machine is a daisy. The fact that you readily save values that float on water is to me the most convincing argument against the wet system."

The Hooper Pneumatic System

is the only reliable method of treating mixed, slimy or rebellious ores. Zinc and lead combinations handled in good shape

WRITE FOR PAMPHLETS, TESTIMONIALS, Etc.

ADDRESS:

THE HOOPER
Pneumatic Milling Co.,
517 West 30th St.,
NEW YORK, N. Y., U. S. A.

ERICSSON SWEDISH TELEPHONES

Seem to possess almost human intelligence. They respond to every requirement in a smooth, positive fashion that shows what a perfect telephone can do. Besides this they have unequalled strength and durability. Their reputation as "STANDARD OF THE WORLD" is built on merit. Is the best too good for you?

ERICSSON TELEPHONE CO. 296 BROADWAY NEW YORK.

Electric, Railway and Manufacturers' Supply Co.,

RAILWAY SUPPLIES AND ELECTRICAL SPECIALTIES.

Pacific Coast Agents ERICSSON TELEPHONE COMPANY.

WE CARRY FULL LINE OF ABOVE GOODS.

548 MISSION STREET, SAN FRANCISCO, CAL.

INDEX TO VOLUME LXXXI

—OF THE—

Mining and Scientific Press

FROM JULY TO DECEMBER, 1900.

A

PAGE.
Abadie, E. R. 129
Abandonment of Mining Claim 431
Abrasives 371
Absolute Zero 339, 517
  Heat of Steam 3
Absorption of Mineral Area 371
  Of Air by Water 183
  Of Gold by Copper Plates 215
* Acetylene Gas Manufacture 282
  Light 151
Achicar 247
Action of Lead Upon Water 491
* Actuating Mechanism for Concentrating Tables 67
Advance in Prices of Mining Supplies 580
Advantages of Electric Motors 461
  Of Compound Engines 530
"Advertising Out" Co-owners 605
Advice to Prospectors 597
* Aerator, College Hill Reservoir, Cal 217
* Aerial Wire Rope Tramway 596
African Mines 601
Age of Big Trees 494
  Of Mineral Lodes 605
Agricultural Patents vs. Apex Rights 371
Air Absorption by Water 183
  Compressors, Automatic 35
  Consumed in Gas Engine 371
  For Cylinder of Gas Engine 463
  Friction in Pipes 339
  * Hoist 39
  Humidity of 311
  Purifying in Mines 491
  Weight of Cubic Foot 371
Airtight Suction Pipe for Pumps 119
Aitchison R. P. M. Co 318, 601
Alaska Mines .... 10, 41, 69, 126, 159, 190, 223, 287, 317, 377, 406, 439, 498, 510, 536, 549, 562, 574, 586, 598, 611.
  Stamps 399, 510
  Treadwell Mill Tailings 3
Alaskan Experience 2
Alcohol in Oil or Gas Engines 399
Aliens and Mining Claims 580
  Privileges in the Several States 279, 580
Alkali in Boiler Water 3
Allis, E. P Co 71, 226, 350, 527
Alloy of Gold and Aluminum 63
  And Process of Making Same 38
  For Amalgamating Surface 95, 120
  Of Aluminum and Tungsten 279
  Of Silver and Copper 3
  Of Zinc and Silver 215
Almaden, Spain, Quicksilver Mines 91
Aluminothermie 157, 583
Aluminum Alloy 580, 584
  Brass 279
  Bronze 63
  Conductivity 279
  Electrical Conductivity 63, 215
  How Hardened 592
  Silvered or Gilded 311
Amalgam, How Affected by Temperature 371
  Percentage of Gold and Quicksilver 339
  Plates, How Cleaned 183
  * Press 606
  * Safe 39
Amalgamated Copper Plate Precipitation 8
* Amalgamator 521
American Institute Mining Engineers .. 2, 431, 580
  Diamond Rock Drill Co 442
  Metal Mining 338
  Mine Economy 2
  Miners 398
  Miners in Korea 374
  Mining Engineers 246
  Nickel Works 311
  Smelting & Refining Co 279, 431, 462
  Standardizing Bureau 503
  Steam Pump Co 442
  Steel & Wire Co 539
Ammoniacal Cooler for Preventing Fire Damp Explosions 399
Anaconda Converter 220
  Montana, Mine 436
Analyses of Coal 596
* Annealing Furnace 606
* Anhydrous Concentration of Ore 186
  Tungstic Acid 592
Anthropology of California 435
Antidotes for Corrosive Sublimate 463
  For Cynanide Poisoning 3
  For Foul Air in Mines 63
  For Lead Poisoning 431, 463, 491
  For Rattlesnake Bite 91
Anti-Friction Metal 568
Apex Law 338, 371
* Apparatus for Concentrating and Separating Ores 315
  * For Cutting Metal Shavings 219
  * For Electrolyzing Ores 282
  * For Handling Ore 7
  * For Leaching Ores 508
  * For Refining and Desilvering Lead 571
  * For Regulating Fuel Supply 122
  * For Reheating Compressed Air 375
  * For Removing Material from Below the Surface 282
  * For Repairing Drills 343
  * For Separating Gold from Magnetic Sands 571
  * For Separating Metal from Ore 67, 375, 596
  * For Sharpening Rock Drills 547
  * For Working Ores 122
Appreciation of Metal Prices 503
Arc Light Carbons, How Made 151
Archaic Mining Methods 370
Argentine Republic Tax on Mining Machinery .. 504
Arizona's Native Copper 35
  Mines .... 10, 41, 69, 97, 126, 159, 190, 223, 255, 287, 317, 347, 377, 406, 439, 469, 498, 510, 523, 536, 549, 574, 586, 611.
  Mining Law 371
  Recorder's Legal Charge 3
  * Stamp Mill 188
Around the World in Thirty Days 63
Arsenious Acid Ore, How Treated 517
Artificial Fuel 509
Asbestos Production in California 463
  For Covering Pipes 339
  Hornblende and Serpentine 63
  Mine, How Worked 436
Ash Percentage of Coke and Coal 279
Ashcroft Process 431
As Judged in New York 190
Asphaltum, Determination of 431

PAGE.
Assaying Specimen Ore 568
Assays, Charge for 3
  Of Copper, Colorimetric 345
  Of Copper Materials for Gold and Silver 314
  Ton 247
Assessment of Mining Stock 3
  Work on Unpatented Mining Claims 9, 463, 504, 568
As Told in Colorado 65
* Atlas Pipe Wrench 346
Atmosphere, Constituents of 151
  Height of 605
  Pressure of 91, 151
Atomic Weights of the Elements 585
  Weight of Tellurium 151
* Attachment for Water Supply of Furnaces 89, 96
Attempted Mine Swindle 519
Auger Bit Use 580
* Aultman Balanced Screen 254
Auric Chloride 592
Austin, Texas, Dam 546
Australian Mines 71, 225, 259, 525, 588, 613
  Gold, Highest Price 491
  Treatment of Slimes 517
Automatic Compression of Air 35
  * Stair Lift 578
* Automobile Ditching and Grading Machine .. 282
  "In the Klondike" 509
  Prices of 504
  * Styles 436
Avoirdupois Weight, Difference in 605
Awards at Paris Fair 286, 370, 490
* Awning for Mine Shafts or Tunnels 584

B

Babbitt Metal, How Made 491
Back Numbers, Cost of 215
  Pressure on Pump Plunger 530
* Balanced Shaking Screen 254
Ballard, H. C 409
* Ballast Excavator 434
Ballou, E. L 71
Banket of South Africa, What It Is 517
Barium Oxide 431
Barometer Readings, Indicating Pressure 91
Barrel Chlorination, Cost of 339, 399
Bartlett, F. L 526
Bay Counties Power Co 190
Bedded Vein 605
B. C. Government Fees 371
  Mines .... 13, 43, 70, 98, 128, 162, 194, 225, 257, 290. 318, 349, 378, 408, 441, 470, 500, 512, 525, 539, 552, 564, 577, 588, 601, 613.
Bell Signals for Mines 315
  * Gyrating Disc Engine 190
Bellite 1
Belt Dressing 151, 399
  * For Ore Concentrators 435
  How Best Placed 183
  Lacing 580
  Not Seen at Paris Exposition 507
  Transmission of Power 279, 311
Belted Governor 35
Benjamin, E. H 258
Bering Sea Changes 36
Bessemer, Henry 63
Bessemer Steel, How Made 491
Bessemerizing Copper Matte 592
* Big Copper Furnace 337
  Railway Tunnel 435
  Trees, Age of 494
Bitumen, What It Is 463
* Black Hawk, Colorado 590, 593
* Black Range District, New Mexico 346
  * Sand Catching 369, 372
Blaisdell, H. G 99
Blake, W. P 43
Blast Furnace for Lead Smelting 63, 372
  Furnace Economy 592
  Furnace Gas for Fuel 463, 519
Blasting Charge, How Prepared 91
  Gelatine 1
  Powder 219
Bleaching Powder's Advance in Price 431
"Bleeder," What It Is 183
Blowpipe Reduction 3, 491
Blue Prints, How Made 311
"Blue Vitriol," Annual Consumption 339
Board Measurement, What It Is 530
Boer War, Cost of 491
Bogue, W. C 163, 565
Bogus Mine Promoters 91
Boilers, Effect of Drouth Upon 468
  Explosions, Cause and Remedy 314
  Explosions, Cause of 91
  * Feeder 155
  Heating Surface 215
  Incrustations, Composition for Preventing 155, 371, 530
  Inspection 63
  Leaks, How Stopped 339
  Manufacture 316
  "Power" 119, 491
  Tests 605
  Tube, Deposition of Sulphuric Acid 517
Boise Basin Mining District 400
Bolthoff, H 614
* Bomb and Calorimeter 567
Bond and Lease 517
Book Notices .... 14, 43, 258, 318, 349, 378, 442, 500, 513, 526, 589, 614.
Booming With a Shooter 594
Borax, Process of Making 155
Bordeaux, A 578, 609
Born Before the Flood 39
Borneo Mine 91
Bornite 505
Borts in a Diamond Drill 35, 311
* Boston & Montana M. Co 246
Boulders in Mines 438
Bowie, A. J 226
Boyce, Edw 513
Braden, E. B 513
Bradley, F. N 168
Branch Carrying Pipes 313
Brass Screens 399
Bratnober, H 513
Braun, F. W., & Co 71
Bravery of an Engineer 246
Bretherton, S. E 577
Bridge Replacement 597
* Briquette Machine 534
British Guiana Mines 408, 525
Brittleness, Kinds of 316
Broken Hill Proprietary, N. S. W 278, 582
Bromine Gold Extraction Process 431
  Process 91
Bronze Pipe for Mines 35
Brown, F. L 163
Brown, H. F 441, 526
Browne, Ross E 71, 589
Brunton, D. W 565
Bucyrus Company 614
Building Stones, Durability of 339
Bullion Product of Comstock, Nevada 568
  Quotation in U. S. and Great Britain 431
Bullock, M. C., Mfg. Co 129, 350, 500, 527, 585
Bunsen Flame Temperature 151
Burlap Process 609
* Burning Pulverized and Liquid Hydrocarbons .315
Burns by Electric Current 215
Bursting Capacity of Tube 247
Burt Mfg. Co 43, 470
Bush, Chas. J 552
Bush, P. P 290
Bushel of Charcoal 491
Business Methods and Results 555
  Not Politics 462
"Busy" Men 516

PAGE.
Butte, Montana, Men Employed 463
Butters, Chas 13
Buying Mining Machinery 490
  Mining Stock 117, 399, 490
By-products of Coke Production 431
  From Charcoal Pits 405

C

Cable for Bering Sea 316
  Line to the Philippines 66
Cablegrams, How Received 491
Calamine 151
* Calcining Furnace 155, 251
* Calcium Carbide Furnace 7
Calculating Pressure in Pipes 580
California Anthropology 435
  Average Annual Gold Output 339
  Awards at Paris Fair 286
  Code of Mine Bell Signals 316
  Crude Petroleum as a Fuel 312
  Custom Receipts 580
  Dead Rivers 311
  Debris Commission 119, 125, 504
  Deep Mining 433
  Diamonds 35
  Fiftieth Anniversary 247, 310
  * Gold Dredging 5, 503, 529, 582
  Highest Mine 119
  Locations 371
  Mines .... 10, 41, 69, 97, 126, 159, 191, 223, 255, 287. 317, 347, 877, 406, 439, 469, 498, 510, 523, 536, 549, 562, 574, 586, 598, 611.
  Miners' Asylum 119, 580
  Miners, Number of 3
  Miners Passing Away 35
  Mining Law 605
  Mining Recorders 119, 371
  Nugget 529
  Oil Production 222, 313, 374, 530
  Oil Wealth 2, 96
  Petroleum .. 96, 222, 313, 314, 340, 437, 466, 489, 492, 520, 579.
  Quicksilver Mines 504, 506
  Stamp Mill 187
  State Miners' Association .... 91, 154, 398, 463, 503, 530, 542, 543, 572, 580.
  State Mining Bureau 35, 189, 533, 580, 606
  Stock 117
  Supreme Court Decisions 183
  Water Storage 214
  Weight of 215
  * Wire Works 189, 470
Calorific Value of Coal 605
Calumet & Hecla Copper Values 491
  Dividends 311
* Cam Shafts and Fasteners 283
Caminetti Act Constitutional 91, 346
Camp Bird, Colo., Mine 338, 347
Campbell, R. H 319, 476
Canada's Largest Stamp Mill 119
Canadian Mining Legislation 182
  Mines 43, 129, 290
Canton Steel Co 43, 589
Canvas, How Made Mildew Proof 63
Canyon of the Colorado 64
Capacity of Piston Pump 3
* Cape Nome, Alaska, Scenes 245
Carbide, Weight of 530
Carbolite 35, 215
Carbon, Solvent for 517
Carbonate of Lime in Feed Water 119
Carbonic Oxide Fatal 371
Carbons for Arc Lights, How Made 151
* Carborundum Manufacture at Niagara Falls .. 213, 218.
  As An Abrasive 371
  * Company 183
Care Necessary in Handling Explosives 436
Cariboo Hydraulic Mine 504
Carson, Nevada, Mintage 3
Casey, W. J 442
* Casing Head for Oil Well 547
Castings, To Find Weight of 7, 491
Cast Iron Contracting 491
  Pipe, Necessary Thickness 491
Catalogues, How to Mail 90
  Notices of 14, 100
* Catching Black Sand 369, 372
Cause of Failure in Mine Development 517
Causes of Boiler Explosions 91, 314
Caving System 517
Cazo Reduction Process 466
Celebrated Case 377
Celestine 35, 63
Cement for Stopping Leaks in Steam Pipes 63
  For Belts 279
  For Cracks 371
  For Electric Wire Connections 405
  * Gravel Working 489, 494
  Non-poisonous 247
  Weight of 119
Cementation 215
  Steel Process 491
Centennial-Eureka Mine, Utah 246
Central California Electric Co 40
  * Ore Separator 94
Centrifugal Pumps Electrically Driven 151
  Force of Flywheel 215
Century's Greatest Inventions 604
Cerite 35
China Clay 35
Champion vs. Providence Case 463
Change in Output of Mines 568
  In Earth's Surface 604
Chappellet, Felix 71
Characteristics of California Petroleum 437
Charcoal, Bushel of 491
Charcoal Precipitations from Cyanide Solutions 248
Charge for Blasting, How Prepared 91
Chemical Analysis 63
Chemists for Foundry Work 63
Chilean Mines 577
Chimneys' Relative Capacity 431
Chinese Mines 123
Chloride of Gold 119
  Of Silver, How Made 463
Chlorination, Cost of 339
  Process 35, 215, 373, 568
  Tank Linings 63
Chlorine, How Prepared 491, 568
Chodzko, A. E 379
Chrome Ore 91, 247, 580
* Chute Closure 571
Cilley, J. V 163
Circular Percussion Table 399
Cistern Capacity 311
Clark, W. A 258, 565. 614
Classification of Crude Oils 532
Classification of Rocks 504
* Cleaning Up in Empire, Cal., Mill 117
  Copper Plates 151, 183, 215
  Mercury 35
  Quicksilver 35
  Rusted Steel Tools 517
* Clean-up Pan 39
Clearance in an Engine 530
Clement, V. M 43, 99, 226, 441, 513
Climax Wire 504
Closeness in Bids 591
Close of the Century 606
Clumsy Mine Swindle 519

PAGE.
* Clutch Mechanism for Mine Cage 94
* Coal Conveyor 374
  Analyses of 569
  And Coke Ash Percentage 279
  Calorific Value of 605
  Cost of 534
  Deterioration of 530
  * Drill 572
  Exportations to Europe 438
  Gas, Temperature of 530
  Heating Capacity of 35
  Man and Muscle 404
  Miners' Strike 338
  Spontaneons Combustion of 151
  Statistics of San Francisco 399
  Value in Heat Units 517
Coating Quicksilver 91
Cobalt Oxide, Price of 399
Code of Mine Bell Signals 316
Cohen, H. A 71
Coke from Utah Coal 491
  Plant, Largest 431
  Production, By-products of 431
Colorado's Gold Mining Dividends 463
  Canyon 64
  Deepest Shaft 605
  Fires 214
  Highest Mine 119
  Iron Ore 371
  Iron Works Co 43, 89, 96, 99, 527, 539, 552
  Metals 521
  Mine Bell Signals 595
  Mines .... 11, 41, 69, 97, 126, 160, 192, 224, 256, 288, 317, 347, 377, 406, 439, 469, 498, 511, 523, 536, 550, 562, 574, 586, 599, 611.
  Mining Law 91, 154, 490
  Mining Stock Assessable 3
  Oil Pumping 494
  Ore Rates 591
  Ore Thieves 370, 404
  School of Mines 605
  Smelter Methods 19, 248
Colorimetric Assay of Copper 345
Colville, Wash., Reservation 279
Combustion in Furnace 119
  * Crucible 94
Commendable Work 90
Commendatory Letters 578
Committees of California Miners' Association .. 572
* Compagnie du Boleo 309, 603
Complimentary Notices 183
Composition for Preventing Boiler Incrustations 155
Compound Engines 183
  * Duplex Pressure Pump 158
  Engine, Advantages of 530
  Expansion Engines 3
Compressed Air, Automatic 35
  Air For Pumping Water 63
  Air Limits of Conveyance 183
  * Air Machinery Co 286
  Air, Use of 404
  Efficiency at Different Altitudes 517
  How Calculated 215
  Machinery Co 526
  Oxygen 63
  Temperature 215
Comstock, Nevada, Deepest Mine Workings 339
  Nevada, Bullion Product 568
  Pumping Association 371
* Concentrating Plant of the Gould & Curry, Nevada 154
  System, New 156
  * Table 547
* Concentration, Factors in 37
  By Petroleum 40, 278
  * Of Ores Anhydrously 186
  Test 93
* Concentrator 187, 375
  * Belt 435
Concrete, How Mixed 376
  Lining for Mine Shafts 592
  Tests 493
Conductivity of Copper and Aluminum 279
Congress Mine, Arizona 119
Congress of Mines and Metallurgy at Paris 66
Connecting Safety Valve to Steam Boiler 517
* Consol. Lighting & Equipment Co 590
Consolidating Mines 430
* Consolidations in Gilpin Co, Colo 593
  Cyanide Companies 490
Consumption of Chemicals in Chlorination Process 35
* Con. Telpherage Co 61
Contemporary Comment 34
* Controller for Electric Motor 571
Contract of Sale 183
Converting Iron into Steel 403
  At Anaconda, Montana 220
* Conveyor 547
  * For Ropeways 495
Convict Labor in Mining 592
* Cook Mine, Black Hawk, Colo 40, 593
Cooling Tower 221
Cooper, A. S 99
Co-operative Mining 247
Co-owners in Mining Claim 605
Copper Alloy for Amalgamating Surface 95, 120
  And Zinc Extraction 607
  Coin Shipped for Scrap 605
  Colorimetric Assay of 345
  Conductivity 279
  * Deposits of Southwestern Nevada 397, 401
  Dividends and Prices 585
  Estimation of in Ores 312
  Extraction by Wet Method 279
  Extraction from Tailings 67
  * Furnace 337
  In Coin Silver 310
  King, Cal., Property 91, 279
  Native in Arizona 35
  Ore Smelter Charges 463
  Output of Montana Mines 491
  Plate Absorption of Gold 215
  Plate Precipitation of Gold 8
  Plates, Cleaning 151
  Plates, How Silvered 594
  Queen Mine, Arizona 220
  Refining by Electrolytic Method 504
  Refining from Antimony Solutions 315
  Saving 153
  Statistics 183, 187
  Stocks 567
  Strength and Temperature 279
  Tensile Strength 151
  Volumetric Determination of 344
  Wire for Dynamo Use 35
  World's Production of 64, 183, 187
Coram, J. A 552
Cord of Ore 279
Cordite 1
Cores for Castings 151
Cornish Pump, Advantages of 504
Corporation Stock Assessable in California 580
  Laws 568
Correspondence Schools 151
Corrosion of Pipe by Mine Water 371
Corrosive Mine Water 35
  Sublimate, Antidote for 463
Cost of Platting and Office Work 555
  Of Barrel Chlorination 339
  Of Boer War 491
  Of Coal 534
  Of Refining Copper 504
  Of Smelting Silver-Lead Ores 463
  Of Steam Power Reduced 463
  Of Testing a Mine 125
Couch, Thos 577, 589
* Counterbalanced Chute 584
Crawford, J. J 526

(Continued on Next Page.)

---

* This mark indicates that the article indexed is illustrated.

INDEX TO VOLUME LXXXI.

(Continued from Preceding Page)

PAGE.
* Cripple Creek, Colorado, Volcano ... 35, 68, 93
Cripple Creek's Dividends ... 371, 567
Critical Temperature ... 119
* Cross Shaft, Angels, Cal ... 522
Crosstalk in Telephone ... 580
Crown Gold Milling Co ... 99, 156, 290, 589
* Crucible Furnace ... 438
  * Shaker ... 508, 596
Crude Oil Classification ... 325
  * Ore Feeder ... 353
  *Petroleum as a Fuel ... 312, 340
* Crushing and Pulverizing Machinery ... 275
  * Machine ... 375
Cryolite ... 63, 568
* Crystal Springs, Cal., Dam ... 216, 217
Cupriferous Ores, How Treated ... 504
Current for Lifting Magnet ... 580
Cyanide and Barrel Chlorination ... 399, 431
  Companies' Consolidation ... 490
  Dissolution of Gold and Silver ... 35
  For Cleaning Amalgam Plates ... 183, 215
  For Removing Copper Oxide ... 339
  Information in This Paper ... 580
  Of Gold Insoluble in Water ... 580
  Patents in British Colonies ... 504, 580
  Poisoning ... 3
  Precipitation ... 124, 248
  Process for Estimation of Copper in Ores ... 312
  Process, Pneumatic ... 592
  Solution, Contents of ... 151
  Treatment of Silver ... 504
Cyaniding Ore Two or Three Times ... 517
  * Siliceous Ore in South Dakota ... 284
* Cylindrical Roller Crusher ... 219

D

Daly, Marcus ... 162, 539
* Dam at Crystal Springs, Cal ... 216, 217
  Construction ... 247
Dawn of Twentieth Century ... 594
* Dead Centers; Device for Overcoming ... 67
  Sea Steamer ... 189
* Deep Mining at the Utica Mine, Angels, Cal ... 124
  Mining in California ... 433
  * Well Working Head ... 438
Deepest Mine Shaft ... 215, 592, 604
  Belgian Coal Mine ... 463
  Mine on the Coast ... 247
* Deflector for Hydraulic Nozzles ... 403
Degree of Cold on Sierra Peaks ... 63
  Fahrenheit and Centigrade ... 399
  Of Mining Engineer ... 398
Deidesheimer, P ... 290
Delinquent Co-owner of Mining Claim ... 119
De Lamar, Capt ... 13, 226
Delmar, A ... 258
Demand for Mining Machinery ... 402
Denniston, E. G ... 500
Density of Rocks ... 530
Denver Engineering Works Co ... 163, 433
Department of Mines and Mining ... 503
Deposition of Sulphuric Acid on Boiler Tubes ... 517
Derby, C. C ... 513
Dern, Jno ... 290, 441, 552, 589
* Derrick Attachment for Drill Rods ... 219
Descent of Man ... 597
* Desert Gold Mine ... 94
Desert Land Entries ... 35
Description of a California Stamp Mill ... 187
Designs in Steam Engines ... 399
* Desulphurizing Petroleum Oil ... 434
Detail, Value of ... 182
Determination of Iron in Ores ... 399
  Of Copper by Volumetric Method ... 344
Determination of Asphaltum ... 431
  Silver in Gold Bullion ... 431
Determining Steam Temperature ... 279
  Lead Export Duties ... 605
Developments in Jigging ... 405
Devereux, W. B ... 43, 258
* Device for Mine Signaling ... 153
  * For Collecting Slimes, Etc ... 521
  * For Discharging Coal ... 189
Diamagnetic Influence ... 183
Diameter of Pump Cylinder ... 119
Diamonds, How Weighed ... 491, 573
  In California ... 35
  Drill Settings ... 35
  Work ... 404
Diesel Motors ... 517
Difference Between Marble and Limestone ... 311
Direct Acting Steam Pumps ... 491
  * Acting Hoists ... 585
* Disc Engine ... 190
Discharge of Pipe ... 183
* Discharging Device for Transfer Coal Barge ... 159
Dismantling a Large Pump ... 397
Displacement by Explosives ... 183
  And Tonnage ... 530
Dividends ... 100, 130, 194, 258, 290, 319, 379, 409, 443, 470, 489, 500, 513, 527, 540, 553, 565, 577, 589, 601, 614.
Dodd, W. G ... 614
Dooley, N. P ... 441
Downie, R. M ... 290
Dow Pumping Engine Co ... 378, 461
Drawback of Duties on Imported Lead ... 339
* Dredger for Placer Mining ... 67
* Dredger Suction Pipe Mouthpiece ... 343
* Dredging Apparatus ... 315
  * Bucket ... 38, 251
  For Gold ... 35, 464, 503, 528
  For Gold, How Made Profitable ... 464, 582
  * In the Feather River, Cal ... 5, 503, 582
  * Machine ... 547, 572, 582
  * Suggestions on Inland Gold ... 597
Dressing for Belts ... 151, 399
  Plates ... 151, 592
* Drill Gauging Machine ... 251
  * Supporting Column and Column Clamp ... 67
  Tempering ... 534, 592
Drilling Case-Hardened Iron or Steel ... 491
  Glass ... 592
  * Machine ... 403
Drills from Hammered Steel ... 247
Drift Mining in California ... 35
* Driving Ahead in Sirena Mine ... 4
Drop in 10-Stamp Mill ... 63
Drouth, Effect in Boilers ... 468
Dry Concentration ... 183
  Sheet on Tubular Boiler ... 311
* Dumping Car ... 584
Duncan, W. E ... 441
Dunn, R. L ... 565
Duplex Telegraphy ... 466
  * Steam Pump ... 519
Durability of Building Stone ... 339
Dutch Guiana Mines ... 441
Duties of a Mine Manager ... 247
Dyke Accompanying a Vein ... 580
Dynamite, How Made ... 592
Dynamites and Their Manufacture ... 1
  Price of in South Africa ... 431
Dynamo, Test of ... 215
  Run by Gas Engine ... 517

E

PAGE.
Earth Backing for Masonry Dams ... 580
Economic and Mining Geology ... 214
Economy of Gas Engines ... 401
  In Using Machinery ... 247
Edison, Thos. A ... 63, 283
Effect of Drouth on Boilers ... 468
Efficiency of Gas Engines ... 119
  Of Man as a Machine ... 605
* Electric Conveying and Elevator Apparatus ... 521
  * Aerial Transportation ... 61
  * Arc Lamp ... 186
  Arc Light Carbons, How Made ... 151
  Burns, Relief for ... 215
  * Furnace ... 123, 219, 282, 375, 438, 495
  Fuse ... 547
  * Generating Apparatus ... 250
  Head and Pressure in California ... 580
  * Heating Apparatus ... 463, 467
  * Lamp for Miners ... 282
  Light, Municipal Ownership ... 119
  Lighting Plant ... 530
  Liquid Forge ... 63
  * Meter ... 467
  * Mine Hoists ... 433
  * Mine Locomotives ... 567
  Mine Pumps ... 463
  Motor Advantages ... 461
  * Motor Controller ... 571
  Motor Driving on Machinery ... 339
  * Motor Enclosed ... 466
  Power, Cost of in Machine Shops ... 507
  Power on the Comstock ... 490
  Power Supply at Niagara Falls ... 431
  Power Transmission 153 Miles ... 610
  Pumps ... 63, 89
  Railways ... 181
  * Sinking Pump ... 89, 92
  Smelting Furnace ... 247, 371, 571
  * Staircase ... 495
  Storage Battery ... 582
  Transmission ... 149, 215, 467, 504, 604, 610
  * Tubular Dispatch ... 61
  * Welding Machine ... 403
  Wire Connections ... 405
* Electrical Exposition at Buffalo, N. Y ... 283
  Booster ... 215
  Conductivity of Aluminum ... 63
  Cutting of Trees ... 220
  Exhibit at Paris Exposition ... 604
  Extraction of Mercury ... 580
  * Generator Applied to Car Truck ... 591
  * Geodetic Apparatus ... 130
  Increase ... 503
  Machinery in South Africa ... 494
  * Manufacture of Carborundum ... 213, 218
  Precipitation of Gold on Amalgamated Copper Plates ... 8
  Production of Phosphorus ... 311
  * Safety Fuse ... 122
  Standard Needed ... 503
  Transmission ... 35, 568
  Underground Concentration ... 371
Electrically Driven Centrifugal Pumps ... 151
  Operated Dredger ... 431
Electricity in Mining ... 151
  And Magnetism ... 399
  In Various Things ... 286
  When First Used in California Mining ... 339
  When First Used in Colorado Mining ... 339
Electrolysis ... 580
Electrolytic Deposition of Gold ... 504
  Extraction of Quicksilver ... 504
  Extraction of Zinc ... 91, 251
  Method of Producing Ozone ... 371
  * Production of Caustic Soda ... 38
  Production of Copper ... 530
  Production of White Lead ... 35
  Refining of Copper ... 504
  Refining of Gold and Silver ... 215
Electro-Magnetic Ore Stamps ... 151
Elements, Atomic Weight of ... 585
* Elevator Sluice, Placer Co., Cal ... 606
Elkins, Jno. T ... 500
Elmore Concentration Process ... 278
El Paso, Texas, Time ... 9
Emery as an Abrasive ... 371
Emmons, S. F ... 71, 290, 379
* Empire Mines, Grass Valley, Cal ... 120, 152, 154, 181, 185.
* Enclosed Electric Motor ... 466
End and Beginning ... 604
Energy, Transmission of ... 35
  From Liquid Air ... 605
Engine, Duty of ... 91
  "Long" and "Short" Stroke ... 463
  Piston Speed ... 517
Engineering, Art of ... 151
Engineers' Bravery ... 246
  Club of San Francisco ... 584
Engines of the D & R. G. Ry ... 66
* Ericsson Telephone Co ... 252
Esler, A. M ... 350
Estimation of Copper in Ores ... 312
Etard Process of Gold Recovery ... 311, 373
Ethylene ... 215
Evans, J. P ... 99
* Evans Slime Table ... 66
  * Elevator, Placer Co., Cal ... 609
Evaporation in Reservoir ... 247
Evaporative Power of Wood and Coal ... 311
* Excavator ... 219, 434
* Exhaust Head ... 282, 343
  Steam on Amalgamating Plates ... 91
* Expansion Drill ... 122
Experiences Asked for ... 463
* Experimental Burning of Oil ... 545
Experiments Regarding the Influence of Silica on the Loss of Silver in Scorification ... 342
Experts, Mining ... 89, 118
Explosion, What It Is ... 491
  Of Scientific Interest ... 573
Explosives, Care Necessary in Handling ... 436
  Care Required in Handling ... 371
  Manufacture of ... 1, 277, 339, 369
Export Duty on Australian Gold ... 605
Exporting Coal to Europe ... 438
Exports of Sulphur ... 605
Exposition at Paris ... 7
Extinguishing a Gasoline Fire ... 463
Extracting Copper From Tailings ... 67
  Copper From Pyrites Cinders ... 279
  Fragment of Steel Tool ... 504
  * Gold and Silver From Ores ... 434
  Zinc and Copper ... 467, 607
Extraction of Precious Metals ... 67
  By Chlorination Process ... 215
Extralateral Rights ... 63, 247, 371

F

* Factors in Concentration ... 37
  Of Safety ... 570
Falkenau, Louis ... 290
Fassett, C. M ... 194
Fastest Vessel Afloat ... 311
Fatigue of Metals ... 467
Federal Appropriation for Mining Schools ... 463, 567
  Mining Law ... 91, 592
* Feed Apparatus for Boilers ... 155
  Water Tests ... 3
* Feeder for Boiler ... 155
  * For Crude Ore ... 253
Ferro-Chrome ... 580

PAGE.
Fiftieth Anniversary of Quartz Gold Mining in California ... 370
Fifty-Ton Plant ... 580
Filling Holes in Castings ... 339
Filtration for Petroleum ... 342
Final Proofs ... 254
Fineness of Gold Bullion ... 463
Fire-Damp Explosion Preventive ... 399
Fire Extinguishers ... 247, 463
Fireproof Paper ... 580
Fires, How Started ... 545
  In Forests ... 214
  In Mining Towns ... 2
First Atmospheric Gas Engine ... 580
  Gold Dredging Company in California ... 403
  Gold Mine in the U. S ... 339
Flame, Temperature of Coal Gas ... 530
Flashlight Photography ... 247
Flash Powder ... 467
Flat Wire Rope ... 339, 530
* Flexible Joint ... 123
Flint & Lomax ... 129
Floured Quicksilver, How Recovered ... 339
Fluid Pressure, Formula for Finding ... 3
Fluorspar ... 35, 568
Flux for Ore ... 339
Flying Machines ... 517
Flywheel's Centrifugal Force ... 215
Foot-Pound ... 247
Foot-Second ... 215
For Eastern Readers ... 117
Forest Fires ... 214
Formation of Verdigris, How Prevented ... 399
  Of Lode Matter ... 429, 466
Formula for Fluid Pressure ... 3
Foundation for Gas Engines ... 151
Fossilized Cedar Tree Trunks ... 339
Fowler, E. J ... 13
Fraser & Chalmers ... 43, 71
* Free Gold Mines, San Diego Co., Cal ... 95
Freeland, F. T ... 500, 601
French Duty on Lead Ore ... 183
Friction in Pipe ... 3, 339
* Fuel Economizer ... 39
* Fuels Used on Pacific Coast ... 569
Furnace Combustion ... 119
  * For Producing Calcium Carbide ... 7
  * For Roasting Ores ... 7, 67
Furman, H. Van F ... 71, 290
Fusible Plugs, How Made ... 530

G

Galena in Anhydrous Zinc Chloride ... 371
"Galvanized" Wire, How Made ... 568
Gardner Electric D. & M. Co ... 565
Gardner Process ... 124
Garments, How Rendered Uninflammable ... 339
Garretson Copper Smelting Furnace ... 371
Gas Engine Economy ... 401, 463, 530
  And Steam Engines ... 546
  Density of ... 463
  Engine for Dynamo ... 517, 530
  Engine Efficiency ... 119, 285, 311
  * Engine ... 7, 435
  * Engine, 50 H. P ... 89, 96
  Engine Foundation ... 151
  Engine Improvements ... 594
  Engine Manufacturers ... 592
  Engines, Classes of ... 504, 530
  Engines, Largest ... 463
Gasoline Engines Feasible at Any Altitude ... 504
  Engine Spark Coil ... 3
  Engine Fuel ... 399
  Engine, Horse Power of ... 605
  Engines Economical ... 371, 463
  Fire, How Extinguished ... 463
Gates Iron Works ... 194, 539, 577
Gates, Jno. W ... 290
Gelignite ... 1
General Electric Co ... 378, 513, 567
General Land Office Rulings ... 580
Generation of Power ... 402
Genesis of Ore Deposits ... 90
Geology, Mining and Economic ... 214
Georgia Mines ... 378
Geologist Employed by Mining Corporation ... 247
Geological Folios and Topographical Maps ... 554
  Survey and Mining Industry ... 150
German Concentrator ... 546
  Mines ... 257
  Silver, Substitute for ... 63, 183
* Gilpin Co., Colo., Consolidations ... 593
Gilsonite ... 247
Glass as a Flux for Cyanide Slimes ... 63
  For Windows, How Made ... 431
  How Drilled ... 592
  Oil Pipe Line ... 151, 463
Globe Engineering Works ... 552
* Glower Heating Apparatus ... 467
Glycerine, Price of ... 463
Godshall, L. D ... 314, 601
Gold Absorption in Vats ... 91
  Amalgam, Temperature ... 371
  Amount of in the World ... 568
  And Quicksilver in Amalgam ... 339
  Bullion, Fineness of ... 463
  Dissolving Power of Potassium Zinc Cyanide ... 63
  * Dredging ... 528, 582
  Dredging, How Made Profitable ... 464
  * Dredging in California ... 5, 403, 503, 582
  * Dredging Inland ... 597
  Extraction Process ... 158
  * Extractor ... 584
  Fields of Siberia ... 254
  * Gravel Working ... 489, 494
  Highest Price in Australia ... 491
  Imports and Exports ... 339
  In $20 Gold Piece ... 605
  Loss in Placer Mining ... 311
  Mine, Life of ... 215
  Mining in Gravel ... 279
  * Mining Machine ... 596
  Mint Coinage ... 247
  Of South Africa, Average Value ... 399
  * Pan ... 584
  Precipitants ... 119, 580
  Precipitation on Copper Plates ... 8, 151
  Prices in London ... 463
  Prices in the Klondike ... 491
  Production of World ... 118, 606
  Proof, How Prepared ... 215
  Pure, Value of ... 339
  Quartz Ore Crossing Placer Ground ... 399
  Recovery by Etard Process ... 311
  Refined Electrolytically ... 215
  Sands of Snake River, Idaho ... 401, 610
  * Saving Apparatus ... 38
  Scrap Containing Platinum ... 592
  * Separator ... 434, 606
  Solvent for Refractory Ores ... 155
  Test for ... 151
  To Reclaim From Toning Powder ... 580
  Trust ... 567
  When "Visible to the Naked Eye" ... 431
Good Advertising, What It Is ... 530
  Roads Necessary ... 462, 509
Goode, R. U ... 163, 319
* Gould & Curry Concentrating Plant ... 154
Governing of Turbines ... 581
* Governor for Water Wheel ... 7
Gow, P. Geo ... 552

PAGE
* Grab Bucket and Trolley ... 189
Grade for Gravity Tramway ... 35
  10%, What It Means ... 63
Granolite ... 580
Graphite Brazing ... 247
Gravel Mining ... 279, 489, 494
  * Bars of Snake River ... 610
Grease on Quicksilver ... 189
Greatest Inventions of the Century ... 604
* Gregory Gulch, Gilpin Co., Colo ... 593
* Griffin Mill ... 121
Grollet Process ... 605
Ground Water, Movement of ... 468
* Guanajuato, Mexico, Mining Enterprise ... 5
Guggenheim Smelting Co ... 462, 547, 555, 595
Gunpowder, How Prepared ... 592
* Gyrating Disc Engine ... 190

H

Hague, J. D ... 379
Hammered Steel Drills ... 247
Hammon, W. P ... 258
Hammond, J. H ... 129, 290, 442, 513, 552, 565, 601
Hand Concentration Test ... 98
Handling Explosives ... 436
Harmon, Dana ... 319, 552
Harvey, F. H ... 441
Hardening Copper ... 311, 521
  Iron or Steel ... 571
Harveyized Steel Plate ... 491
Hastings, J. B ... 552
* Head Gear at Cripple Creek, Colo ... 573
Head and Pressure in California Electrical Plants ... 580
* Hearth for Roasting Ores ... 521
Heat Producing Qualities of Coal and Petroleum ... 3, 35, 124, 517
  Values of Wood, Coal and Oil ... 517
Heating Surface of Boiler ... 215
Heaviest Stamps ... 247
Height of Reservoir Bank ... 119
Hendrie & Bolthoff Mfg. Co ... 42, 43
Hendy, Joshua, Machine Works ... 470, 500
* Heyl & Patterson ... 506, 513
High Expansion Ratios ... 3
  Explosives ... 1, 33, 369
"High-Grade" and "Low-Grade" Ore ... 463
Highest Electric Power Transmission ... 149, 215
  Mines in California and Colorado ... 119
  Point of Railway ... 91
  Smelter ... 247
Hoepfner Wet Process ... 568
* Hoist or Lift ... 584
* Hoisting Apparatus ... 343, 606
Holding a Mining Claim ... 118
Holloway-Longridge Process ... 63
Hooper Pneumatic Milling Co ... 601
Hoover, H. C ... 589
* Hopper Bottom Car ... 547
Horse Power of Steam Engine ... 35
  Power of Gasoline Engine ... 605
  Power, What It Is ... 247, 431
Hot Blast in Smelting ... 572
  * Blast Water Jacket Furnace ... 337
How Fires Are Started ... 545
  To Build Good Roads ... 509
  To Drill Case-Hardened Iron or Steel ... 491
  To Find a Pocket ... 155
  To Make Gold Dredging Pay ... 464
  This Paper Grows ... 429
Hug, D ... 526
Huntley, D. B ... 441
Hurley, Thos. J ... 513
* Hydraulic Air Compressor ... 571
  * Elevator ... 186
  Mining in California ... 91
  Mining Defined ... 215
  * Motor Regulator ... 219
  * Nozzle ... 495
  Nozzle Mechanism ... 605
  * Plate Closing and Riveting Device ... 283
  * Pressure Dredging Machine ... 596
  * Regulating Nozzle ... 521
  * Valve ... 435
  * Work, Mecca G. P. M. Co, Breckenridge, Colo ... 64
* Hydrocarbon Burner ... 218
  New ... 517
Hydrocyanic Acid ... 580
Hydrogen, How Produced ... 91

I

Idaho Mines, 11, 42, 70, 98, 127, 161, 192, 224, 257, 289, 318, 348, 378, 407, 440, 470, 498, 511, 524, 538, 551, 563, 575, 587, 599, 612.
  Population ... 311
  Supreme Court Decision ... 584
Ideas Wanted ... 491
Illinois Mines ... 224
  Steel Works ... 63
Illuminating Gas ... 183
*Impact Motor ... 186
  *Water Wheel ... 495
Import Duty on Quicksilver ... 491
Important Land Office Decision ... 595
Importation of India-rubber ... 375
Imports of Gold ... 339
  Of Lead Ore ... 181
*Improved Copper Furnace ... 337
Incandescent Lamp for Miners ... 39
Increased Gold Production ... 118
Incrustation in Boilers ... 63
In Darkest Russia ... 555
Indexing Notes ... 286
India Mines ... 500
Influence of Silica on Loss of Silver in Scorification ... 342
Ink for Writing on Glass ... 63
* Inland Gold Dredging ... 597
Inspection of Boilers ... 63
Interior Department Rulings ... 62, 310, 463, 494
*Internal Combustion Motor ... 403
  Mining Congress ... 580
*International Line at Nogales, Arizona ... 461, 465
Interpretation of Ore Contract ... 605
Inventor of the "V" Flume ... 494
Inventions, and Employes' Rights Therein, 509, 568
  Of the Century ... 604
"Inverted" Siphons ... 311, 406
Iron in Ore, Determination of ... 399, 463
  How Distinguished from Steel ... 183
  How Softened ... 339
  Ore Production of U. S ... 435
  Rails in Sluices ... 605
Irrigation Water, Price of in California ... 431

J

Jackling, D. C ... 526
Jackson Rock Drill ... 99
Jackson, D. H ... 513
Janin, Louis ... 71
Janin, Louis, Jr ... 500
Jeanesville Iron Works ... 129, 409
Jeffrey Mfg. Co ... 290, 374, 379, 409, 519
Jennings, Hennen ... 349, 408, 500
Jigging, New Developments in ... 405
Jobbers and Manufacturers ... 583
Johnson, F. M ... 162
Johnson Pneumatic Cyanide Process ... 598
*Joshua Hendy Machine Works ... 554, 560
Johnston Pipe Wrench ... 130
Joints in Wires and Cables, How Made ... 218
Judicial Decisions ... 310, 346

K

PAGE.
Kaolin 35, 595
Keeping and Indexing Notes 286
Kelvin, Lord 63
Kennedy Mine, Cal 215
*Kern River, Cal, Oil Fields 489, 492
Kerosene for Gas Engines 606
Kerosene's Specific Gravity 605
Kerr, M. B 470
Keuffel & Esser Co 560
Keystone Driller Co 43
Keyes, W. S 99, 258, 319, 441
*Kia Oro Gold Dredge 6
Kinds of Miners 90
Kirby, E. B 565
Kislingbury, G 565
Klepetko, F 513, 577
Klondike Gold Output 580
  Mines, 13, 43, 71, 99, 129, 162, 225, 290, 318, 349, 441, 526, 565.
*Knockdown Flume 403
Knots and Statute Miles 34, 491
"Known" Mine: What It Is 119
Koppel, Arthur 258
Korean Mines 13, 194, 374, 441
Krag-Jorgensen Rifle 91

L

La Belle Mine 431
*Labor Saving Device 506
Lacing Belts 580
Lake Superior Copper Dividends and Prices 585
Lakh of Rupees 580
Lamar, J. R 71
Lamp for Miners 39
Land Office Rulings 3, 35, 125, 338, 399, 580, 595
Lane, Chas. D 194, 552
Largest Coke Plant in the World 431
  Gas Engines 463
  Mine Blast in California 119
  Stamp Mill in Canada 119
  Storage Battery 183, 582
Law of Tunnel Sites 431
  Points ..151, 215, 247, 279, 311, 346, 370, 399, 430, 580
Laws, J. G 409
Leaching Low-Grade Copper Ore 247, 518, 531
Lead Concentrate Shipment from Cœur d'Alenes 371
  Explosion Around Joint 215
  Lining for Chlorination Tanks 63
  Ore Imports 181
  Plummet for Shaft Measuring 592
  Prices of 2, 62
  Poisoning 183, 254, 431, 463
  Quotations in London 63
  *Refining and Desilvering 571
  Tariff, Prices and Supply 62
  When Elastic 311
Lead's Action Upon Water 491
Leadville, Colo., Brokers' Association 337
Leakage from Safety Boilers 35
Leaks in Boilers, How Stopped 530
Leasing System 516
Legal Mining Location 580
Legislation for Miners 529
Lepidolite 3, 605
Le Conte, J 349
Le Roi Mine, Rossland, B. C 35
Leland, F. M 513
Leonard, Franklin 513
Leyner, J. G 290, 350, 527
Lien for Wages 35
Life of Wire Screens 247
  Of a Gold Mine 215
"Light of Genius" 560
Lightest Substance Known 63
Limestone and Marble, Difference Between 311
Lime, Weight of 119
Lindgren, Waldemar 162, 290, 513
Lindley, C. H 470, 539
Lining Mine Shafts With Concrete 592
Link Belt Engineering Co 565
*Link-Belt Stair Lift 578
Liquid Air 580
  Air as an Explosive 151, 279
  Chlorine 247, 463
  Hydrogen 592
List of U. S. Patents, 13, 44, 71, 99, 129, 163, 194, 226, 258, 290, 319, 350, 379, 409, 442, 470, 501, 514, 527, 540, 553, 565, 577, 589, 601, 614.
"Lis:" What It Means 399
Lithia 3
Lithographic Stone 316
Location of Mining Claims 313, 338, 371, 580, 592
Locators' Rights, 118, 183, 215, 247, 311, 313, 338, 371, 431, 580, 605.
Locomotive Horse Power 580
*Locomobile Styles 436
"Lode" and "Vein" 91
  Claim Locators 592
  Matter, Formation of 429, 430, 466
Lombard, T. M 580
Long and Short Stroke Engines 463
  Distance Electrical Transmission 504, 604
  Ore Shoots 517, 580
Los Angeles & Salt Lake Railroad 604
Loss of Gold in Placer Mining 311
  Of Pressure in Pipe 605
  Of Silver in Scorification 342
Loud Speaking Telephone 545
Lowest Temperature 517
  Cost Production of Metallic Lead 605
"Low Grade Propositions" 526
*Lowell & Arizona Mine 249
Lower California Mines 129, 408, 500, 525, 565, 603
*Lowering Brake for Hoist 606
Lubricant for Hoisting Rope 530
  Primary Function of 592
Lumber in a Twelve-Foot Stick 35
Luting for Muffles 399
Ludlow-Saylor Wire Co 565
Lunkenheimer Co 163, 532, 572
Luxon, J. R 258
Lyddite 33

M

MacDonald, Bernard 349, 526, 589
MacDonald, M. E 5
*Machine Drills on the Pacific Coast, 432, 468, 496, 505, 518.
  Drilling on the Rand, S. A 310
  Drill Stoping 94
  Economy 247
  *For Sharpening Rock Drills 467
  *For Crushing Ores 94
  *For Extracting Gold 584
  *For Excavating and Loading Ballast 434
— Tools as Developed 371
"Machine:" What It Is 311
Machinery Rust, How Removed 311
Magnetic Substance in Liquid Form 491
  Screen 35
  Separation 310
  *Separator 584, 596
Magnesia for Covering Pipes 339
  Alumina Manufacture 315
Magnesite 491, 517
Magnetism of the Earth 580
  And Electricity 399
Malleable Castings, How Made 491
Manganese Cement 63
  Production of California 399
  Steel 91
Man, Muscle and Coal 404

PAGE.
Man's Machine Efficiency 605
Manufacture of Explosives 1, 277, 369
  *Of Flat Wire Cable 375
  Of Metallic Silicum 584
Marble and Limestone, Difference Between 311
*Marigold Dredger 6, 582
Market Reports ..... Every Issue
Master Mechanics' Club, Cripple Creek, Colo 570
May's Process of Gold Extraction 159
Mauser Rifle 91
Mattice, Asa M 577
McDowell, Jos 577
McFarlane & Co 601
*McGillverey Creek Mining District, B. C 93
McVichie, D 601
Means for Applying Fluid Metals 467
Measuring the Earth 508
  Pipe Diameter 3
*Mechanism for Sizing Ores 434
  Of Hydraulic Nozzle 605
Meinecke Classification 516
Melting Point of Metals 63, 151
Men, "Busy" and Otherwise 516
Menace of Fires 214
Mercury Average, Loss of, in Gold Mill 217
Metasomatism 215
Mercury, Electrical Extraction of 580
  Evaporative Temperature of 371
  How Cleaned 35
Metals, Fatigue of 466
  And Their Uses 402
Metaphysical Discussion 3
Metallic Silicum, Manufacture of 584
  *Flexible Joint 534
  Gold Not Soluble in Single Acid 605
*Method of Making Endless Wire Ropes 122
*Metallurgical Filter 94
Metallurgy of Zinc 373
  *Furnace 38, 495
  Process 157, 310
Metric System 85, 592
  System and Equivalents 376
Methods and Results 555
  For the Extraction of Copper and Zinc 607
Method of Refining Gold and Silver Electrolytically 215
  *Of Treating Ores 403, 521
  Of Treating Telluride Ores 508
Mexican Mines, 1, 4, 13, 43, 71, 129, 162, 194, 225, 290, 318, 349, 378, 441, 500, 526, 539, 552, 565, 577, 588, 601, 613.
  Mining Law 463, 504, 530
  *Ore Packers 4
  Smelting Methods ..92, 121, 157, 185, 222, 249, 284
*Mica Mining in India and the United States 280
  Value of 491, 567, 580
Michigan College of Mines 290
  Pre-eminent in Metal Mining 338
  Mines, 12, 159, 224, 257, 348, 378, 440, 524, 538, 551, 563, 575, 587, 600, 612.
*Mill Practice in Cyaniding Siliceous Ores, S. D 284
  Run of Ore 35
  Scale, How Removed from Forgings 371
  Site, How Patented 339
  Site Locations 311, 313, 339, 595
Mine Bell Signals 315
  And Smelter Supply Co 43, 601
  Blasting 280
  *Car Latch 495
  Capitalization 193
  *Car Fastener 183
  Consolidation 430
  Decisions 247, 595
  Locomotive's Tractive Power 605
  Management Consolidation 34
  Managers' Duties 247
  *Rock Drills on the Pacific Coast, 431, 468, 496, 505, 518.
  "Salting" a Felony in Washington 592
  *Signal Device 153
  Swindle 519
  Testing, Cost of 125
  Values 119, 278, 435
  Ventilation 401
Mines Above and Below Sea Level 339
  *On Baranof Island, Alaska 220
  Of China 123
  *Of Rico, Colo 341
Miner and Prospector 604
Miners, Kinds of 90
*Miners' Candlestick 250, 521, 571
  Drilling Contests 401
  Inch 91, 119, 371
  Lamp 39
  *Lamp Support 403
  *Separating Pan 467
Mining Conditions in Rhodesia, S. A 548
  And Economic Geology 214
  And Smelting Distinct Industries 3
  *And Metallurgical Patents, 7, 38, 67, 94, 122, 155, 186, 218, 219, 250, 282, 315, 343, 375, 403, 434, 467, 495, 508, 521, 534, 547, 571, 584, 596, 606.
  And Milling: How to Write a Book Thereon, 339
  A Profitable Investment 246
  Asbestos 436
  Beach Sands 119
  Claim Surveys 63, 568
  Claims and Aliens 580
  Claims, Work on 2, 118, 119, 313, 517, 580
  Combinations 182
  Congress 2, 66
  Decisions 247, 430, 580
  Development 183
  Dividends ..... Every Issue
  *Drill 183
  *Elevator 572
  Engineers 90, 91, 567
  Experts 89, 118
  Expositions 462
  "Fakes" 183, 519
  For Gold in Gravel 279
  Frozen Ground in Siberia 397
  In the Philippines 405, 531
  Industry and Geological Survey 150
  Law, United States. 247, 279, 339, 494, 517, 568, 592
  Law of Mexico 463
  Legislation 529, 567
  Legislation in Canada 182
  *Machine 495
  Machinery in Demand 402, 490
  Machinery Trade 555
  Noblest of Industries 468
  Partnerships 279
  Progress and Profit 2
  Recorders in California 119
  *Scenes in Taviche, Mexico 541
  School Attendance 310, 567
  Stock Exchanges 591
  Stock Purchase 490, 555
  Stock Values 278, 504, 580
  Summary ..... Every Issue
  Timbers 596
  To Be Encouraged 338
Mineral Analysis 63
  Collections 580
  Land Entries 35, 371
  Lodes, Age of 605
  Production of the United States 555
Minerals, Forms of 568
Minnesota Mines 440
Missouri Mines 42, 225, 512
*Mitla, Mexico 502, 507
*Mixer and Vaporizer for Gas Engine 521
Mixing of Concrete 376
  Sulphuric Acid and Water 431
Mixture for Silvering Metals 584
  For Welding Steel 279
Modern Explosives 277
  Boiler Making 316
Modified Cyanide Process for Estimation of Copper in Ores 313
Moebius Process 215

PAGE.
Molybdenum 247, 504, 568, 605
  Quantitative Test for 187
Molten Iron Shipments 583
Montana Mines, 12, 42, 70, 98, 128, 159, 193, 225, 257, 289, 318, 348, 378, 407, 440, 470, 498, 512, 521, 538, 551, 563, 576, 587, 600, 612.
  Mine Bell Signals 316
*Moonlight Photography 188, 247
Mother Lode, California 595, 606
*Moran Flexible Joint 123
Motor Generator: What It Is 463
Mount Bischoff Tin Mine 431
Mountain Copper Co., Cal 370, 580
*Mouthpiece for Dredger Suction Pipe 343
Movement of Ground Water 468
Mooney, S. V 409
Molson, C. A 441
Moore, R. S 129
Mt. Morgan Gold Mine 529
Multiple Expansion Engines 3
Municipal Ownership of Electric Light 119
Muntz Metal 491
Muscovite 568

N

Narrow Guage Railway 151
National Tube Works 43
Native Copper in Arizona 35
Nevada Mines ..... 12, 42, 70, 98, 128, 161, 193, 225, 257, 289, 318, 348, 378, 407, 440, 470, 499, 512, 525, 528, 551, 563, 576, 587, 600, 612.
*New Concentrating System 156, 505
  *Electric Furnace 438
  Metallurgical Process 157, 583
  Process of Gold Extraction 158
New Mexico Mines ..12, 42, 98, 128, 159, 193, 225, 257, 289, 318, 348, 378, 407, 440, 470, 499, 512, 538, 551, 564, 576, 587, 600, 612.
New Mexico's Mining Statutes 504
New Process Raw Hide Co 409
New York Gold and Silver Imports and Exports 339
New Zealand Mines 99, 614
New Zealand Stamps 279
Newell, F. W 513
*Niagara Falls Carborundum Manufacture. 213, 218
Niagara Falls Power Co 546
Nicaraguan Mines 601
Nickel Enterprise in Ontario 402, 463
Nickel-Matte, Composition of 463
Nickel-Steel 63
Nitrate of Soda in South America 91
Nitro-Glycerine Combustion, Product of 592
*Nogales, Arizona 461, 465
Nome and Northern Alaska 507
Northport, Wash., Refinery 530
Notable Electric Transmission 604
Note on Hand Concentration Test 93
Notes on the Occurrence of Platinum in N. A 158
Notices of Recent Patents ..... 13, 44, 71, 99, 129, 163, 194, 226, 258, 290, 319, 350, 379, 409, 442, 501, 514, 526, 540, 553, 565, 577, 589, 601, 614.

O

*Oaxaca, Mexico, Mines 541
Occurrence of Platinum in North America 158
Ocean Cablegrams, How Received 491
Oil, Classification of 532
  And Gas Yielding Formations of California 546, 561, 573, 585
  Concentration Process 278
  *Desulphurization of 434
  *Experiment in Burning 545
  Fields of Fresno Co., Cal 545
  *Fields of Kern River, Cal 489, 492, 520, 531
  For Furnace Fuel 91, 117, 312, 340
  Fuel for Locomotives 118, 579
  Land Decision 370
  Pipe Line of Glass 151
  Price of 311
  Pumping in Colorado 494
  Refining 183, 579
  Tanks in Canada 342
  Testing 149, 312
  Value in Heat Units 517
  Wealth of California 2, 96, 222
  *Well Jack 495
  *Well Pump 155, 584
  Wells of California 313, 579
Old Bell 92
Oldest Copper Producer 530
  *Gold Mining Camp 240
Opal 605
*Ophir Hill Vein, Empire Mine, Cal 149
Options 315
*Ore Bins, Empire Mine, Cal 181
  *Classifying Apparatus 343
  *Concentrating Agitator 281
  *Concentration Anhydrously 186
  Concentration by Petroleum 40
  *Concentrator 122, 534
  Containing Black Oxide of Manganese 504
  *Crusher 186
  Deposits, Origin of 90
  *Feeder 253
  "High" and "Low" Grade 463
  Impregnated With Arsenious or Sulphuric Acid 517
  *Mixer and Sampler 186
  *Mixing Machine 606
  *Packing in Mexico 4
  Rates in Colorado 591
  *Refractory, Treatment of 521
  Reworked by Cyanide Process 517
  *Roasting Furnace 7, 67
  *Separating Machine 155
  *Separating Process 282
  *Separator 434, 435, 508, 596
  Shoots in California 517
  *Sorters at Sirena Mine 1
  *Stamp 122, 534
  Stealing 370, 404
  *"Train," Empire, Cal., Mill 117
  *Washer and Separator 495
  *Yards at Sirena Mine 1
Oregon Mines. 12, 42, 70, 98, 128, 160, 193, 225, 257, 289, 318, 348, 378, 407, 440, 470, 499, 512, 525, 538, 551, 564, 576. 587, 600, 613.
  Mining Law 580
  Mining Stock Exchange 530
  R. & N. Co 350
Ores of Uranium 221
Origin and Source of Mine Values 435
  Of Ore Deposits 90
Orr, Wm 290
*Orthodox and Wild Cat Oil Propositions 594, 608
Osborne, H. Z 441
Osmiridium 247
Osmium 339
Overheating Steel Tool 517
Oxnam, T. H 441, 577
Oxygen, How Produced 91, 605
Ozokerite 8
Ozone, How Produced 371

P

*Pacific Coast Fuel Values 569
Pacific Tank Co 226
*Packing Mining Machinery for Foreign Shipment 554, 561
Palladium 463

PAGE.
*Pan-American Exposition 64, 283
*Pan for Miner 467
*Panoramic Views of Kern River, Cal., Oil Field 489
Paper, How Made Fireproof 580
Paramagnetic Influence 183
Para Rubber 152
Paris Exposition 9, 398, 490, 592
Parker, R. A 526, 589
Parks, J. F 349
Parting Silver Buttons 504
Patent Law 491, 504, 605
Patented Mining Claims 35, 605
Patents, Mining and Metallurgical ..... 7, 38, 67, 94, 122, 155, 186, 218, 219, 258, 282, 315, 343, 375, 403, 434, 467, 495, 508, 521, 534, 547, 572, 584, 596.
Patents, Notices of ..... 13, 44, 71, 99, 129, 163, 194, 226, 258, 290, 319, 350, 379, 409, 412, 501, 514, 526, 540, 553, 565, 577, 589, 601, 614.
  Piracy 504
Patterns, Proportion of Weight to Castings 215
Pennington, G. W. & Sons 99, 163, 187, 522
Percentage Gold and Quicksilver in Amalgam. 339
Percussion Table 399
Permanence in Depth 182
Permanganate of Potash 91
  Process of Gold Recovery 605
Peters, Carl 129
Petroleum, Barrel of 119
  Characteristics of 437
  Concentration of Ores 40, 278
  Filtration 342
  For Road Sprinkling 491
  Heating Capacity of 3, 35, 340
  In California 96, 313, 340, 374, 466, 489, 492, 520
  *Motor 534
  *Oil Desulphurized 434
  Production of Russia 400
  Refining 605
  Refuse for Fuel 371
  Spirit, Specific Gravity of 491
  Theories as to Its Origin 119
Peyton, G. S 565, 589
Philippine Mining Resources 405, 531
Phosphorus Produced Electrically 311
*Photographed by Moonlight 188, 247
Photographing Distant Objects 63
*Pick 251
  Dressing 247
Pinney, G. M 513
*Pipe Cutting Device 122
  Corrosion 371
  Diameter, How Measured 3
  Discharge of 183
  Discharged 63
  *Making Apparatus 467
  Pressure, How Calculated 580
  *Riveting Machine 508
  *Wrench 345, 346, 434, 596
Piping California Oil 246
Piston Clearance, What It Is 580
  Pump Capacity 3
  Speed in Engines 517
Pittsburgh Reduction Co 3
Placer Locations 580
  *Mining Dredge 67
Plate Dressing at Cariboo Mill 592
Platinizing Copper or Brass 35
Platinum in North America 158
  In Gold Scrap 592
  In Russia 403
  In the Yukon 35
  Ore 371, 582
Platting and Office Work Costs 555
Pneumatic Cyanide Process 592
Pocket, How to Find 155
Poets Among Miners 568
Poisons, How Affect Human Body 463
  Nature and Effect 495
*Portable Melting Apparatus 38
Postlethwaite, R. H 614
*Powell Filter 68
Power, H. T 194
Power for Compressed Air Rock Drill 63
  Behind Nature 535
  For Stamp Mills 247, 605
  Generation 402
  Necessary to Raise Water 3
  Of Steam Boiler 119
  Pump Advantages 530
  Required for Circular Saw 431
  Required for Stamp Mill 431
  Transmission by Belt 279, 311
Pull of Double Belt 119
*Pulverizing Machine 7, 547
*Pumping Engine 186
  Hot Liquids 3, 605
  *Mechanism for Conveyors 403
  Oil in Colorado 494
  *Triplex Electric 89, 92
  Water by Compressed Air 63
Pumps, Single and Double Acting 530
  *For Oil Wells 155
Precious Metal Extraction 534
Precipitation in Cyaniding 124
  Of Gold 119
*Preparation of Roofing Slate 344
Pressure of Flowing Water 3, 311
  Loss in Pipe 605
*Process of Extracting Metals From Ores or Slimes 38
  *Of Extracting Sulphur From Ores 7
  Of Gold Extraction 158
  Of Leaching Ores or Tailings 251
  Of Making Borax 155
  *Of Making Tubing 7
  Of Obtaining Zinc From Ore 155, 606
  *Of Producing Solutions of Zinc Chloride 596
  Of Separating Precious Metals From Ores 343
  *Of Treating Gold and Silver Ores 251
Preventing Formation of Verdigris 399
Prevention of Patent Piracy 504
  In Pipes, How Calculated 580
  Of Wind 151
Price of Back Numbers 315
  Of Hardening Iron or Steel 571
Products From California Crude Oil 579
Profit in Mining Investment 246
Progress at the Anaconda Mine 436
Proof Gold, How Prepared 215
Prospecting East of the Missouri River 339
Prospector, The 246, 529
Prospectors, Advice to 597
*Protecting Shaft Timbers When Blasting 532
Providence vs. Champion Case 463
Psychical Discussion 3
Public Land Laws 35
Pump, Height at Which It Will Suck 517
"Pure Water a Poison" 374
Purifying Air in Mines 491
Purple of Cassius 151, 247
Pyritic Smelting 3, 533, 548, 561, 570
Pyrometer, Principle of 517

Q

Quantitative Test for Molybdenum 187
Quantity of Water Elevated 3
*Quartz Mill 219
  Veins of Recent Origin 399
Quartzite 3, 39, 124
Quick Railroad Work 597
Quicksilver, Duty on 279, 491
  Electrolytic Extraction of 504
  How Cleaned 35
  In British Territory 431
  In California 504, 506
  *In Terlingua, Texas 64
  Mines of Almaden, Spain 91
Quinan, W. R 513
Quintera Lode, Sonora, Mexico 183

(Continued on Next Page)

INDEX TO VOLUME LXXXI.

(Continued from Preceding P)

R

PAGE.

Radford, W. H....13, 552
Raht, A....13
Railroad Restriction....2
  Rates in Colorado....591
  Tunnel in California....431
Railway's Highest Point....91
Rainfall at San Francisco, Cal....183
Ralston, W. C....290, 3-9, 539
*Ralston Divide, Placer Co., Cal....609
*Rand, Jasper R....125
  District, South Africa....34
  Drill Co....470, 527, 589
  Mines During the War....252
Rank of States in Population and Railway Mileage....595
Rate of Combustion in Furnace....119
Ratio and Value of Silver....3
*Raw Hide Gears and Pinions....502, 507
Rawhide Rope....63
Ray, N. C....99
*Rear Compression Gas Engine....375
Reardon, D. M....589
*Reciprocating Conveyor....506
Record of Mining Locations....592
Recovery of Silver in U. S. Mint....580
Reduced Cost of Steam Power....463
Reduction of Zinc....399
Referendum Dollars....546
Refinery at Northport, Wash....530
*Refining and Desilvering Lead....571
  At U. S. Mint....605
  California Petroleum....466, 609
  Copper Electrolytically....504
  Mineral Oils....183, 466
*Refractory Ore, Treatment of....521
*Regulator for Hydraulic Motor....219
Relative Heat Efficiency....124
*Relative Values of Fuels Used on the Pacific Coast....569
Removing Stumps With Dynamite....405
Replacement of Bridge....597
*Republic, Wash., Sampling and Reduction Works....369, 372
Rerolled Rails....491
Reservoir Evaporation....247
Resumption of Transvaal Gold Mining....462
Retort for Treating Ores....7
  *Furnace....94
*Review of West Australia Mining Law....580
Revision of American Mining Law....431
Revision of Mining Laws....503
"Revolutionizing" Smelting....56
Reworking Ore....517
Rhodesia, South Africa, Mines....398
Rickard, T. A....36, 500, 526, 552, 614
*Rico, Colo., Mines....341
Riffle Washers....504
*Right and Left-Hand Cam Shafts and Fasteners....283
Rights of Employes in Their Inventions....509
Rio Tinto Copper Mine....517
Risdon Iron Works....129, 163, 258, 346, 470, 513
Rise in Price of Diamonds Used in Drills....507
Risks in Mining Investments....430
Rives, Geo. T....513
Road Sprinkling With Petroleum....491
Roads in Mining Districts....462
*Roasting Furnace....7
Roberts, Geo. E....43
Robertson, W....58
*Robins Belt Conveyor....93
Rock Classification....504
  *Drill....4 5, 5, 547
  *Drill Cylinder Head....547
  *Drill Sharpener....467, 547
  *Drilling Engine....547
  *Drills on the Pacific Coast.431, 468, 496, 505, 518
Rocks, Density of....530
Roebling's Sons Co., Jno. A....409, 519
*Roofing Slate, Preparation of....344
Rope, How Different Kinds Are Made....371
*Ropeway Conveyor....495
Ross, G. McM....349
Rossler-Edelmann Process....215
Rot of Telegraph Poles, How Prevented....463
Rotary Booster....215
  Converters....3
  *Engine....190
Roturite....1
Rubber Stamp Reproduced on Blue Print....63
Rubble Wall, How Built....339
*Ruins of Mitla, Mexico....502, 507
Rulings of Land Office....3, 151, 310, 311
Russian Mines....349, 552
  Mining Conditions....555
  Mining Laws....517
  Mining Requirements....491
  Platinum....403
Russia's Petroleum Production....400
Rust Joint....339
  How Removed From Machinery....311
  Of Steel Plates....63
Rusted Steel Tools, How Cleaned....517

S

Safeguard Against Fire....370
Safety Chairs for Mine Cages....494
  *Device for Mines....250
  Valve for Boiler....63, 517, 530
Salt Production in California....530
*Sampling and Reduction Works, Republic, Wash....369, 372
San Francisco Coal Statistics....399
San Francisco Gold and Silver Imports and Exports....339
San Francisco's Rainfall....183
*San Francisco's Water Supply....216, 217
*San Francisco Workshop....286
*Sand Pump....66
Saturated Steam....91, 215
Saving Copper....153
Saw That Rips and Planes....530
Scallon, W....577
*Scenes at Cape Nome, Alaska....245
Science vs. Technology....596
Scott, H. T....614
Screen for Magnetism....35
  *For Stamp Mills....219
"Scrip" Decision....370
Seawater, Weight and Boiling Point....530
Selby Smelting & Lead Works....91, 583
Seldon, H. P....5
Selection of a Working Process....465
Selenium....35
  When Insoluble....530
*Self-acting Feed Apparatus for Boilers....155
Self-hardening Steel....517
Sensational "Science"....34
*Separating Pan for Miners....467
*Separator and Amalgamator....571
Sericite....568

PAGE.

Setting Telegraph Poles....530
  A Diamond Drill....35
Sharpening Drills....339
Shingling Nails....568
Shipping Molten Iron....583
  Ton....63
Siberian Gold Fields....254, 565
Siemens-Martin Steel....491
*Sierras to the Sea....345
*Signal Device for Mines....153
Sighting in Mine Surveying....605
Silica, Influence of, on Loss of Silver in Scorification....342
  Bricks....580
Silicon in Pig Iron....183
  Copper....311
Silly Mine Investments....504
Silver Bullion Purchases....279
  Alloy....311
  And Cyanide Treatment....5 4
  At a Premium....119
  Coinage....215
  Determination in Gold Bullion....431
  Imports and Exports....339
  Lead Ores, Cost of Treating....463
  Lead Ores, Treatment of....591
  Lead Parting....215
  Loss in Scorification....342
  Losses in Cupellation....371
  Mines, Profit in Operating....431
  Money, Weight of....311
  Plating Amalgam Plates....183, 530
  Price of....2, 3, 34, 398, 431, 442
  Production by Amalgamation....371
  Property Profitable....491
  Ratio and Value....3, 215
  Recovery in U. S. Mint....580
  Refined Electrolytically....215
  Smelting in Mexico..92, 121, 157, 185, 222, 249, 284
  Yield of Butte, Mont., Copper Mines....530
  Zinc Alloy....215
Silvering Copper Plates....594
Simmons, T. H....71
Simplon Tunnel....555
*Sinking Pump....89, 92
Sixteen to One....215
Sizing Battery Pulp....371
*Skips in Shaft Empire Mine, Cal....184
*Slate, Preparation of, for Roofing....344
*Slime Jigging Machine....521
  *Table....66
Slimes, Treatment of....517, 605
  What They Are....504
Sludge in Final Precipitation....399
Sluice Box for 2500 Inches....311
Sluices, Length of....605
Small Gas Engine....285
Smelter Methods in Colorado....9
  Vs. Assay Returns....371
  Charges on Copper Ore....463
Smelters Not in Trust....503
Smelting with Blast Furnace....372
  By Electricity....371
  Silver in Mexico....92, 120, 157, 185, 222, 249, 284
  Silver-Lead Ores, Cost of....463
  Zinc Ores....516
*Smidth Ball Mill....535
Smith, Hamilton....13
*Smoke Consuming Device for Furnaces....186, 315
  From Charcoal Pits....504
  What It Is....517
Snake River, Idaho, Gold Sands....404, 610
Snoqualmie Falls Power Co....547, 605
Snyder, F. T....37
Sodium Amalgam, How Made....399, 504, 530
Soft-Drawn Copper Wire....35
Soldering Fluid That Will Not Rust....63
Solidified Petroleum Refuse for Fuel....371
*Solution of Zinc Chloride....596
Solvent for Carbon....517
Some Questions Answered....583, 595
Source and Origin of Mine Values....435
South African Gold, Average Value....319
  Mines....91, 99, 160, 371, 408, 500, 526, 539, 614
  Stamps....279
South American Mines....225, 408
South Dakota Corporation Law....119, 160
  Mines, 12, 42, 98, 128, 183, 193, 349, 440, 471, 499, 512, 525, 538, 551, 564, 576, 587, 600.
Southern Pacific Co....247
Southwest Miners' Association....129, 503
Spanish Mines....91, 99
Spark Coil for Gasoline Engine....3
Specific Gravity of Kerosene....605
Speed of Piston in Engine....517
  Regulator for Engine....35, 534
  When Dangerous....504
*Spiral Sand Pump....66
*Splicing Wire Rope....376, 468
Spodumene....504
Spontaneous Combustion of Coal....151
  Combustion....517
Squared Timbers for Mine Timbering....568
*Stair Lift....578
Stamp Battery Development....91
  Drop, Time of....311
  Duty on the Rand, S A....491
  *Mill B. & D. M. Co., Black Hawk, Colo...34, 42
  *Mill of Octave G. M. Co., Arizona....188
  Mill in California....187
  Mill Practice in South Africa....279
  Mill, Power Requisite for....605
  *Mill Screen....219
  *Milling of Free Gold Ores, 555, 556, 557, 558, 559, 560.
  Stems, Fatigue and Breakage....239
Stamps, Weight of....151, 215, 247
Standard Oil Co....279
State Mining Legislation....529
Static Booster....215
Stealing Ore....370
Steam, Absolute Heat of....3
  And Gas Engines....546
  Boiler Power....119
  Engine and Weather....530
  Engine Designs....399
  *Engine for Ore Stamps....122
  Engine, H. P. of....35
  *Motor....467
  Pipe, Size of....183
  Power, Reduced Cost of....463
  Pumps, Direct Acting....491
  *Pumping Engine....606
  Temperature, Determination of....279, 311
  *Turbine....495
  Separable Into Oxygen....491
  *Shovel....67
Steel Syndicate....63
  For Steamship Boilers....399
  *Head Gear at Cripple Creek, Colo....573
  How Distinguished from Iron....183
  How Made....491
  How Softened....3 9
  Screens....311
  Some Facts About....376
  Tensile Strength of....63
  Weight of Cubic Inch....215, 530
  Welding....279
  What It Is....568
Stevens Process....35
*Stilwell-Bierce & Smith-Vaile Co....438
Stone for Building....339
*Stope in Sirena Mine....4
Stoping with Machine Drills....94
  *Empire Mine, Cal....149
Storage Battery, Large....183, 582
Strontium Sulphide....63
Structural Steel Consolidation....92
Stump Removal by Dynamite....405
*Sturtevant Roll Jaw Crusher....39
*Sturtevant, B. F., Co....466
Subaqueous Rock Breaker....343
  *Dredger....534

PAGE.

*Submarine Dredger....434
  Electro-Contact Mine....63
  *Pipe Laying, San Francisco Bay....218
Substitute for German Silver....63
*Subterranean Water Developed at Sunol, Cal..216
*Suggestions on Inland Gold Dredging....597
Sulphate of Copper....279
  Of Iron....279
  Of Lime in Feed Water....119
  Of Zinc for Lead Poisoning....463
Superheated Steam....215
Supernatant....504
Storms, W. H....290, 408, 442
Stratton, W. S....71
Strong, Geo. H....589
Strout, W. H. & Son....577
Studying Mining Engineering....567
Success Dependent on Success....583
Sullivan Machinery Co....409, 589
Sulphide Treatment at Broken Hill, N. S W...583
  Of Mercury....339
Sulphocyanate of Potassium....605
Sulphides, When Soluble in Water....463
Sulphuric Acid for Lead Poisoning....463
  Acid Deposition on Boiler Tubes....517
  Acid Manufacture....530
  Acid Mixed with Water....431
Sulphur Exports....605
Sulphurous Acid, How Prepared....279, 568
*Summer Outing Scenes....6
Sunday, When It Begins....530
*Support for Miners' Lamp....403
Supreme Court Decisions....530
Sutro Tunnel....339, 568
Swinburne Process of Treating Zinc....491
Swindling Mine Promoters....91
Syenite....247
Sympathetic Pendulums....402
Syphon, Limit of....247

T

*Table for Slimes....66
Talc....119
Tale of Two Engines....340
Tallow for Belt Dressing....399
Tank Capacity....279
Tanks, Steel and Wooden....151
Tannic Acid Not Good for Boilers....3
Tariff on Mining Machinery in New Zealand....491
Tasmanian Mines....565, 614
Tatum & Bowen....589
*Taviche District, Mexico....541
Tax on Gold Dredging Machine....899
Taxing Mines....279
Technical Education, Value of....541
Telegraph Poles, Rotting of Prevented....463, 530
Telegraphic Circuit of 6000 Miles....119
Telegraphy, Duplex System....466
Telephone and Telegraph Consolidation....373
  In Business....34, 579
  Service in Mines....247
Telephonic Communication....398, 548
Telescope With Photograph Camera....63
*Telescopic Drill Shaft....251
Telluride Ore Treatment....508
Tellurides, Where Found....399
Tellurium's Atomic Weight....151
*Telpherage....61
Temperature of Bunsen Flame....151
  For Battery Water....311
  Of Boiling Water....63
  Of Gold Amalgam....371
  On Sierra Peaks....63
  Of Steam....91, 279, 311
"Tempering" Brass....504
  Drills....534, 592
  Tool Steel....517
Ten Per Cent Grade: What It Means....63
Tensile Strength of Copper....151
Tensile Strength of Steel....63
  Strength: What It Means....580
*Terlingua Quicksilver District....64
Tesla's Work....370
Test for Foul Air....35
  For Gold....151
  For Molybdenum....187
Testing a Mine, Cost of....125
  A Dynamo....215
  Oils....149
  Boilers....605
Tests for Feed Water....3
  Of Concrete....493
Texas Mines....257, 318, 378, 576
Theory and Practice....279, 430
*Throttle Valve....569
*Timbering at the Utica Mine, Angels, Cal....124
Tin Chemically Pure....91
  In Tasmania....431
  In Tinplate....182
Tittman, O. H....589
Toning Powder, Reclaiming Gold From....580
Tonite....1
*Tool for Perforating Pipes....343
  Sharpening....247
  Steel, How Tempered....517
Tower for Cooling Water....221
Tractive Power of Mine Locomotive....605
*Traction Engine....38
Trade Following the Flag....182
*Train Lighting From Car Axle....591
Trajectory of Bullets....91
*Tramway on Sirena Mountain....4
Transmission of Air....605
  Of Electrical Energy....35, 215
  *Of Power....508
  Of Power by Belting....279, 311
Trans-Siberian Railway....63
Transition to Electric Power....404
Treating Telluride Ores....508
Treatment of Cupriferous Ores....504
  *Of Refractory Ore....521
  Of Silver-Lead Ores....591
  Of Slimes....517, 605
Trees Felled by Electricity....220
Trend of Mining Engineers' Training....247
  Of Ore Bodies....339
*Triplex Electric Sinking Pump....89, 92
Tropenas Steel Process....253
Truscott, Jno....500
*Tubing, Process of Making....7
Tungsten Alloys....279
Tungstic Acid....592
Tunnel Site Law....431, 605
Tunnels Not Financially Successful....463
Turbine Government....581
Turner, H. W....43
Turquoise Mines....63
Twentieth Century's Dawn....594
Types of Vanners....504

U

Underground Oil Tanks in Canada....342
Unearned Award....490
Unignited Gas in Gas Engine....605
Uninflammable Garments....339
*Union Gas Engine....89, 96
Union Iron Works....43, 91, 163
Unique Gold Mine....529
United Verde Property, Arizona....399
Unzicker, Menno....513
Uranium and Its Ores....221, 517
Use of Auger Bits....580
  Made of Some Metals....402
  Of Compressed Air....404
  Of Hot Blast in Smelting....572

PAGE.

U. S. Geological Survey....90, 150, 151, 279, 398
U. S. Gold Coin, Fineness of....371
U. S. Mining Law Revision....431, 579
U. S. Mining Statutes....9, 63, 91, 399, 530, 568
U. S. Mint Refining Methods....605
U. S. Mint Recovery of Silver....580
U. S. Official Rulings....62, 63, 125, 399, 430, 530
U. S. Patent Law....463
U. S. Supreme Court Decisions....3, 310, 371, 376
Usual Clumsy Attempt at Swindle....519
Utah Mines...12, 42, 70, 98, 128, 160, 193, 225, 257, 289, 318, 349, 378, 407, 440, 470, 499, 512, 525, 538, 551, 564, 576, 588, 600, 613.
*Utica Mine, Cal., Timbering....124, 522

V

Value and Ratio of Silver....3
  Of Detail....182
  Of South African Gold....399
  Of this Paper....604
  Of Technical Education....541
Values in Heat Units of Wood, Oil and Coal....517
  Of California Petroleum....579
  Of Mines and Mining Stocks....278
  *Of Pacific Coast Fuels....569
  Their Source and Origin....435
*Valve Gear for Explosive Engines....508
Vanadium, Uses of....573
Van der Naillen, A....9
Vanner Types....504
*Vaporizer for Gasoline Engines....187, 343
*Vaporizing Attachment for Smelting Furnaces....89, 96
Vat Absorption of Gold....91
Vaughn Process....505
"V" Flume, Inventor of....494
  Of Faling Bodies....605
*Vein, Empire Mine, Cal....149
Velocity, How Measured....399
  Of Water....119, 605
Ventilation of Mines....401
Verdigris, How Removed From Copper Plates....183, 311, 399
Veteran Prospector's Advice....597
*Vibratory Screens....123
*Volcano at Cripple Creek, Colo....36, 68, 93
Voltage, Highest Electric....149
Volumetric Determination of Silver in Gold Bullion....431
  Method for the Determination of Copper....344
Von Rosenberg, Leo....513
Voorhies, E. C....319, 543
*Vulcan Copper M. & S. Co., Siegelton, Nev....397, 401
Vulcan Iron Works, Seattle, Wash....601
*Vulcan Iron Works, Toledo, O....528
Van Wagenen, Theo. F....99, 129, 226, 280

W

Walsh, T. F....565, 577
Ward, Alan....442
Ward, A. H....552
*Washer and Concentrator for Ores....435
Washington Mines....13, 43, 70, 98, 128, 160, 193, 225, 257, 289, 349, 378, 408, 441, 470, 499, 512, 525, 539, 552, 564, 576, 588, 600, 613.
Waste Steam....35
Water Affected by Lead....491
  Column Head and Pressure....91, 119
  Cooling Tower....221
  *Jacket Furnace....337
  Pressure of....3, 91, 119
  Price of for Irrigation in California....431
  Pumped by Compressed Air....63
  Requisite Power to Raise....3, 119
  *Stop or Gate....584
  Storage in California....214
  *Supply of San Francisco, Cal....216, 217
  *Tube Boiler....250
  Under Pressure, Rise of....399
  *Wheel....38
  *Wheel Governor....7, 151
Water's Absorption of Air....183
Watt, How Calculated....563
Watts, W. L....319, 539
Wave Motors....339
Wear and Tear of Shoes and Dies....279
Weber Gas Engine Co....539, 554, 560
Weigele Pipe Works....565
Weight of Cubic Inch of Various Metals....491
  Of Patterns and Castings....215
  Of Stamps....151, 215
  Of the Elements....585
  Of Wood....91
Welding Copper....605
  Steel....279
West Australian Mining Law....579
Western Machinery & Supply Co....48
Westinghouse Companies....290, 318, 526, 565, 601
Wetherill Magnetic Separator....119
  Process....310, 570
Wet Steam....65
Where Twentieth Century Begins....594
  Magnetic Needle Points North....605
Whin....3, 39, 124
White Gold....463
  Lead Prepared by Electricity....35
Whitehead, Cabell....315, 577
Wilfley Concentrators....43
Williams, G. F....290
Williamson, Jos. H....552
Wiltsee, E. A....408
Wind Pressure....151
Winslow, Arthur....258
Wireless Telegraphy....504
*Wire Rope and Bucket Clip....508
  Rope, How Made....371
  *Rope, How Spliced....376, 468
  Ropes, How to Use....311, 339
  Screens, Life of....247
Wisconsin's Speed Record....491
*Witte Gas and Gasoline Hoist....567
Witwatersrand Banket, What It Is....517
Wood Distillations....517
  Value in Heat Units....517
  Weight of....91, 530
Working an Asbestos Mine....436
  *Cement Gravels....489, 494
  Process, Selection of....465
World's Gold Production....118
Wright, L. T....290
Wynkoop, W. C....526
Wyoming Mines....13, 193, 257, 289, 349, 408, 441, 470, 500, 512, 539, 552, 564, 577, 588, 601, 613.

Y

Yale, Chas. G....539
Yosemite Valley, Cal., Origin of....567
Young, J. W....349
Yuba River, Cal., Restraining Barriers....91
Yukon Region....43, 71, 99, 129, 162, 225

Z

Zeitler, Fred....349
Zinc, Electrolytic Extraction of....91
  Ores....183
  Oxide, Production of....568
  Prices and Supply....119
  Recovery From Complex Ores....251, 399, 530
  Swinburne Process of Treating....491